La Revue de Santé de la Méditerranée Orientale

EST une revue de santé officielle publiée par le Bureau régional de l'Organisation mondiale de la Santé pour la Méditerranée orientale. Elle offre une tribune pour la présentation et la promotion de nouvelles politiques et initiatives dans le domaine des services de santé ainsi qu'à l'échange d'idées, de concepts, de données épidémiologiques, de résultats de recherches et d'autres informations, se rapportant plus particulièrement à la Région de la Méditerranée orientale. Elle s'adresse à tous les professionnels de la santé, aux membres des instituts médicaux et autres instituts de formation médico-sanitaire, aux ONG, Centres collaborateurs de l'OMS et personnes concernés au sein et hors de la Région.

The Eastern Mediterranean Health Journal is abstracted/indexed in the Index Medicus and MEDLINE (Medical Literature Analysis and Retrieval Systems on Line) and the ExtraMed-Full text on CD-ROM, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), CAB International, Lexis Nexis™ and the Index Medicus for the WHO Eastern Mediterranean Region (IMEMR).
EMHJ is also available on the World Wide Web: http://www.emro.who.int/emhj.htm

ALL ARTICLES ARE PEER REVIEWED

ISSN 1020-3397

© WORLD HEALTH ORGANIZATION, 2006

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. All rights reserved.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitations of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned.

The authors alone are responsible for the views expressed, which do not necessarily reflect the opinion of the World Health Organization or of its Member States.

COVER: Remote sensing image of the area of the world that includes the Eastern Mediterranean Region. Cover image produced by the Canada Centre for Remote Sensing, Ottawa, Canada. (NOAA AVHRR Composite) Reproduced with permission

Cover designed by Ahmed Hassanein
Printed on acid-free paper
Printed by League of Arab States Printshop
Contents

Letter from the Editor ............................................................................................................. 858

Research articles

Wife abuse in Esfahan, Islamic Republic of Iran, 2002
S.M. Mousavi and A. Eshagheh................................................................. 860

Prevalence and determinants of intimate partner violence in Babol city, Islamic Republic of Iran
M. Faramarzi, S. Esmailizadeh and S. Mosavi ............................................. 870

Domestic violence: a cross-sectional study in an Iranian city
A. Ghazizadeh ......................................................................................... 880

Reproductive health knowledge, attitudes and practices of Iranian college students
M. Simbar, F.R. Tehrani and Z. Hashemi .................................................. 888

Quality of life of patients with schizophrenia 2
T.K. Daradkeh and T. Al Habeeb .............................................................. 898

Patient satisfaction and related factors in Kerman hospitals
A. Bahrampour and F. Zolala ................................................................ 905

Patient satisfaction with dental services at Ajman University, United Arab Emirates
R. Hashim ......................................................................................... 913

Compliance with good practice in prescription writing at outpatient clinics in Saudi Arabia
Y.M. Irshaid, M. Al Homran, A.A. Hamdi, K.K. Adeon-Yousoh and A.A. Mahfouz ......................................................... 922

Adherence to universal precautions among laboratory personnel in Lebanon
J.G. Kahlaleh and A.R. Jurus ................................................................. 929

Planning dental manpower in Lebanon: scenarios for the year 2015
B. Doughan, K. Kassak and D. Bourgeois ............................................... 943

Smoking prevalence, knowledge and attitudes among medical students in Karachi, Pakistan
F.M. Khan, S.J. Husein, A. Laseq, A. Awais, S.F. Hussain and J.A. Khan ................. 952

Prevalence and type of anaemia in young Egyptian patients with type 1 diabetes mellitus
N. Salah, F. Abd El Hamid, S. Abdelghaffar and M. El Sayem .......................... 959

Blood pressure distribution among healthy schoolchildren aged 6–13 years in Tehran
M.R. Ashrafi, M. Abdollahi, B.M. Abranjan and R. Shabanian ..................... 968

Evaluation of a programme for control of Schistosoma haematobium infection in Yemen
M.A.M. Nagi ................................................................. 977
Prevalence of pediculosis capitis and determination of risk factors in primary-school children in Kerman
  F. Kamiabi and F. Hosain Nakhaei .......................................................... 988

Serum interleukins and urinary microglobulin in children with idiopathic nephrotic syndrome

Acetylator phenotype in Iraqi patients with systemic lupus erythematosus
  R.A. Najim, Y.Y.Z. Farid, T. Abed Samad and S.A.R. Shihab ................................................................. 1003

Role of mast cells and T-lymphocytes in pemphigus vulgaris: significance of CD44 and the c-kit gene product (CD117)
  N.R. Ghaly, O.A. Roshdy, S.A. Nassar, S.M. Hamad and A.M. El-Shafei .......................................................... 1009

إصابات العمل في قطاعات البناء وتشكل المعايد والصناعات الغذائية في محافظة أرحايا/فلسطين
  عصام أحمد الختاب، رم مقدادي، رامي حيش، غادة عليان، فداء خفيف، سالما حرابسة .................................................. 1018

Specificity and sensitivity of clinical diagnosis for chronic pneumonia
  M. Avijgan .................................................................................. 1029

Changing trends in drug resistance among typhoid salmonellae in Rawalpindi, Pakistan
  T. Butt, R.N. Ahmad, M. Salman and S.Y. Kazmi .......................................................... 1038

Prevalence of asymptomatic bacteriuria in pregnant women in Sharjah, United Arab Emirates
  A.A. Abdullah and M.I. Al-Moslih .......................................................... 1045

Prévalence du virus de l’hépatite G chez les donneurs de sang en Tunisie
  M. Moustouri, L. Safer, B. Pozzetto, T. Bourlet et M. Khedher .......................................................... 1053

Reviews

Medical ethics in the Islamic Republic of Iran
  B. Larijani, F. Zahedi and H. Malek-Afsahi .......................................................... 1061

Comparison of health care financing in Egypt and Cuba: lessons for health reform in Egypt
  C.A. Gericke ........................................................................... 1073

Management of source and drinking-water quality in Pakistan
  J.A. Aziz .............................................................................. 1087

Burn and scald injuries
  H.A-L. Mousa ........................................................................ 1099

Short communications

Anti-smoking campaign in Multan, Pakistan
  M. Mohsin .......................................................... 1110

Bacterial distribution analysis of the atmosphere of two hospitals in Ibb, Yemen
  M.F. Al-Shahwah .......................................................... 1115

Effect of Ramadan fasting on secretion of sex hormones in healthy single males
  B. Mesbahzadeh, Z. Ghiravani and H. Mehrjoofard .................................................. 1120

Human development index adjusted for environmental indicators: case study in one Egyptian village
  M.M. Gamal El-Din ...................................................................... 1124

Eastern Mediterranean health journal reviewers’ panel, 2005 .................................................. 1128

Guidelines for authors .......................................................... 1134

WHO sales and discount policy .................................................. 1140

Evaluation form ........................................................................ 1141
Eastern Mediterranean Health Journal

M. Haytham Khayat MD, FRSH, Editor-in-chief
Ahmed Ezzat Abdou BSc, DPH, PhD, Executive Editor

Editorial Board
Ibrahim M. Abdel Rahim MBBS, MPH&TM, MRCP
Houssain Abouzaid MS (Chem Eng), MS (Sanit Eng), DrS
Zuhair Hallaj MD, DPH, DrPH
Mohamed Hussein M. Khalil MD, MPH, PhD (Biostat)
Bolgacem Sabri MD, MPA, MA (Econ)
Abdel Aziz Saleh Dip (Hosp Pharm), Dip (Indus Pharm), PhD
Kassem Sara MD, MAM
Anna Verster MBBS, Dip Nutr
M. Helmy Wahdan MD, DPH, PhD

International Advisory Panel
Dr S. Aboulazm. Professor of Orthodontics. Egypt
Professor Y.H. Ahmed MA (Resp die), MA (Pub health/ Com med). Somalia
Dr Abdul Rahman Al-Awadi BSc, MD, MPH, Honorary FRCPM. Ireland, Honorary Dr. Law, Korea, Honorary FRCS & P, Glasgow, FRCP, Edinburgh. Kuwait
Dr Fariba Al-Darazi RN, MSc, PhD. Bahrain
Dr M. Al-Nozha. Professor of Medicine and Consultant Cardiologist. Saudi Arabia
Dr Ali'din Alwan MD, FRCP, FFPHM. Iraq
Dr F. Azizl. Professor of Internal Medicine and Endocrinology. Islamic Republic of Iran
Dr K. Bagchi BSc, MD, PhD. India
Professor K. Dawson BA, MD, PhD, FRCP, FRACP, FRCPCH, DObst, RCOG. New Zealand
Professor Kaussay Dellagi MD. Tunisia
Dr R. Dybkaaer MD. Denmark
Dr M. Aziz El-Matri. Professor of Medicine. Tunisia
Professor F. El-Sabban BSc, MS, PhD. United States of America
Dr A.H. El-Shaarawi MSc (Stat), PhD (Stat). Canada
Professor N. Fikri-Benbrahim PhD (Pub health) (SocSci). Morocco
Professor A.T. Florence BSc (Pharm), PhD, DSc, FRSC, FRPharmS, FRSE. United Kingdom
Professor Cheherezade M.K. Ghazel BS (Nursing), MS (Nursing), DPH, MPA. Egypt
Professor M.A. Ghoneim MD, MD (Hons). Egypt

Dr J.A. Hashmi DTM&H, FRCP. Pakistan
Professor J. Jervell MD, PhD. Norway
Professor G.J. Johnson MA, MD, BChir, FRCS (C), FRCPath, DCEH. United Kingdom
Dr M. Kassas. Emeritus Professor of Plant Ecology. Egypt
Professor M.M. Legnain MBBS, MRCOG, FRCP. Libyan Arab Jamahiriya
Professor El-Shelsh Mahgoub DipBact, PhD, MD, FRCPath. Sudan
Professor A.M.A. Mamlil MSc (Paediatr), MPH, DrPH. Egypt
Professor A.B. Miller MB, FRCP. Canada
Professor S.S. Najjar MD. Lebanon
Dr Abubaker A. Qirbi BSc, MD (Edin), FRCP (Cen), FRCP FRCPPath (UK). Republic of Yemen
Professor O.S.E. Rasslan MD, PhD. Egypt
Professor W.A. Reinké MBA, PhD. United States of America
Professor I.A. Sallam, MD, Dip High Surgery Cairo, Honorary FRCS, PhD (Glasgow), LRCP, MRCS, FRCS (London), ECFMG. Egypt
Dr C.Th.S. Sibinga FRCP (Edin), FRCPPath. The Netherlands
Mr Taoufik Zeribi Eng BSc, MSc. Tunisia

Editorial: Fiona Curlet, Marie-France Roux, Alison Bichard
Letter from the Editor

The year 2005 has seen an unprecedented number of natural disasters, which have taken a heavy toll on people around the world. We started the year with the aftermath of the tsunami; then followed the numerous and severe hurricanes in the Americas. We are ending the year closer to home with the ongoing effects of the earthquake on 8 October in Pakistan and Kashmir which killed tens of thousands of people and has left hundreds of thousands homeless and in a precarious position with the onset of winter. Our thoughts and prayers are with all those who have suffered and all those who work to alleviate the suffering. We hope that 2006 will not see so many devastating events across the world.

Such crises were in the minds of members of the 52nd session of the WHO Regional Committee for the Eastern Mediterranean and they passed resolution EM/RC52/R.2 on emergency preparedness and response. This encouraged Member States to further strengthen national emergency preparedness and response programmes through legislative, technical, financial and logistical measures.

Also at the 52nd Regional Committee, resolution EM/RC52/R.10 was passed adopting the Islamic Charter of Medical and Health Ethics prepared by the Regional Office in collaboration with the Islamic Organization for Medical Sciences, the Islamic Educational, Scientific and Cultural Organization, and the Executive Bureau of the Health Ministers Council for the Cooperation Council States. Of interest, therefore, in this issue is a review of medical ethics in the Islamic Republic of Iran.

Of particular interest we include for the first time papers on domestic violence. In November, WHO launched its report *WHO multi-country study on women's health and domestic violence against women. Initial results on prevalence, health outcomes and women's responses*. This landmark study shows that violence against women is widespread with far-reaching health consequences, and the three papers here indicate that it is indeed an area of concern. Also included are two papers on patient satisfaction which is an area of growing interest as patients become more involved with the health care they receive.

As this is the final issue of Volume 11, we would like to extend as always our thanks to our esteemed reviewers whose names can be found at the back of the issue.

We hope our readers will find much in the issue of interest and value.
رسالة من المحرر

لقد شهد عام 2005 عددًا غير مسبوق من الكوارث الطبية التي عصفت بهيئة أعداد كبيرة من البشر حول العالم. فقد استهل العام مقدمة بآثار كارثة إعصار تسونامي اليابان، ثم تلته الأعاصير الكبيرة والشيديد التي اجتاحت سواحل الولايات المتحدة. وبدأت العام صفحاته ما قبل قرية من، حيث غادرت مائة أمين آثار الزلازل الذين ضربوا باكستان وكشمير في الثاني من تشرين الأول/ أكتوبر 2005، وحصد عشرات الآلاف من الأرواح، وخلف وراءها مئات الآلاف بغير مأوى وفي ظروف مخطئة بالمخاطر. وهم على أعماق الشتاء. إن قلوبنا ودعواتنا مع أولئك الذين فارقوا من ويلات هذا الزلازل، كما أفلا أيضاً مع هؤلاء الذين يعملون بلا كلل للتخفيض من معاناة هؤلاء الناس، وكننا أمل لا ترى في العام الجديد، 2006 هذا القدر من الأحداث المدمرة، في أي مكان من العالم.

ولقد عاشت هذه الأزمات في قلوب وعقول أعداد كبيرة من الدول والخدام للجنة الإقليمية لمنظمة الصحة العالمية في شرق المتوسط، الذين قاموا بتحرير القرار رقم ش/م 52/2 - 2. حول الاستعدادات للطوارئ ومواقفها، الأمر الذي شجع الدول الأعضاء على تقوية وتعزيز برامج الاستعداد للطوارئ ومواقفها، من خلال أخاذ التدابير التشريعية والتقنية والمالية وال*logistics المشابهة.

كما مرت اللجنة الإقليمية أيضاً في دورتها الثانية والمخمسين للجنة الإقليمية لمنظمة الصحة العالمية، الذي أعدته المحكمية، بتعاون مع المنظمة الإسلامية للعلوم الطبية، والمنظمة الإسلامية للتربية والعلوم والتكنولوجيا، والمكتبة التنفيذية لمجلس الصحة العالمية، ومن الجدير بالاهتمام، أن هذا العدد من المجلة الصحية يضم بين صفحاته استعراضاً لمبادئ الأخلاقية العلوية في جمهورية إيران الإسلامية.

وما يشير الاهتمام بشكل خاص، أن هذا العدد أيضاً، يحتوي، ولمرة أخرى، على بحوث حول العنف المنزلي. لقد أطلقت منظمة الصحة العالمية، في تشرين الثاني/ نوفمبر، تقريراً صادم تحت عنوان "دراسة نموذجية الصحة العالمية المتعارضة البلدان، حول صحة المرأة والعنف المنزلي ضد النساء، النتائج الأولية حول مدة انتشار، وتتاليه الصحية، ورد فعل النساء حاليا". وتشير هذه الدراسة إلى علاقة عازمة في هذا المجال. مدة انتشار ظاهرة العنف ضد النساء، والذي يقضي حالات صحتية خطيرة. وتوضح هذه الدراسات الثالثة أن هذه الظاهرة التي ينظر فيها مرئية وقابلة للcuador، من جهة أخرى، فإن هذا العدد يضم أيضاً وقتيت بن بحوث تتعلق برداءة المرض، وهو مجال يزايد الاهتمام حوله، بالنظر إلى كثرة أن المرض أصبح أكثر امتيازًا في خدمات الرعاية الصحية التي يمثلونها.

وحيث إن هذا العدد هو الأخر في المجلة الحادية عشر، فإننا نغتنم هذه المناسبة، كما درجنا عليه دائماً لتوجه مراد من الفكر والعفان لراجعيهم الموهوبين، الذي تظهر أحساؤهم على الصفحة الخلفية من هذا العدد.

والإملاء لكل الأمل أن يجد قراءنا الأعزاء، كل ما يفيدهم ويشير اهتمامهم ضمن صفحات هذه المجلة.
Wife abuse in Esfahan, Islamic Republic of Iran, 2002

S.M. Mousavi¹ and A. Eshagian²

ABSTRACT We carried out a cross-sectional study with cluster random sampling to study the status of wife abuse in Esfahan from April to July 2002. We interviewed 386 married women using a standard questionnaire. Mean age was 35.7 years (range 15–78 years). Prevalence of wife abuse was 36.8%; incidence was 29.3%. Types of abuse included inattention to wife's feelings 44.8%, threatening to prevent communicating with the wife's family 38.1%, slapping 31.9% and beating 27.2%. Husband's age, use of drugs or alcohol, smoking, income and number of children were all associated with wife abuse (P < 0.05). We recommend further investigation to detect the risk factors for wife abuse in this community along with mass education concerning sexual responsibility and conduct towards wives. We also advocate the promotion of supportive measures for abused women.

La maltraitance conjugale à Ispahan (République islamique d’Iran), 2002

RÉSUMÉ Nous avons réalisé une étude transversale avec échantillonnage aléatoire par grappes sur la situation de la maltraitance conjugale à Ispahan d'avril à juillet 2002. Nous avons interrogé 386 femmes mariées à l'aide d'un questionnaire standard. L’âge moyen était de 35,7 ans (extrêmes : 15-78 ans). La prévalence de la maltraitance conjugale était de 36,8 % ; l'incidence était de 29,3 %. Les types de maltraitance comprenaient le mépris des sentiments de l’épouse (44,8 %), la menace d’empêcher tout contact avec la famille de l’épouse (38,1 %), les gifles (31,9 %) et les coups (27,2 %). L’âge du mari, l’usage de drogues ou d’alcool, le tabagisme, le revenu et le nombre d’enfants étaient tous associés à la maltraitance conjugale (p < 0.05). Nous recommandons d’autres études pour identifier les facteurs de risque de la maltraitance conjugale dans cette communauté parallèlement à une éducation de masse concernant la responsabilité sexuelle et la conduite envers l’épouse. Nous préconisons en outre la promotion de mesures de soutien pour les femmes maltraitées.

¹Department of Health and Community Medicine, Medical College, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran (Correspondence to S.M. Mousavi: smmousavi@yahoo.com).
²Fatemieh Medical University, Qom and Esfahan Family Clinic, Esfahan, Islamic Republic of Iran.

Received: 29/02/04, accepted: 06/07/04
Introduction

Wife abuse is a negative attempt to control the behaviour of a wife. Wife abuse occurs when a husband threatens or harms his spouse to gain power and control over her. This includes emotional, physical and sexual abuse.

In the United States of America, between 1 million and 4 million women experience serious assault by an intimate partner each year [1, 2]; 47% of the men who beat their wives do so at least 3 times per year [3]. Nearly 1 in 3 American women experience at least 1 physical assault by a partner during adulthood [2]. It has been estimated that 1 in every 10 women in Canada is abused by her partner every year [4].

Recognizing wife abuse as an issue that impacts on the community is a new idea in the Islamic Republic of Iran. Till recently, it has been believed that wife abuse was not a major problem, that it happened to only a minority of women and that it was a private family matter.

There have been only a few reports on wife abuse in the Islamic Republic of Iran [5–10], however, it happens among every socioeconomic group [11]. Reports from emergency rooms of many hospitals and legal medical centres suggest there are many cases of trauma due to physical spouse abuse [12–15].

Now, with the increased awareness of the pervasiveness of this phenomenon and its devastating psychological and physical impact it is important to determine the extent of the problem in the community. We, therefore, carried out a cross-sectional study to determine the prevalence of wife abuse and associated factors in Esfahan in the Islamic Republic of Iran. Our main aim was to gather basic data which may be useful in reducing this problem in the community.

Methods

We carried out a cross-sectional study of a sample of married women in Esfahan, selected using cluster random sampling. The study was carried out from April to July 2002. Using a map of Esfahan, the city was divided into 495 blocks and we selected 50 blocks randomly. Then we selected 4 residential units randomly in each of these 50 blocks; the total number of homes was 458. The total number of married women living in these homes was 434. We explained the study to the women and invited them to participate; 11.1% refused to participate. The main reasons given were their husbands would not agree or they were satisfied with their relationship. Oral consent to take part in the study was given by 386 women. They were interviewed in their homes by trained interviewers using a standardized questionnaire. In some cases, other family members were present during the interview, but in no case was the husband present.

Using variables based on our goals, we drew up a questionnaire. This was utilized after its validity, reliability and objectivity were tested on a random sample of 30 women from the clustered random sample. We used 24 closed questions to collect information about demographic variables and the socioeconomic situation of participants and 38 closed questions to detect the prevalence, incidence and types of wife abuse.

We used SPSS, version 11.0, to manage the data and perform descriptive and inferential statistical tests. The data were analysed using the Pearson chi-squared test; \( P < 0.05 \) was considered significant.

The age group of the sample was representative of the population of Esfahan according to the latest census (Statistical Centre of Iran, 1996) [16]. There was no statistically significant difference between the
Results

The mean age of the women in the study was 35.7 years [standard deviation (SD) 10.88; range 15–78 years] and that of their husbands was 41.6 years (SD 12.64; range 18–82 years). Mean age at marriage for the women was 19.3 years (SD 4.85; range 9–44 years) and for their husbands was 25.2 years (SD 5.2; range 14–58 years). Non-Iranians constituted 2.4% of the sample; 1.8% were Christians and the others were Muslims, 75.6% were natives of Esfahan and 7.5% had migrated there within the past 10 years. Mean number of children was 2.28 (range 0–9). Mean family income per month was US$ 179 (range US$ 0–3614). Most of the participants had some education, only 7.5% of the women and 6.5% of their husbands were uneducated. Prevalence of smoking was 1.8%, alcohol use 0.5% and drug use 0.5% in the women and 33.7%, 7.8% and 5.7% respectively in husbands. Only 26.9% of the participants were employed outside the home; 1.8% stated their husbands were unemployed. About 57% of the families were householders and about 30% rented their home (Table 1).

Reported prevalence of wife abuse during the marriage was 36.8%, with an incidence rate of 29.3%. There was a statistically significant association between history of spouse abuse in the marriage and the following characteristics of the husband ($P < 0.05$): history of smoking, using alcohol or using drugs; nationality; and age. It was also associated with being a family native to Esfahan; immigration of the family to Esfahan; family income; and number of children (Table 2). The typical time for abuse was at night.

More than 70% of wives of alcohol users and drug users said they were abused. Prevalence of wife abuse was also very high if the husband was of non-Iranian nationality; 32.5% of husbands who were natives of Esfahan and 50.0% of non-natives were wife abusers (Table 3). Of husbands who were immigrants to Esfahan, 55.2% of those who had been there < 10 years were wife abusers compared to 35.3% of those who had been there ≥ 10 years.

Increasing age of the husband was associated with an increase in the prevalence of wife abuse, 28.8% for those < 35 years, 40.1% for those 35–45 years and 48.8% for husbands ≥ 45 years. Also, prevalence of wife abuse was significantly related to family size. For families with 0 children, wife abuse was 21.3%; for those with 1–2 children, it was 37.4% and for those with ≥ 3 children, 42.2% of wives reported being abused.

Physical abuse was reported to be in the form of beating 27.2% [with history of ecchymosis (16.3%) bleeding (7.3%) fracture (3.1%) and hospitalization (2.6%)]. Other forms of physical abuse were reported such as slapping (31.9%), stabbing (3.4%) and throwing objects at the victim (23.6%).

Psychological and emotional abuse was mainly reported to be insulting (32.4%). Abuse in the form of threats to: isolate the woman from her family (38.1%), or leave (17.6%), divorce (15.3%), beat (24.1%), attack with a knife (5.7%), shoot (1.6%) or kill (7.0%) her were also reported.

About 45% of the participants reported that they did not get any attention from their husbands regarding their feelings. Aggression was reported by 43.8% and 15.8% said they did not feel secure inside their house. Other types of abuse included belittling the woman, 31.6%; not responding to her feelings, 31.3%; intentionally refusing to
Table 1 Cross tabulation for all variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (n = 386)</th>
<th>History of wife abuse (n = 142)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>No.</td>
</tr>
<tr>
<td><strong>Woman's education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uneducated</td>
<td>29</td>
<td>17</td>
</tr>
<tr>
<td>Primary</td>
<td>72</td>
<td>29</td>
</tr>
<tr>
<td>Secondary</td>
<td>71</td>
<td>30</td>
</tr>
<tr>
<td>Diploma</td>
<td>134</td>
<td>43</td>
</tr>
<tr>
<td>University degree</td>
<td>66</td>
<td>20</td>
</tr>
<tr>
<td>Higher degree</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td><strong>Husband's education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uneducated</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Primary</td>
<td>66</td>
<td>29</td>
</tr>
<tr>
<td>Secondary</td>
<td>71</td>
<td>25</td>
</tr>
<tr>
<td>Diploma</td>
<td>123</td>
<td>42</td>
</tr>
<tr>
<td>University degree</td>
<td>80</td>
<td>25</td>
</tr>
<tr>
<td>Higher degree</td>
<td>21</td>
<td>6</td>
</tr>
<tr>
<td><strong>Woman's work status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Works in the house</td>
<td>282</td>
<td>102</td>
</tr>
<tr>
<td>Employed outside the home</td>
<td>104</td>
<td>40</td>
</tr>
<tr>
<td><strong>Husband's work status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Employed</td>
<td>379</td>
<td>140</td>
</tr>
<tr>
<td><strong>Woman smokes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>No</td>
<td>379</td>
<td>137</td>
</tr>
<tr>
<td><strong>Husband smokes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>130</td>
<td>67</td>
</tr>
<tr>
<td>No</td>
<td>256</td>
<td>75</td>
</tr>
<tr>
<td><strong>Woman uses alcohol</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>No</td>
<td>384</td>
<td>140</td>
</tr>
<tr>
<td><strong>Husband uses alcohol</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30</td>
<td>22</td>
</tr>
<tr>
<td>No</td>
<td>356</td>
<td>120</td>
</tr>
<tr>
<td><strong>Woman uses drugs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>384</td>
<td>141</td>
</tr>
<tr>
<td><strong>Husband uses drugs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>22</td>
<td>17</td>
</tr>
<tr>
<td>No</td>
<td>364</td>
<td>125</td>
</tr>
<tr>
<td><strong>Accommodation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Householder</td>
<td>220</td>
<td>70</td>
</tr>
<tr>
<td>Rented</td>
<td>113</td>
<td>50</td>
</tr>
</tbody>
</table>
### Table 1 Cross tabulation for all variables (continued)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (n = 386)</th>
<th>History of wife abuse (n = 142)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>No.</td>
</tr>
<tr>
<td></td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Family house</td>
<td>51</td>
<td>22</td>
</tr>
<tr>
<td>Government apartment house</td>
<td>2</td>
<td>–</td>
</tr>
<tr>
<td>Husband's nationality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iranian</td>
<td>377</td>
<td>135</td>
</tr>
<tr>
<td>Afghan</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Esfahan native (husband)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>292</td>
<td>95</td>
</tr>
<tr>
<td>No</td>
<td>94</td>
<td>47</td>
</tr>
<tr>
<td>Husband migrated to Esfahan (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 10</td>
<td>29</td>
<td>16</td>
</tr>
<tr>
<td>≥ 10 or native</td>
<td>357</td>
<td>126</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muslim</td>
<td>379</td>
<td>139</td>
</tr>
<tr>
<td>Christian</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Woman's age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–24</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>25–34</td>
<td>206</td>
<td>71</td>
</tr>
<tr>
<td>35–44</td>
<td>109</td>
<td>42</td>
</tr>
<tr>
<td>45–54</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>55–64</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>65–78</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Woman's age at marriage (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9–17</td>
<td>189</td>
<td>74</td>
</tr>
<tr>
<td>18–34</td>
<td>193</td>
<td>67</td>
</tr>
<tr>
<td>35–44</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Husband's age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–24</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>25–34</td>
<td>148</td>
<td>42</td>
</tr>
<tr>
<td>35–44</td>
<td>192</td>
<td>77</td>
</tr>
<tr>
<td>55–64</td>
<td>27</td>
<td>13</td>
</tr>
<tr>
<td>65–82</td>
<td>18</td>
<td>9</td>
</tr>
<tr>
<td>Husband's age at marriage (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14–17</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>18–34</td>
<td>358</td>
<td>128</td>
</tr>
<tr>
<td>35+</td>
<td>12</td>
<td>6</td>
</tr>
</tbody>
</table>
give her money, 10.4%; refusing to give her food, 7.8%; not providing suitable housing, 14.2%; refusing to provide clothes 14.2%; and refusing to provide supplies for basic needs, 12.4%.

Verbal abuse was mainly reported to be in the form of loud speech (51.0%) or using indecent language (29.3%).

Sexual abuse included ignoring the wife’s sexual enjoyment, 19.2%; forcing the wife to have sex, 31.3%; and forcing the wife to engage in sexual activities she does not want, 18.4%.

For 92.0% of men who abused their wives, there was a history of wife abuse by their fathers.

In response to the question: “Who was most responsible for wife abuse occurring?” 22.5% of the women responded that they were responsible.

The commonest motivations reported for continuing to live with their abusing husbands were being concerned for the children and their family life and the lack of social support for women after divorce.

Discussion

The meaning of wife abuse had not previously been explained to the women who participated in this study: we were the first to explain it to them. There may, therefore, be recall bias for some types of abuse. In this study, overall prevalence of wife abuse was 36.8%, ranging from 1.6% for threatening with a weapon to 51.0% for using loud speech. Since 12.5% of the women we approached refused to participate, the prevalence and incidence rate may have been affected.

A study conducted in 1997 in Tehran reported that prevalence of physical spouse abuse was 27.7% [10] while in a hospital-based study conducted in 1999 in Yazd, reported prevalence was 55.7% [17]. Physical spouse abuse in a Nicaraguan study in 1999 was reported to be 52% in women 15–49 years old [18] while in a study from southern Ethiopia in 1998, prevalence of spouse abuse was reported as 45% [19]. In our study the overall prevalence of wife abuse

Table 1 Cross tabulation for all variables (concluded)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total (n = 386)</th>
<th>History of wife abuse (n = 142)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly family income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(000 rials)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80--&lt; 1 250</td>
<td>155 68</td>
<td>43.9</td>
</tr>
<tr>
<td>1 250--30 000</td>
<td>157 41</td>
<td>26.1</td>
</tr>
<tr>
<td>No response</td>
<td>74 33</td>
<td>44.6</td>
</tr>
<tr>
<td>No. of children</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>61 13</td>
<td>21.3</td>
</tr>
<tr>
<td>1–2</td>
<td>171 64</td>
<td>37.4</td>
</tr>
<tr>
<td>≥ 3</td>
<td>154 65</td>
<td>42.2</td>
</tr>
</tbody>
</table>

*Below the poverty level.
Table 2  Statistical relationship between some variables and history of wife abuse in the marriage, Esfahan, 2002

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pearson chi-squared test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
</tr>
<tr>
<td>Woman’s education</td>
<td>11.119</td>
</tr>
<tr>
<td>Husband’s education</td>
<td>9.779</td>
</tr>
<tr>
<td>Woman’s work status</td>
<td>0.172</td>
</tr>
<tr>
<td>Husband’s work status</td>
<td>0.207</td>
</tr>
<tr>
<td>Wife smokes</td>
<td>3.679</td>
</tr>
<tr>
<td>Husband smokes</td>
<td>18.341</td>
</tr>
<tr>
<td>Wife uses alcohol</td>
<td>3.455</td>
</tr>
<tr>
<td>Husband uses alcohol</td>
<td>18.682</td>
</tr>
<tr>
<td>Woman uses drugs</td>
<td>0.151</td>
</tr>
<tr>
<td>Husband uses drugs</td>
<td>16.444</td>
</tr>
<tr>
<td>Accommodation</td>
<td>7.089</td>
</tr>
<tr>
<td>Nationality</td>
<td>6.897</td>
</tr>
<tr>
<td>Esfahan native</td>
<td>9.328</td>
</tr>
<tr>
<td>Migrated to Esfahan</td>
<td>4.558</td>
</tr>
<tr>
<td>Religion</td>
<td>0.113</td>
</tr>
<tr>
<td>Woman’s age</td>
<td>4.519</td>
</tr>
<tr>
<td>Woman’s age at marriage</td>
<td>1.050</td>
</tr>
<tr>
<td>Husband’s age</td>
<td>9.977</td>
</tr>
<tr>
<td>Husband’s age at marriage</td>
<td>2.266</td>
</tr>
<tr>
<td>Family income</td>
<td>12.975</td>
</tr>
<tr>
<td>No. of children</td>
<td>8.258</td>
</tr>
</tbody>
</table>

was 36.8%, with physical abuse ranging from 3.4% to 31.9% for different types. For almost all the men who abused their wives, there was a history of wife abuse in their parents. Similar results have been reported in other studies [18–20].

Studies done in Lebanon [21], the United States of America [22,23] and Norway [24] have found an association between alcohol consumption and history of spouse abuse. In our study also, the association was significant ($P < 0.001$).

Association between age of the husband and history of spouse abuse has been previously reported [25] but in a study from Nicaragua no such association was found [18]. In our study, increasing age of the husband was associated with increased prevalence of wife abuse but another study found it was related to the age of the wife, being much more in women aged 16–24 years [26].

For the question about monthly family income, 19.1% of the women in our study didn’t respond. In these cases, therefore, we used the best case–worst case analysis. When family income was < 1 250 000 rials per month (below the poverty line), 43.9% of men were spouse abusers; this figure was
We found no association between husband’s education level and history of spouse abuse. The results of a number of other studies support this finding [18–23].

**Conclusion**

One of the neglected health problems in the Islamic Republic of Iran is wife abuse. In this study, we found a high prevalence of this problem in Esfahan city.

Since the prevalence of wife abuse in this community is high, we recommend:

- carrying out analytic studies to determine the risk factors for wife abuse using case–control studies;
- planning for the prevention of wife abuse based on the risk factors determined from such studies;
- mass education in the field of sexual responsibility, conduct towards a wife, a wife’s rights in regard to support and protection from abusive husbands;
- promotion and revision of supportive laws for abused women.

**Acknowledgements**

This work was carried out with the permission and support of Fathemieh Medical University. We would like to thank Ms. Zinat Sadat Mousavi for her comments and correcting the English text. We would also like to express our appreciation to the staff of Esfahan Family Clinic for their support and assistance to this project.

**Table 3** Prevalence of wife abuse according to some characteristics of husbands, Esfahan, 2001

<table>
<thead>
<tr>
<th>Characteristic of husband</th>
<th>Wife abusers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoker</td>
<td>51.5</td>
</tr>
<tr>
<td>Non-smoker</td>
<td>29.3</td>
</tr>
<tr>
<td>Uses alcohol</td>
<td>73.3</td>
</tr>
<tr>
<td>Does not use alcohol</td>
<td>33.7</td>
</tr>
<tr>
<td>Uses drugs</td>
<td>77.3</td>
</tr>
<tr>
<td>Does not use drugs</td>
<td>34.3</td>
</tr>
<tr>
<td>Iranian</td>
<td>35.8</td>
</tr>
<tr>
<td>Non-Iranian</td>
<td>77.7</td>
</tr>
<tr>
<td>Native of Esfahan</td>
<td>32.5</td>
</tr>
<tr>
<td>Non-native of Esfahan</td>
<td>50.0</td>
</tr>
<tr>
<td>Migrated to Esfahan &lt; 10 years ago</td>
<td>55.2</td>
</tr>
<tr>
<td>Migrated to Esfahan ≥ 10 years ago</td>
<td>35.3</td>
</tr>
<tr>
<td>Family income &lt; 1 250 000/ month</td>
<td>43.9</td>
</tr>
<tr>
<td>Family income ≥ 1 250 000/ month</td>
<td>26.1</td>
</tr>
</tbody>
</table>


26.1% for family income ≥ 1 250 000 rials per month.

As in our study, reports from Lebanon [21] and Nicaragua [18] found an association between family income and spouse abuse.

Our results also show that the greater the number of children in the family, the greater the prevalence of history of wife abuse but the causes of this were not determined.

**References**

2. Violence and the family: report of the American Psychological Association


6. [Anonymous], Women in Tehran exposed to spouse abuse more than other women in Iran. Hayat-e-Noo (Tehran), 20 July 2002 [in Farsi].


8. [Anonymous]. 36% of women in Iran are silent in spouse abuse. Resalat (Tehran), 22 September 2001 [in Farsi].


12. Ardekani SMY, Rohani AS. Spouse abuse in Karegar's Shoahad Hospital in Yazd city [thesis]. Yazd, Yazd University of Health and Medical Sciences, Faculty of Psychiatry, 1999.

13. Nasr M. Personality in spouse abuse couples at the Legal Medical Center in Esfahan, 1999 [thesis]. Esfahan, Esfahan University of Health and Medical Sciences, 1999 [in Farsi].


15. Freshte A. Psychosomatic survey in physical abused women referred to the Legal Medicine Center of Tehran in 1996 [thesis]. Tehran, Tehran University of Health and Medical Services, 1996.


17. Rohani AS. Spouse abuse in women who were referred to Yazd Karegran Hospital, 1999 (http://database.irandoc.ac.ir/scripts/wxis.exe, accessed 1 October 2005).


*WHO multi-country study on women’s health and domestic violence against women. Initial results on prevalence, health outcomes and women’s responses*

This report presents initial results based on interviews with 24 000 women by carefully trained interviewers. The study was implemented by WHO, in collaboration with the London School of Hygiene and Tropical Medicine (LSHTM), PATH, USA, research institutions and women’s organizations in the participating countries. This report covers 15 sites and 10 countries: Bangladesh, Brazil, Ethiopia, Japan, Peru, Namibia, Samoa, Serbia and Montenegro, Thailand and the United Republic of Tanzania.

Report findings document the prevalence of intimate partner violence and its association with women’s physical, mental, sexual and reproductive health. Data are included on non-partner violence, sexual abuse during childhood and forced first sexual experience. Information is also provided on women’s responses. The report concludes with 15 recommendations to strengthen national commitment and action on violence against women.

Data from the report show that violence against women is widespread and demands a public health response.

Prevalence and determinants of intimate partner violence in Babol city, Islamic Republic of Iran

M. Faramarzi,1 S. Esmailzadeh2 and S. Mosavi3

1Department of Midwifery; 2Department of Obstetrics and Gynaecology; 3Department of Psychiatry, Babol University of Medical Sciences, Babol, Islamic Republic of Iran (Correspondence to M. Faramarzi: Mahbob330@yahoo.com).

Received: 28/12/03; accepted: 17/05/04

ABSTRACT To determine the prevalence and determinants of intimate partner violence, 2400 married women attending public clinics in Babol, Islamic Republic of Iran, were screened for domestic violence. Overall, 15.0% of women had suffered physical abuse from their husbands in the previous year, 42.4% sexual abuse and 81.5% various degrees of psychological abuse. A significant association with intimate partner violence was found for women with low income, age ≤ 20 years, unemployed, low education, non-pregnant and non-houseowners. There was no significant relationship between violence and parity or length of marriage. On multivariate regression, the strongest predictor of physical abuse was unemployment of the woman, whereas for psychological and sexual abuse it was rural residence. Empowering women through promoting employment and improving education may reduce the risk of intimate partner violence.

Prévalence et déterminants de la violence exercée par le partenaire intime dans la ville de Babol (République islamique d'Iran)

RÉSUMÉ Afin de déterminer la prévalence et les facteurs de la violence exercée par le partenaire intime, on a interrogé 2400 femmes mariées qui fréquentaient les centres publics de consultations d'obstétrique, de gynécologie et de planification familiale à Babol (République islamique d'Iran) pour chercher à savoir si elles avaient fait l'objet de violence familiale. En tout, 15,0 % des femmes avaient subi des violences physiques de la part de leur conjoint dans les 12 mois précédant l’enquête, 42,4 % des violences sexuelles et 81,5 % des violences psychologiques à des degrés divers. On a trouvé une association significative avec la violence exercée par le partenaire intime pour les femmes ayant de faibles revenus, âgées de 20 ans, ne travaillant pas, ayant un faible niveau d'instruction, non enceintes et non propriétaires de leur logement. Il n’y avait pas de relation significative entre la violence et le nombre d’enfants ou la durée du mariage. À l’analyse de régression multivariée, le facteur prédictif de violence physique le plus fort était l’inactivité professionnelle de la femme tandis que pour la violence psychologique et sexuelle, c’était la résidence rurale. L’autonomisation des femmes par la promotion de l’emploi et l’amélioration de l’éducation peut réduire le risque de violence exercée par le partenaire intime.

1Department of Midwifery; 2Department of Obstetrics and Gynaecology; 3Department of Psychiatry, Babol University of Medical Sciences, Babol, Islamic Republic of Iran (Correspondence to M. Faramarzi: Mahbob330@yahoo.com).

Received: 28/12/03; accepted: 17/05/04
Introduction

Violence against women is a major health and human rights issue. Worldwide, at least 1 in 5 of the world’s female population has been physically or sexually abused by a man or men at sometime in their life. It has been estimated that violence against women is as serious a cause of death and incapacity among women of reproductive ages as cancer, and a greater cause of ill health than traffic accidents [1]. Domestic violence or intimate partner violence is one of the most common forms of violence against women. The deleterious effects of domestic violence on women’s health are so serious that it has been recognized as a public health crisis with far-reaching effects on society [2].

Intimate partner violence has long-term negative health consequences for survivors, even after the abuse has ended [3,4]. These effects can manifest as poor health status, poor quality of life and high use of health services [5–7]. Intimate partner violence is one of the most common causes of injury in women [8]. Women who are abused are frequently treated within the health care system. However, they generally do not present with obvious trauma, even in accident and emergency departments [9]. Recent studies have demonstrated that screening women for domestic violence can predict future violence [10]. By ignoring the issue, health care professionals may be losing an opportunity to reduce or prevent the consequences of domestic violence. It is important, however, to recognize that inept domestic violence screening may put battered women in danger and that women who leave their partner are at increased risk [11].

Obstetrics, gynaecology and family planning health services typically serve both healthy and sick women and provide a unique opportunity for routine domestic violence screening to all clients receiving services. This study aimed to screen for, and estimate the prevalence of, 3 types of intimate partner violence among women attending public obstetrics, gynaecology and family planning health services in Babol city, Islamic Republic of Iran. We also identified the personal, socioeconomic and family function characteristics associated with domestic violence.

Methods

The project

In a collaboration between the obstetrics and gynaecology department, midwifery department and psychology department of Babol University of Medical Sciences, a project was set up to screen for domestic violence among women attending public obstetrics, gynaecology and family planning health services in Babol city, Islamic Republic of Iran. The goal was to provide information for a policy calling for routine screening for domestic violence. The first stage of the project was a 4-hour in-service education for midwifery staff which trained midwives in project clinics to screen and identify of victims of domestic violence and to prevent intimate partner violence among women through identifying possible victims and counselling them. The second stage was to implement a screening questionnaire for domestic violence. For this study, a sample of women attending clinics of the public health services in Babol city were interviewed about their experiences with intimate partner violence.

Sample

Babol city was divided into 3 areas according to the socioeconomic status (SES) of the population (high, middle and low status areas) and 1 public health service clinic was
selected from each of those 3 areas. We recruited patients attending obstetrics and gynaecology and family planning clinics. The inclusion criteria were married women who had a husband during the past year and who gave written informed consent to enter the study. Women are used to attending such clinics and often attend alone. Thus the refusal rate among the women was low. We started screening at the 3 clinics at the same time and continued until 800 women in each clinic were entered in the study. Thus, we recruited 2400 women from November 2002 to August 2003. The women were interviewed at the clinic by the midwife in a private room. The interview lasted between 30 and 50 minutes. The women were unaccompanied by either the husband or a female friend; women attending with their husbands were not entered in the study. As they were familiar with the midwives and they were interviewed in private, the women were generally free from fear.

**Screening questionnaire**

After obtaining informed consent, midwifery staff interviewed the sample of women attending the clinics and completed a questionnaire for each participant. The abuse assessment form was developed in the department of obstetrics with the collaboration of the departments of midwifery and psychiatry. We adapted the abuse assessment screening from the 2001 American College of Obstetricians and Gynaecologists form \[12\], but added many questions about different types of violence which were culturally adapted. A pilot study was carried out to determine the validity and reliability of this form before the start of the project.

The abuse assessment form consisted of questions that cover the woman’s personal characteristics and 3 sections about her experiences of physical, sexual and psychological abuse. Women were asked to indicate which, if any, of various kinds of abuse they had experienced from their partner in the year prior to the interview. Nine questions covered the experiences of physical abuse, 3 questions about sexual abuse and 15 questions about emotional/psychological abuse (question items were the same as Table 1). If a woman responded positively to any item, we considered her to be abused. A non-abused woman was one who had no experience of any item of violence. We estimated the severity of violence by assigning a score of 1 for every item checked. Thus, the range of scores for physical, sexual and psychological abuse were 0–9, 0–3 and 0–15 respectively. We also added the scores of the 3 types of violence and calculated the total score of violence for each woman (range 0–27).

At the end of every visit, the midwifery staff assessed the degree of risk for that woman and if necessary counselled her about the best intervention strategy for primary prevention and referred her to advocacy services. All victims of physical or sexual violence or moderate and severe psychological abuse were referred for psychiatric consultation.

**Analysis**

The data was analysed using SPSS, version 10 software. The correlation between independent variables such as education, job and residence were tested using Pearson \(\chi^2\)-test (2-sided). We considered \(P < 0.05\) as significant. We applied ANOVA test for comparing of the mean of scores of violence and age of groups or the length of marriage. Multivariate regression was applied to predict the factors that affected the risk of violence from husbands.
Table 1  Prevalence of physical, psychological and sexual abuse experienced by married women attending clinics in different socioeconomic status areas of Babol city, Islamic Republic of Iran

<table>
<thead>
<tr>
<th>Type of abuse</th>
<th>High status area</th>
<th>Middle status area</th>
<th>Low status area</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 800)</td>
<td>(n = 800)</td>
<td>(n = 800)</td>
<td>(n = 2400)</td>
<td></td>
</tr>
<tr>
<td>Physical abuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slapping</td>
<td>7.8</td>
<td>9.1</td>
<td>14.1</td>
<td>10.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Pushing</td>
<td>5.5</td>
<td>6.9</td>
<td>10.3</td>
<td>7.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Shooting</td>
<td>3.1</td>
<td>8.5</td>
<td>10.6</td>
<td>7.4</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Punching</td>
<td>3.9</td>
<td>7.6</td>
<td>10.3</td>
<td>7.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Kicking</td>
<td>4.1</td>
<td>6.5</td>
<td>9.0</td>
<td>6.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Whipping</td>
<td>0.9</td>
<td>1.5</td>
<td>2.5</td>
<td>1.6</td>
<td>0.03</td>
</tr>
<tr>
<td>Choking</td>
<td>0.3</td>
<td>1.1</td>
<td>1.4</td>
<td>1.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Stabbing</td>
<td>0</td>
<td>1.1</td>
<td>1.3</td>
<td>0.8</td>
<td>0.008</td>
</tr>
<tr>
<td>Burning</td>
<td>0</td>
<td>0.1</td>
<td>0.5</td>
<td>0.2</td>
<td>0.07</td>
</tr>
<tr>
<td>Sexual abuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forced sexual intimacy</td>
<td>10.5</td>
<td>50.1</td>
<td>31.4</td>
<td>30.7</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Forced intercourse</td>
<td>1.3</td>
<td>42.9</td>
<td>32.5</td>
<td>25.6</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Forced non-vaginal sex</td>
<td>11.1</td>
<td>17.0</td>
<td>22.4</td>
<td>16.8</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Psychological abuse</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shouting</td>
<td>37.3</td>
<td>39.8</td>
<td>46.8</td>
<td>41.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Preventing wife's employment</td>
<td>37.1</td>
<td>40.3</td>
<td>41.4</td>
<td>39.6</td>
<td>0.1</td>
</tr>
<tr>
<td>Insulting</td>
<td>37.3</td>
<td>21.0</td>
<td>38.5</td>
<td>32.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Claiming ownership right to wife</td>
<td>10.1</td>
<td>37.3</td>
<td>27.6</td>
<td>25.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Showing contempt in public</td>
<td>9.6</td>
<td>31.5</td>
<td>25.1</td>
<td>22.1</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Criticizing</td>
<td>14.8</td>
<td>23.5</td>
<td>25.8</td>
<td>21.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Giving threatening looks</td>
<td>10.5</td>
<td>17.1</td>
<td>18.6</td>
<td>15.4</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Restricting wife's leaving house</td>
<td>5.4</td>
<td>19.0</td>
<td>18.0</td>
<td>14.1</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Restricting communication</td>
<td>5.8</td>
<td>16.8</td>
<td>15.4</td>
<td>12.7</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Inquiring about wife's expenses</td>
<td>4.8</td>
<td>15.8</td>
<td>14.3</td>
<td>11.6</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Ridiculing in public</td>
<td>5.8</td>
<td>12.8</td>
<td>16.0</td>
<td>11.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Making threats to leave house</td>
<td>5.6</td>
<td>9.3</td>
<td>12.1</td>
<td>9.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Refusing to give money</td>
<td>3.0</td>
<td>13.1</td>
<td>11.0</td>
<td>9.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Pursuing</td>
<td>1.0</td>
<td>5.0</td>
<td>7.5</td>
<td>4.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Making threats to property</td>
<td>0.9</td>
<td>4.6</td>
<td>7.0</td>
<td>4.2</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

n = total number of women attending clinics in these areas.

*P*-value for difference between frequencies of abuse in different types of clinic.
Results

A total of 2400 patients made 2715 visits during the study period. We recruited 800 patients at clinics in high SES areas, 800 patients from clinics in middle SES areas and 800 patients from clinics in low SES areas. The mean (SD) age of the women was 28.2 (6.6) years and mean (SD) parity was 1.7 (1.1). Of the women, 71.3% were seen for family planning and the remainder were seen for gynaecology (15.5%) and prenatal care visits (13.2%).

Prevalence of abuse

The prevalence of abusive experiences during the preceding 12 months is shown in Table 1. Physical violence was experienced by 15.0% of the women, sexual abuse by 42.4% (forced sexual intimacy 30.8%, forced intercourse 28.1% and forced nonvaginal sex 16.8%) and psychological/emotional abuse by 81.5% (mild 68.4%, moderate 10.6%, severe 2.5%). The following kinds of violence were more common for physical abuse: slapping, pushing, shooting and punching (Table 1). For psychological abuse, the most common actions were shouting, preventing the woman’s employment, insulting, criticizing, claiming ownership right to wife and showing contempt in public.

The relationship between scores on physical, sexual and psychological abuse and total scores of violence and partner abuse are shown in Table 2. On average, the scores of women attending clinics in high SES areas were 58% lower for physical violence, 66% lower for sexual violence and 44% lower for psychological abuse compared with women in low SES areas.

The prevalence rates of physical, psychological and sexual abuse during pregnancy were 9.1%, 82.3% and 36.3% respectively.

Characteristics of abused women

The relationship between the characteristics of the women and mean total scores for violence are shown in Table 3. There were significant differences between the mean total score of violence and the following variables for the woman: low versus high education (< 6 years compared with > 12 years), unemployed versus employed, age ≤ 20 versus > 20 years, rural versus urban residence, low versus middle or high family income (< 1 500 000 rials per month, 1 500 000 to 3 000 000 rials per month, > 3 000 000 rials per month respectively) (US$ 1 ≈ 8000 rials at the time of the study),

<table>
<thead>
<tr>
<th>Type of abuse (maximum score)</th>
<th>Mean (SD) violence score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High status area (n = 800)</td>
</tr>
<tr>
<td>Physical abuse (max. 9)</td>
<td>0.25 (0.92)</td>
</tr>
<tr>
<td>Sexual abuse (max. 3)</td>
<td>0.29 (0.68)</td>
</tr>
<tr>
<td>Psychological abuse (max. 15)</td>
<td>1.82 (1.17)</td>
</tr>
<tr>
<td>Total violence (max. 27)</td>
<td>2.53 (2.95)</td>
</tr>
</tbody>
</table>

n = total number of women attending clinics in these areas.  
SD = standard deviation.  
P-value for difference between means.
Table 3 Relationship between women’s characteristics and mean total score of violence for married women attending clinics in Babol city

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD) total violence score</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Woman’s education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High education (&lt; 6 years)</td>
<td>3.03 (3.17)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Low education (&gt; 12 years)</td>
<td>4.71 (5.22)</td>
<td></td>
</tr>
<tr>
<td><strong>Woman’s employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>3.48 (4.30)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Unemployed</td>
<td>4.27 (4.80)</td>
<td></td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>4.09 (4.72)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Rural</td>
<td>5.48 (5.25)</td>
<td></td>
</tr>
<tr>
<td><strong>Woman’s age (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 20</td>
<td>5.40 (5.60)</td>
<td></td>
</tr>
<tr>
<td>21–30</td>
<td>4.20 (4.10)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>31–40</td>
<td>3.90 (4.60)</td>
<td></td>
</tr>
<tr>
<td>&gt; 40</td>
<td>3.50 (3.60)</td>
<td></td>
</tr>
<tr>
<td><strong>Length of marriage (years)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 5</td>
<td>4.37 (4.80)</td>
<td></td>
</tr>
<tr>
<td>6–10</td>
<td>4.36 (5.20)</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>11–15</td>
<td>3.96 (4.80)</td>
<td></td>
</tr>
<tr>
<td>16–20</td>
<td>3.60 (3.50)</td>
<td></td>
</tr>
<tr>
<td>&gt; 20</td>
<td>2.20 (5.50)</td>
<td></td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>4.50 (4.90)</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>1–2</td>
<td>4.20 (4.80)</td>
<td></td>
</tr>
<tr>
<td>≥ 3</td>
<td>3.70 (3.70)</td>
<td></td>
</tr>
<tr>
<td><strong>Family’s monthly income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low (&lt; 1500000 rial)</td>
<td>4.71 (5.22)</td>
<td></td>
</tr>
<tr>
<td>Middle (1500000–3000000 rial)</td>
<td>3.12 (3.13)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>High (&gt; 3000000 rial)</td>
<td>2.84 (3.26)</td>
<td></td>
</tr>
<tr>
<td><strong>Pregnancy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnant</td>
<td>3.59 (3.68)</td>
<td>0.001</td>
</tr>
<tr>
<td>Non-pregnant</td>
<td>4.31 (4.91)</td>
<td></td>
</tr>
<tr>
<td><strong>Houseownership</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-houseowner</td>
<td>4.63 (5.12)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Houseowner</td>
<td>3.85 (4.42)</td>
<td></td>
</tr>
</tbody>
</table>

*US$ 1 ≈ 8000 rials at the time of the study.
SD = standard deviation.

There were no significant differences between pregnant versus non-pregnant, and non-houseowner versus houseowner (P < 0.05).
between the mean total scores of violence and length of marriage or parity \((P > 0.05)\).

On univariate analysis, the variables that were significantly \((P < 0.05)\) associated with an increase in physical, sexual and psychological abuse were: low woman’s education, rural residence, non-pregnancy, non-houseowner, woman’s age \(\leq 20\) years, length of marriage > 5 years and woman’s unemployment. The variable which not significantly \((P > 0.05)\) associated with violence on univariate analysis was parity.

**Predictors of abuse**

All variables were considered for the multivariate regression model. On multivariate analysis, the strongest predictor of physical violence among the clinic attenders was unemployment of the woman \((OR = 2.95; 95\% CI: 1.48 to 5.91)\) (Table 4). Other strong \((OR > 2)\) predictors of physical abuse were: woman’s age \(\leq 20\) years \((OR = 2.23; 95\% CI: 1.59 to 3.14)\), non-houseowner \((OR = 2.15; 95\% CI: 1.68 to 2.75)\) and low income \((OR = 2.05; 95\% CI: 1.53 to 2.75)\). Other less strong but statistically significant predictors were non-pregnancy status and low woman’s education. Length of marriage, parity and residence were not associated with physical abuse on multivariate analysis.

For sexual abuse, the strongest predictor on multivariate analysis was the area of residence. The odds of a rural woman suffering abuse were 50% higher than those of urban women \((OR = 1.56, 95\% CI: 1.16 to 2.10)\). The other variables were not associated with sexual abuse on multivariate analysis. The strongest predictor of 3 types of partner violence on multivariate analysis was rural residence \((OR = 1.97, 95\% CI: 1.14 to 3.41)\).

For psychological abuse, on multivariate analysis the strongest predictor of violence among the clinic attenders was rural residence \((OR = 1.3; 95\% CI: 0.95 to 2.03)\). Other predictors of psychological abuse were low education \((OR = 0.67; 95\% CI: 0.51 to 0.88)\) and low income \((OR = 0.38; 95\% CI: 0.27 to 0.53)\). Length of marriage, parity, pregnancy, age, employment and houseownership were not associated with psychological abuse on multivariate analysis.

**Table 4 Independent predictors of physical violence for married women attending clinics in Babol city**

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Odds ratio</th>
<th>95% CI</th>
<th>(P)-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed versus employed (woman)</td>
<td>2.95</td>
<td>1.48 to 5.91</td>
<td>0.002</td>
</tr>
<tr>
<td>Age (\leq 20) versus &gt; 20 years (woman)</td>
<td>2.23</td>
<td>1.59 to 3.14</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Non-houseowner versus houseowner</td>
<td>2.15</td>
<td>1.68 to 2.75</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Low income versus middle income</td>
<td>2.05</td>
<td>1.53 to 2.75</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Non-pregnant versus pregnant</td>
<td>1.80</td>
<td>1.20 to 2.83</td>
<td>0.005</td>
</tr>
<tr>
<td>Low education versus high education (woman)</td>
<td>1.70</td>
<td>1.35 to 2.27</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Rural versus urban residence</td>
<td>0.76</td>
<td>0.52 to 1.11</td>
<td>0.76</td>
</tr>
<tr>
<td>Length of marriage (\leq 5) versus &gt; 5 years</td>
<td>1.10</td>
<td>0.87 to 1.51</td>
<td>0.31</td>
</tr>
<tr>
<td>Parity 0 versus parity (\geq 1)</td>
<td>0.81</td>
<td>0.55 to 1.04</td>
<td>0.58</td>
</tr>
</tbody>
</table>

\(CI = \) confidence interval.
Discussion

The results of this study show that the prevalence of psychological, physical and sexual abuse is high in this sample of Iranian women (15.0%, 81.5% and 42.4% respectively). Studies of health centre attendees in other countries show the prevalence of intimate partner violence varies between 4% and 33% [13–15]. The wide discrepancies in the prevalence of violence against women may reflect different definitions of violence in every society, the method of screening, religious beliefs and cultural issues [16].

The findings of this research as well as many other studies supports the view that poverty and its associated stress are key contributors to intimate partner violence. Although violence occurs in all SES groups, it is more frequent and severe in lower SES groups [17–27]. The results of this study suggest that low education, being unemployed and residence in a rural area are strong predictors of risk of intimate partner violence for women. In many studies, high educational attainment of women is associated with low levels of violence [26–31]. Education confers social empowerment via social networks, self-confidence and ability to use information and resources available in society, and may also translate into wealth. Some previous studies suggest that financial independence of women is protective against violence [32,33], although in other studies, employment of women did not have a protective role against partner abuse [18,29]. Circumstances in which the woman but not her partner is working convey additional risks [34]. The results of Maziak’s study on the association of residence with partner abuse is similar to this study [17], but in some studies urban or rural residence are not risk factors [18,27].

In this study, the prevalences of physical, psychological and sexual abuse during pregnancy were 9.1%, 82.3% and 36.3% respectively. Some previous studies show that partner violence decreases during pregnancy. Saltzman found that the prevalence of abuse across 16 states of the United States of America was 7.2% during the 12 months before pregnancy, 5.3% during pregnancy, and 8.7% around the time of pregnancy [35]. Kramek found that the prevalence of physical and psychological abuse during pregnancy was 25% [36].

There are several implications of this study. Public health services can play an important role in the detection of domestic violence and improve their responses to the victims. Abused women may present to health services before they present to criminal justice or social service agencies, and if abuse is identified, they can receive interventions that increase their safety and improve their health. This project demonstrated the efficacy of screening in detecting the victims of partner violence by the staff of health services in the Islamic Republic of Iran and is an important first step in addressing the problem of partner violence in this community. Thus, assessment for intimate partner violence of all women should be considered in all health care services. Another implication is that partner violence is often predictable and preventable. This study suggests that major strategies for prevention of partner violence are empowering women and improving their status in society with the promotion of sexual equality in all rights especially in employment and education.
References


28. Wadman MC, Muellemann RL. Domestic violence homicides: ED use before viti-


Domestic violence: a cross-sectional study in an Iranian city
A. Ghazizadeh¹

ABSTRACT To determine the prevalence of domestic physical violence against women and its associated factors in Sanandaj city, Islamic Republic of Iran, a random sample of 1000 married women completed a questionnaire. Of the respondents, 15% had been assaulted by their husbands at least once in the previous year and 38% at some time during the marriage. Economic problems were the most frequent cause of domestic quarrels. There was a significant association between husbands' educational level and violence against wives. Physical violence against housewives was significantly more frequent than against employed women. Husband's job was also significantly associated with violence. The existence of a child or daughter in the family was associated with less domestic physical violence against women.

Violence familiale : étude transversale dans une ville iranienne
RÉSUMÉ Afin de déterminer la prévalence de la violence familiale physique à l'encontre des femmes et les facteurs qui y sont associés dans la ville de Sanandaj (République islamique d'Iran), un échantillon aléatoire de 1000 femmes mariées a rempli un questionnaire. Quinze pour cent (15 %) des répondantes avaient été agressées par leur mari au moins une fois au cours des douze mois précédents et 38 % à un moment ou un autre de leur mariage. Les problèmes économiques étaient la cause la plus fréquente des querelles conjugales. Il y avait une association significative entre le niveau d'instruction du mari et la violence envers la femme. La violence physique contre les femmes au foyer était significativement plus fréquente que contre les femmes ayant un emploi. La situation professionnelle du mari était également associée de manière significative à la violence. L'existence d'un enfant, garçon ou fille, dans la famille était associée à une moindre violence familiale physique envers la femme.

¹Department of Epidemiology and Social Medicine, Medical Sciences University of Kurdistan, Sanandaj, Islamic Republic of Iran (Correspondence to A. Ghazizadeh: mrghazi@yahoo.com). Received: 14/11/02; accepted: 06/07/04
Introduction

Physical violence against women is a worldwide problem, crossing all ethnic, economic and social strata. According to the UN declaration at the Fourth World Conference on Women in Beijing in 1995, violence against women is an obstacle to the achievement of the objectives of equality, development and peace [1]. Historically, women have not been legally protected from battering. In many cultures, abuse has been an accepted, even legally sanctioned, fact of marriage. In the United States of America (USA), a man had the legal right to strike his wife until 1884 [2], and even now, by a conservative estimate, 2 million American women are severely assaulted by their partner each year [3].

A World Health Organization study of 24,000 women from 10 different countries and cultures reported that 15%–71% had experienced physical or sexual violence from their partner at some time in their lifetime [4].

In the past few years, violence against wives has become documented with increasing frequency [5, 6]. It is a common type of crime, which is seldom reported to the police. It occurs at all social levels, though some authors have claimed that it is more frequent in families of low socioeconomic status [7]. Similarly, specific cultures and laws may have important roles, and hence the pattern of domestic violence may be different in developing countries from those in industrialized countries. Moreover, such influences may differ between the developing countries themselves, and thus it is important to establish the pattern for individual nations. Researching the phenomenon of violence and evaluating its aetiology is essential for any attempts to prevent the problem.

Iranian women suffer many types of violence, the consequences of which are exacerbated by specific cultural traditions and laws. Married women are fearful of the prospect of separation or divorce, the difficulties of living a single life, losing custody rights or even being unable to visit their children following divorce [8]. For this reason we conducted a study of married women living in Sanandaj city, Islamic Republic of Iran, to determine the prevalence of domestic physical violence against women and socioeconomic factors that predicted it.

Methods

This was a cross-sectional study of married women resident in Sanandaj city during the year 2000.

Sample

The subjects were 1040 women selected by multistage cluster random sampling. The health care of the city is divided into 16 urban health centres, each of which has a health file for every individual household under its coverage. The number of subjects selected from each was proportional to the size of the population served by each centre. A total of 40 women (3% of the sample) refused to participate in the research, giving a final sample of 1000.

The sample size was calculated from the formula

\[ n = \frac{Z^2 PQ}{d^2} \]

where \( P = Q = 0.5 \), \( d = 0.05 \), \( n = 520 \). Given the cluster sampling method, this number was doubled. The power of the study was 80%, \( \beta = 0.20 \).

Questionnaire

A 23-part locally constructed questionnaire collected demographic data about: woman’s age, education level of the woman and her husband, woman’s job, number of children, age of husband and wife at marriage, duration of marriage and number of previous marriages for the woman and her husband.
The questionnaire asked the woman: “In your opinion, what are the reasons for domestic quarrels?” (answers were pre-coded in 8 categories plus other) and “What are the reasons for physical violence against women?” (11 categories plus other). The woman was asked to pick the most important reasons for violence from the list (they could mention as many as they wished). “What is the best way to prevent physical violence against women?” (5 categories plus other). The woman was then asked if she had been beaten during the last year, and at any time in their marriage, and if so how many times and her opinion about the reason for the violence. Participants were interviewed by students of the Faculty of Medical Sciences of Kurdistan University who had been specifically trained for the task.

The pre–post-test reliability coefficient of the questionnaire was 0.82, tested on 30 women and repeated after a month.

Data analysis

The correlates of current domestic physical violence within the previous 12 months and at any time within the marriage were determined using the variables: age, woman’s and husband’s education level, woman’s and husband’s job, number of children, woman’s and husband’s number of previous marriages. Chi-squared tests (univariate analyses) and forward stepwise logistic regression analyses (multivariate analyses) were applied using SPSS, version 10.05 and STATA, version 6 software.

Results

Of the 1000 women who answered the questionnaire, 150 (15%) had suffered physical violence from their husbands in the year before the study and 380 (38%) at some time during their marriage. Of the 150 women who had been exposed to violence in the previous year, 22 (15%) had experienced 1 to 5 episodes of violence and 10 (1%) had suffered 11 or more episodes.

All age groups of women reported suffering violence at some time during the marriage but violence but was more frequent against women aged 30–39 years old (32.4%) (Table 1). The prevalence of physical violence ever in the marriage was lower in marriages of longer duration: 30–39 years (15.4%) and 40+ years (6.2%). The highest prevalence was in marriages of 10–19 years (29.5%) and 20–29 years (26.6%). The association between physical violence and the woman’s age and marriage duration were statistically significant ($P = 0.025$ and $P < 0.001$, respectively). There was no association between ever suffering physical violence and the husband’s age at marriage. Physical violence against women with a history of previous marriages was relatively higher than for women without it, and the association was statistically significant ($P = 0.012$) (Table 1).

Of the husbands, 18% were illiterate, but 10% had completed higher degrees. There was a significant association between physical violence in the previous year and the educational level of the wife and the husband (Table 2). The husband’s job had an association with domestic physical violence, with violence significantly more common among men working as piece workers and drivers ($P < 0.001$).

Physical violence ever in the marriage was more common against housewives than against employed women and the association between physical violence and women’s employment was statistically significant ($P < 0.001$) (Table 2).

There were no association between the occurrence of violence ever in the marriage and whether there were sons in the family or not, but the association between physi-
cal violence and existence of any child or daughter in family was statistically significant ($P < 0.001$). Domestic physical violence was more frequent in families without a child (Table 3) and with a girl, whereas the risk factor for physical violence in families without a child was 2.5 times that of families with a child (OR = 2.58).

As to opinions on the best way to deal with a probable assault, there was a clear difference between wives of differing educational levels; 71.0% of illiterate women believed that remaining silent was the best way, whereas this figure was only 41.0% for those with a higher degree. There was also a clear difference between women of different employment status; 57.4% of housewives believed that remaining silent was the best way of coping, whereas 35.3% of employed women believed that establishing a law
Table 2: Physical violence against women in terms of woman’s and husband’s level of education and employment

<table>
<thead>
<tr>
<th>Variable</th>
<th>Suffered physical violence ever in marriage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Husband’s education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>79</td>
<td>102</td>
</tr>
<tr>
<td>Elementary</td>
<td>171</td>
<td>186</td>
</tr>
<tr>
<td>High school</td>
<td>100</td>
<td>194</td>
</tr>
<tr>
<td>Higher education</td>
<td>33</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woman’s education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>177</td>
<td>190</td>
</tr>
<tr>
<td>Elementary</td>
<td>136</td>
<td>187</td>
</tr>
<tr>
<td>High school</td>
<td>61</td>
<td>181</td>
</tr>
<tr>
<td>Higher education</td>
<td>9</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woman’s employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>23</td>
<td>96</td>
</tr>
<tr>
<td>Housewife</td>
<td>360</td>
<td>521</td>
</tr>
</tbody>
</table>

OR = odds ratio; CI = confidence interval.

Table 3: Physical violence against women according to presence of children in the family

<table>
<thead>
<tr>
<th>Variable</th>
<th>Suffered physical violence ever in marriage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Children in family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>369</td>
<td>562</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>55</td>
</tr>
<tr>
<td>OR</td>
<td>2.58</td>
<td></td>
</tr>
<tr>
<td>Boy in family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>316</td>
<td>481</td>
</tr>
<tr>
<td>No</td>
<td>67</td>
<td>136</td>
</tr>
<tr>
<td>OR</td>
<td>1.33</td>
<td></td>
</tr>
<tr>
<td>Girl in family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>72</td>
<td>186</td>
</tr>
<tr>
<td>No</td>
<td>311</td>
<td>431</td>
</tr>
<tr>
<td>OR</td>
<td>0.54</td>
<td></td>
</tr>
</tbody>
</table>

OR = odds ratio; CI = confidence interval.
to support women would be the best way of preventing domestic physical violence.

From the women’s point of view, the most important etiological factors for domestic violence were household economic problems, the existing patriarchy laws, “wrong culture” (folklore) and distrust. Women who were employed outside the home considered the patriarchy law to be the most important factor (55.0%), whereas housewives mentioned domestic economic problems as the leading cause (32.0%).

In regression analysis, the occurrence of domestic physical violence was entered with the demographic and interview variables in a forward stepwise Wald procedure, but only woman’s age, number of children, man’s education and woman’s job remained as significant predictors of domestic physical violence. The logit regression model of this study for prediction of physical violence against women (Y) during the marriage was: Y = 0.014 -0.029 woman’s age +0.199 number of children –0.238 husband’s education +0.589 woman’s employment.

Discussion

The prevalence of domestic physical violence is high in Sanandaj city, as it is in other communities of the Islamic Republic of Iran [8]. The percentage of women in this study who reported a history of physical violence ever in their marriage (38%) was greater than that reported in a South African study [9] and greater than the prevalence of physical violence among female medical students in the USA [10]. It is higher than the rate reported by Egyptian adult women who had been physically assaulted by an intimate partner in 1991-99 [11,12]. This prevalence is consistent with the findings of Nicaragua (38.5%) [10]. Also the 1-year prevalence of physical violence (15%) was greater than the annual rates of husband–wife violence found in a 1985 national survey in America (11.6%) [13], but is consistent with the findings in South Dakota (15%) [14]. The differences are probably due to the different cultures and populations.

It was found that women aged 30–39 years were more likely to be at risk of violence from their partner than were older women and this is consistent with an Australian study in 1996 [13]. The multivariate analysis showed a significant correlation between domestic physical violence and age, which was also found in Neuberger’s study [16]. Husband’s education emerged as an independent predictor of current physical violence. Factors that aggravate the physical violence, such as illiteracy, unemployment and lower education, for both men and women, placed our population at greater risk, suggesting that the topic of the outcome of domestic violence must be incorporated into the high school and medical education curricula.

A weakness of the study was the potential for recall or reporting bias. Women that experience domestic violence may be reluctant to acknowledge this because of shame or embarrassment. A small proportion of women refused to participate in the research, perhaps from shame or fearing further reprisals for revealing “family secrets”. There were a number of strengths of this study, however, in that our findings are consistent with those of other studies. Further research is necessary to explore the prevalence of domestic physical violence in other populations of the Islamic Republic of Iran to enhance our understanding of the relationship between socioeconomic status and domestic physical violence.

Our study supports the need for the development of a screening protocol for the detection of domestic violence, perhaps based in family planning programmes, and that counselling and intervention initiatives
should be considered. The high prevalence of physical violence found in this study, together with the etiological factors of physical violence mentioned by the women themselves, argue for a law to established to give more support for women’s rights for protection against violence in the home.

Acknowledgements

Financial support for the study was received from Medical Sciences University of Kurdistan, Sanandaj, Islamic Republic of Iran.

References


**Correction**


The name in Arabic of the second author should read:

حجب رش جهان
Reproductive health knowledge, attitudes and practices of Iranian college students

M. Simbar, F.R. Tehrani and Z. Hashemi

1Department of Midwifery, Shaheed Beheshti Medical University, Tehran, Islamic Republic of Iran (Correspondence to M. Simbar: msimbar@yahoo.com).
2National Research Centre for Reproductive Health, Tehran, Islamic Republic of Iran.
3Centre of Education and Research on Population and Family Planning, Medical University of Qazvin, Qazvin, Islamic Republic of Iran.

Received: 18/04/04; accepted: 14/06/04

ABSTRACT To study reproductive health knowledge, attitudes and practices of youth in the Islamic Republic of Iran, 1111 university students completed a questionnaire with 43 closed questions. The overall mean knowledge score was 54%. Knowledge of males and females, and of married and single students, was similar. Of 664 students answering questions about reproductive health behaviour, 54 (8%) reported having sexual intercourse before marriage; 16% of males and 0.6% of females; 48% of them had used condoms. The majority of students believed that the risk of AIDS and other sexually transmitted infections was moderate but that youth had a low ability to practise healthy behaviour. The majority believed in the benefits of reproductive health knowledge for youth but felt that services were inadequate.

Connaissances, attitudes et pratiques des étudiants iraniens concernant la santé génésique

RÉSUMÉ Afin d'étudier les connaissances, attitudes et pratiques des jeunes concernant la santé génésique en République islamique d'Iran, un questionnaire composé de 43 questions fermées a été rempli par 1111 étudiants universitaires. Le score général moyen pour les connaissances était de 54 %. Les connaissances des garçons et des filles, et celles des étudiants mariés et célibataires, étaient similaires. Sur les 664 étudiants ayant répondu aux questions sur les comportements liés à la santé génésique, 54 (8 %) déclaraient avoir eu des relations sexuelles avant le mariage ; 16 % de garçons et 0,6 % de filles ; 48 % d'entre eux avaient utilisé des préservatifs. La majorité des étudiants pensaient que le risque de SIDA et d'autres infections sexuellement transmissibles était moyen mais que les jeunes avaient une faible capacité à adopter un comportement sain. La majorité des étudiants considéraient qu'il y avait des avantages pour les jeunes à avoir des connaissances en matière de santé génésique mais estimaient que les services étaient insuffisants.

888 La Revue de Santé de la Méditerranée orientale, Vol. 11, N° 5/6, 2005
Introduction

The sexual reproductive health needs of young people in the Islamic Republic of Iran are one of the most under-researched aspects of our population. This is concerning at a time when all communities in the world are threatened by morbidity and mortality due to the spread of the acquired immune deficiency syndrome (AIDS) [1].

The latest report of the Joint United Nations Programme on HIV/AIDS (UNAIDS) reveals that almost 60 million people are globally infected by human immunodeficiency virus (HIV), of whom 20 million are expected to die due to complications of the disease [1]. Currently there is no solution except prevention.

The Ministry of Health and Medical Education in Tehran recorded more than 14 000 HIV positive cases by 2003; 60% of these were infected from injecting drug use and 25% from sexual relations [1]. However, it is predicted that the figures could be much higher than reported and there is evidence that the rate of HIV is growing rapidly [2]

Youth are a particular concern for reproductive health. More than half the world’s youth are initiating their sexual activity during their adolescence years [1]. Every year, half of new HIV infected cases and one-third of the 340 million new sexually transmitted infections (STIs) occur in people aged under 25 years. Each year, more than 1 in 20 adolescents contracts a curable STI [3]. Every minute, 10 female adolescents around the world undergo unsafe abortion [4].

While religious teaching and cultural norms in the Islamic Republic of Iran emphasize abstinence from sexual activity until permanent marriage [5], in reality sexual activity before, and outside, marriage occurs in Islamic societies as well as non-Islamic ones. Unfortunately, little is known about this aspect of our community. The few studies of the knowledge, attitude, beliefs and behaviours about sexual reproductive health of Iranian youth have demonstrated poor knowledge about reproductive health [6–10]. It is the task of health researchers to identify the needs for reproductive health promotion and to plan and implement the necessary educational programmes that might include prevention of STIs/HIV/AIDS and unwanted pregnancies.

This descriptive study aimed to study the knowledge, attitudes and behaviour of a group of university students in relation to the health belief model, in order to identify the sexual reproductive health needs of students and to clarify the future vision of health promotion programmes in the Islamic Republic of Iran.

Methods

Quota sampling was used to recruit 1117 female and male students studying medical science, engineering, science or human sciences in Qazvin University of Medical Sciences and Imam Khomeini International University.

Questionnaires were distributed in the university classes and were filled by the students. The questionnaire included 43 closed questions covering demographic data and knowledge, behaviour and attitudes towards reproductive health.

In the knowledge section, students were given a list of contraceptive methods, type of STIs and ways of preventing HIV and asked to mark which they knew about. In the section on reproductive health behaviour, students were asked if they had had premarital intercourse, and if so, whether they had used contraceptives or condoms and if there were any occurrences of unwanted pregnancy, STIs/HIV/AIDS or unsafe abortion. The attitudes section
Results

A total of 1117 students participated in the study, 654 females and 457 males (6 students did not record their sex), with a mean (standard deviation) age of 21.4 (SD 2.4) and 22.7 (SD 3.5) years respectively. Most of the students (924/1117) were single at the time of the study.

Table 1 shows the proportion of students who knew about each type of contraceptive, types of STIs and ways of preventing HIV, in relation to their field of study, sex and marital status.

In the section about knowledge of contraceptive methods, the most familiar method was oral contraceptives (82% of all students knew about this method) and the least known was emergency contraception (only 17% knew about it). The overall mean knowledge score was 55%. Medical students had a higher mean knowledge score (72%) than students studying human science (39%), science (47%) and engineering (55%). Mean scores on contraception knowledge were slightly higher for females compared with males (59% versus 53% respectively) but was identical for married and single students (55% for both).

For the section about knowledge of STIs, 87% of students knew about AIDS compared with only 40% for syphilis and 46% for gonorrhoea. In the section about knowledge of HIV prevention methods, 75% of the students believed that adhering to moral principles (ethics) was a method of prevention for HIV, 67% knew about not sharing needles and blades and 49% about condoms. Few students (17%) recognized abstinence from sex as a method of preventing HIV.

There was no significant difference between the knowledge of males and females or between single and married students about reproductive health. But knowledge

compromised 10 statements (5 supportive of good practice in reproductive health and 5 non-supportive), scored from 1 to 5 from completely disagree to completely agree.

The final part of the questionnaire assessed the health beliefs of the students according to the health belief model, using 6 questions. They were asked their opinion of how much youth are at risk of unwanted pregnancy, HIV/AIDS and STIs; how much unwanted pregnancy or HIV/AIDS/STIs affect the life, career and social life of single young people; how much knowledge about contraception and HIV/AIDS/STIs prevention methods are useful for single young people; and how much youth are able to use prevention methods when they are at risk of unwanted pregnancy or HIV/AIDS/STIs [4 questions, scored from 1 (not at all) to 4 (a lot)]. They were also asked if they believed that reproductive health services and education for youth were adequate (Yes/No) and if not, were the inadequacies related to: inaccessibility of contraceptives for single young people, low knowledge of youth about reproductive health or an inappropriate environment to access reproductive health services.

The questionnaire validity was confirmed by 10 reproductive health experts and its reliability was assessed by the split half method.

The data were processed using SPSS version 10 and analysed using chi-squared, Mann–Whitney, Spearman’s correlation and Kruskall–Wallis tests.

The project was approved by the ethics committee of the Deputy of Research and Technology of the Ministry of Health and Medical Education of the Islamic Republic of Iran. Written consent was taken from the representatives of the heads of both universities. The study was explained to the students in their classes and questionnaires were completed anonymously.
Table 1 Percentage of students who knew about each item and mean percentage knowledge in each category

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hum. Sci. % (n = 359)</th>
<th>Field of study</th>
<th>Sex</th>
<th>Marital status</th>
<th>Total % (n = 1117)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sci. % (n = 145)</td>
<td>Eng. % (n = 223)</td>
<td>Female % (n = 654)</td>
<td>Male % (n = 457)</td>
<td>Married % (n = 193)</td>
</tr>
<tr>
<td>Contraceptives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pills</td>
<td>71</td>
<td>76</td>
<td>86</td>
<td>92</td>
<td>85</td>
</tr>
<tr>
<td>Condoms</td>
<td>62</td>
<td>65</td>
<td>79</td>
<td>80</td>
<td>68</td>
</tr>
<tr>
<td>IUD</td>
<td>44</td>
<td>61</td>
<td>54</td>
<td>88</td>
<td>74</td>
</tr>
<tr>
<td>Norplant</td>
<td>26</td>
<td>32</td>
<td>39</td>
<td>69</td>
<td>50</td>
</tr>
<tr>
<td>Injectables</td>
<td>37</td>
<td>37</td>
<td>46</td>
<td>72</td>
<td>60</td>
</tr>
<tr>
<td>Emergency contraception</td>
<td>7</td>
<td>8</td>
<td>13</td>
<td>31</td>
<td>18</td>
</tr>
<tr>
<td>Menstrual diary</td>
<td>24</td>
<td>37</td>
<td>44</td>
<td>64</td>
<td>53</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>26</td>
<td>27</td>
<td>52</td>
<td>57</td>
<td>42</td>
</tr>
<tr>
<td>Vasectomy</td>
<td>43</td>
<td>61</td>
<td>66</td>
<td>82</td>
<td>67</td>
</tr>
<tr>
<td>Tubectomy</td>
<td>54</td>
<td>67</td>
<td>66</td>
<td>85</td>
<td>75</td>
</tr>
<tr>
<td>Mean knowledge score</td>
<td>39</td>
<td>47</td>
<td>55</td>
<td>72</td>
<td>59</td>
</tr>
<tr>
<td>Diseases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gonorrhoea</td>
<td>27</td>
<td>30</td>
<td>35</td>
<td>75</td>
<td>39</td>
</tr>
<tr>
<td>Syphilis</td>
<td>20</td>
<td>23</td>
<td>22</td>
<td>74</td>
<td>40</td>
</tr>
<tr>
<td>AIDS</td>
<td>82</td>
<td>87</td>
<td>87</td>
<td>92</td>
<td>86</td>
</tr>
<tr>
<td>Mean knowledge score</td>
<td>43</td>
<td>47</td>
<td>48</td>
<td>80</td>
<td>55</td>
</tr>
<tr>
<td>HIV prevention methods</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applying moral principals</td>
<td>67</td>
<td>77</td>
<td>75</td>
<td>81</td>
<td>75</td>
</tr>
<tr>
<td>Using condoms</td>
<td>31</td>
<td>35</td>
<td>59</td>
<td>64</td>
<td>39</td>
</tr>
<tr>
<td>Avoiding used syringes and blades</td>
<td>51</td>
<td>67</td>
<td>64</td>
<td>68</td>
<td>60</td>
</tr>
<tr>
<td>Abstaining from sex</td>
<td>8</td>
<td>11</td>
<td>18</td>
<td>26</td>
<td>23</td>
</tr>
<tr>
<td>Mean knowledge score</td>
<td>39</td>
<td>48</td>
<td>54</td>
<td>60</td>
<td>49</td>
</tr>
<tr>
<td>Overall mean knowledge score</td>
<td>40</td>
<td>47</td>
<td>53</td>
<td>71</td>
<td>56</td>
</tr>
</tbody>
</table>

IUD = intrauterine device.
AIDS = acquired immune deficiency syndrome.
HIV = human immunodeficiency virus.
of female students about contraceptives was significantly higher than males (Mann–Whitney test, \( P < 0.05 \)). Knowledge of male students was higher than females about STIs/HIV/AIDS (Mann–Whitney test, \( P < 0.05 \)) as well as about methods of prevention against STIs (Mann–Whitney test, \( P < 0.05 \)). There were no significant differences between single and married students in knowledge about contraceptives, STIs and HIV prevention methods. Using the Spearman rank correlation test, higher scores on knowledge and attitudes were significantly correlated with a higher level of education of mothers (\( P < 0.05 \)) and fathers (\( P < 0.01 \)), older age (\( P < 0.01 \)), number of years at college (\( P < 0.01 \)), and higher socioeconomic class (\( P < 0.01 \)).

Permission was not given to ask medical science students about their reproductive health behaviour; thus a total of 664 non-medical students (320 male, 344 female) answered this part of the questionnaire. Of the students, 54 (8%) reported having sexual intercourse before marriage; 52 of them were male (16% of males) and 2 were female (0.6% of females). While 39 were still single, both of the females were now married. Out of the 54, 32 (59%) had used contraceptives and 26 (48%) had used condoms. Six (6) cases of STIs were reported by this group, and the men reported 4 cases of unwanted pregnancy and 3 cases of induced abortion occurring with their partner. The students who had not had premarital intercourse were more likely to believe that abstinence was a method of HIV prevention than did students who had had premarital intercourse (Mann–Whitney, \( P < 0.05 \)).

Table 2 shows that the majority of students had positive views about the need for reproductive health education (statements 1, 2, 3, 8, 9 and 10). Over three-quarters disagreed with the statement that “Youth do not need reproductive health information because they have no premarital intercourse”. They also disagreed that “The best method for prevention of unwanted pregnancies and STDs/AIDS is to withhold information from youth”. Around one-third agreed that contraceptives, including condoms should be available easily to youth. Surprisingly, there were some unusual beliefs about contraceptive use: 47% believed that contraceptive use for a long period causes infertility and 34% that contraceptive use before marriage causes infertility.

Figure 1 shows the responses of students according to the 4 questions about their reproductive health beliefs. The students believed the risk of unwanted pregnancy or HIV/AIDS was only low to moderate, that the threat to young peoples’ lives, social lives and careers from unwanted pregnancy or HIV/AIDS was high and that knowledge about reproductive health was important. However, they also believed that young peoples’ ability to protect themselves was low to moderate. According to the students, the main reason for inadequacies in reproductive health services and education were inaccessibility of services (78%), low knowledge of youth about reproductive behaviour (45%) and barriers to accessing reproductive health services (46%).

**Discussion**

According to the declaration of the International Conference of Population and Development (ICPD) in 1994, reaffirmed in 1999, governments should provide reproductive health information and services as a right of human life [11] and a warranty for the future development and health of nations [12].

This study shows that, overall, university students in Qazvin had a moderate level of knowledge, with a mean knowledge score of 55% about methods of contraception,
57% about STIs and 54% about methods of HIV prevention. Knowledge of engineering, science and human science students was significantly poorer than medical students. The results confirm other smaller studies about reproductive health in the Islamic Republic of Iran [6–10]. The study also demonstrated a weak but significant positive correlation of parents’ education and family socioeconomic class with knowledge of students about reproductive health, confirming the influence of social and economic conditions on the successful promotion of reproductive health [13–15]. Our study also showed some misconceptions about long-term contraceptive use before marriage among these students and this needs to be corrected.

The results of this study could form the basis of further educational AIDS prevention programmes in the Islamic Republic of Iran. While all Iranian college students are educated about family planning at university, it seems that further efforts may be needed. As others have recommended [10,16], this should be adapted to their gender and their field of study, with improved education of non-medical students and added emphasis on family planning methods for males and on STIs/HIV/AIDS prevention.

Initiating sexual activity only after marriage is highly valued in the Islamic

<table>
<thead>
<tr>
<th>Statements</th>
<th>Agree %</th>
<th>Neutral %</th>
<th>Disagree %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Youth, single or married, should know how to use contraceptives</td>
<td>87</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>2 Educational booklets about pregnancy and STDs/AIDS prevention methods should be available in youth communities</td>
<td>76</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>3 Reproductive health services are necessary because temporary marriage is allowed in Shari’a</td>
<td>66</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>4 The best method for prevention of unwanted pregnancy and STDs/AIDS is abstinence until marriage</td>
<td>58</td>
<td>18</td>
<td>24</td>
</tr>
<tr>
<td>5 Contraceptive use for a long period causes infertility</td>
<td>47</td>
<td>30</td>
<td>34</td>
</tr>
<tr>
<td>6 Contraceptive use before marriage causes infertility</td>
<td>34</td>
<td>35</td>
<td>33</td>
</tr>
<tr>
<td>7 Contraceptives including condoms should be available easily to youth</td>
<td>34</td>
<td>34</td>
<td>42</td>
</tr>
<tr>
<td>8 Education about pregnancy and STDs/HIV/AIDS prevention methods leads to high-risk sexual behaviours</td>
<td>20</td>
<td>13</td>
<td>68</td>
</tr>
<tr>
<td>9 Youth do not need to reproductive health information because they have no premarital intercourse</td>
<td>14</td>
<td>8</td>
<td>78</td>
</tr>
<tr>
<td>10 The best method for prevention of unwanted pregnancies and STDs/AIDS is to withhold information from youth</td>
<td>10</td>
<td>7</td>
<td>84</td>
</tr>
</tbody>
</table>
culture of our country, whereas in many other parts of the world more than half of young people are starting sexual activities in adolescence [1]. The results of our study showed that the great majority of Iranian students in this sample are only initiating sexual activity after marriage. But there is a small minority who do not. Although the figures are much lower than world figures, we believe our study has demonstrated for the first time that premarital intercourse is occurring in our community (among 8.1% of this sample), even resulting in cases of unwanted pregnancies and unsafe abortions.

The educational needs of this minority of young people cannot be ignored. Research shows that reproductive health programmes promoting abstinence as the only strategy are not always effective, and for sexually active youth these programmes should have other health messages [13,17]. It is perhaps encouraging that contraceptive use among this small group of sexually active youth was high, perhaps due to their higher level of education; world statistics show that only 17% of sexually active youth are using contraceptives [1] compared with 48% of our student sample.

It is difficult to know the accuracy of our data; the figures of this study might be underestimated because premarital sexual behaviour is such a sensitive topic in this community. In addition, the beliefs and practices of these university students cannot be extrapolated to all Iranian young people; the rate of sexual activity might be different in lower ages and in non-student youth communities. In other parts of the world, STIs/HIV/AIDS and unwanted pregnancies are more common among young people who are homeless, are alcohol or drug users or have multiple sexual partners, groups who usually initiate sexual activity at a
lower age [1]. It is a reality that more than 17 million young people worldwide under 18 years old are homeless and living and working on the street, often as sex workers [1]. We have no valid data about the extent of this problem in the Islamic Republic of Iran, nor any prevention programmes for these groups.

There is a belief among many parents and communities that giving information about reproductive health encourages young people into inappropriate sexual behaviours. In our survey of attitudes and beliefs, more than 80% of students did not agree with this. Furthermore, the low level of sexual activity before marriage, and high use of contraceptives among the few who were sexually active, suggests that these young people were practising healthy behaviours. A careful assessment of the issue by the UNAIDS showed no evidence that sexual reproductive health education encourages high-risk activities, in fact that it leads to safer sexual behaviour [18]. Reproductive health education is a right of young people so that they can make informed decisions about their reproductive lives [11] before the initiation of sexual activity [18].

The health belief model showed that the majority of these students believed that reproductive health knowledge among young people is low, that services are inadequate and there are barriers to accessing services. There is no doubt that a supportive environment is essential for improving reproductive health programmes. Appropriate social, political and cultural supports are necessary as well as the availability and accessibility of information and services. Education programmes should not only emphasize giving information but also should focus on providing youth with life skills and improving the ability of youth to manage their risk (self-efficacy) [19].

Psychosocial theories have been recommended for the planning of educational health promotion programmes including AIDS prevention programmes [20–24]. By applying the health belief model, we showed that the majority of Iranian students believed that unhealthy reproductive health behaviours among youth were a risk to life. However, they also believed that young people had a low capability to protect themselves. The HIV epidemic has up to now had a low impact in the Islamic Republic of Iran, presumably because most of the population follow the Islamic moral code which forbids premarital sex, adultery and homosexuality [25]. This has been demonstrated in other countries of the Eastern Mediterranean Region such as Egypt [26]. Our study confirmed that the majority of students believed that adhering to moral principals and abstinence were the best ways for prevention of STIs/AIDS. But in the present age of more open communication between cultures, patterns of behaviour are liable to change in the future. Policy-makers and health authorities need to pay more attention towards retaining and strengthening those aspects of our culture that keeps our youth safe. An appropriate strategy, which has been suggested by other predominantly Muslim countries such as Malaysia [27], Oman [28] and Egypt [26], is to integrate teaching of Islamic values into reproductive health education and promotion programmes.

**Acknowledgements**

The authors thank Dr Hosein Malek Afzali, the Deputy Minister of Research and Technology and the National Medical Sciences Research Centre, Mrs Hejazi and Mrs Rostami for their help in the study.
References


3. Why are adolescents so vulnerable to sexually transmitted infections? Progress in reproductive health research, 2003, No. 64:5.


Quality of life of patients with schizophrenia 2

T.K. Daradkeh1 and T. Al Habeeb2

1Division of Psychiatry, Jordan University of Science, Irbid, Jordan (Correspondence to T.K. Daradkeh: daradkeh@hotmail.com).
2Department of Psychiatry, King Saud University, Riyadh, Saudi Arabia.

Received: 27/05/03; accepted: 15/07/03

ABSTRACT We studied quality of life in 211 patients with schizophrenia from 2 outpatient clinics in Irbid, Jordan and Riyadh, Saudi Arabia, using the self-reporting questionnaire SRQ-24 and the modified version of the schizophrenia quality of life scale. Sex, marital status, employment, education, non-psychotic symptoms and psychotic symptoms were examined. Approximately 27% had good quality of life, 19.4% thought their general health was excellent or very good and about 30% said they had achieved their expectations. There was no significant relationship between sex and marital status and quality of life but employment and education were significantly related. Patients with less severe psychotic and non-psychotic symptoms were also found to have better quality of life.

Qualité de vie des patients schizophrènes – deuxième partie

RÉSUMÉ Nous avons étudié la qualité de vie de 211 patients schizophrènes dans deux services de consultations externes à Irbid (Jordanie) et Riyad (Arabie saoudite) en utilisant le questionnaire direct SRQ-24 et la version modifiée de l’échelle de qualité de vie pour les patients souffrant de schizophrénie. Le sexe, la situation matrimoniale, l’emploi, l’instruction, les symptômes non psychotiques et les symptômes psychotiques ont été examinés. Environ 27 % avaient une bonne qualité de vie, 19,4 % pensaient que leur santé générale était excellente ou très bonne et environ 30 % déclaraient avoir réalisé leurs attentes. Il n’y avait pas de relation significative entre le sexe et la situation matrimoniale et la qualité de vie mais l’emploi et l’instruction étaient significativement liés. On a également trouvé que les patients qui avaient des symptômes psychotiques et non psychotiques moins sévères avaient une meilleure qualité de vie.
Introduction

The quality of life of the mentally ill has been a matter of concern for centuries [1]. The great reforms of the past century were prompted by this, and more recently there has been a move from institutional to community care. Quality of life is now a more valued assessment, not only in psychiatry but also in many other areas, particularly those branches of medicine dealing with patients who suffer over relatively long periods of time. Patients are increasingly viewed as people and not just cases. This is indicative of a more consumer-oriented approach to medical care, in which the patient’s own views are considered important rather than patients being solely the objects of expert opinion from professionals who themselves judge the effectiveness and relevance of what they do [2].

Quality of life has been defined as a broad-ranging concept affected in a complex way by such things as physical health, psychological state, level of independence, social relationships and relationship to the environment [3]. This definition lays emphasis on the subjective nature of quality of life, and also on the need to explore all those factors considered to have a significant impact on quality of life. Subjective well-being, in comparison, concerns itself primarily with affective states, positive and negative.

Quality of life assessment puts patients first, and recognizes the importance of their opinions. This assessment is a response to patients’ desires not to be treated merely as cases but rather as human beings who have many other concerns. Frequently, their disease or condition may not be the main factor affecting their lives; physicians at times have a tendency to reframe all problems as being related to the presenting disease. A quality of life assessment can help identify where a patient has problems or difficulties. In the case of long-term illness such as schizophrenia, overcoming any of these difficulties may make the patient feel healthier, and as a result make fewer demands on health services [1].

Data regarding the quality of life of patients with schizophrenia from the developing countries in the Eastern Mediterranean Region are sparse, and carrying out such assessment may help identify problems that are not visible and not dealt with by the conventional type of management, primarily consisting of pharmacotherapy. For this reason, we previously carried out a psychometric study on the modified version of the schizophrenia quality of life scale [4]. In our present paper we report on the quality of life of patients living in the community.

Methods

We did a cross-sectional study over 8 weeks (February–March 2002) on patients with a clinical diagnosis of schizophrenia attending the main outpatient psychiatric clinic in Irbid, Jordan (n = 162) and patients at a private clinic in Riyadh, Saudi Arabia (n = 49). In Irbid, we selected the first 20 patients attending the Thursday clinic. If a patient refused to participate, the next one was approached. In Riyadh, the sample was selected in 2 clinic sessions in March 2002. We used samples from 2 countries to check the consistency of the findings.

All patients were receiving neuroleptic medications, mainly depot preparations. Patients who agreed to take part in this study were reassessed to confirm the diagnosis of schizophrenia according to DSM-IV definition [5]. For convenience, the study included patients who attended the clinics on Thursdays, the day during which the investigators planned their time to work on this project.
Patients selected were asked to fill in the modified version of the schizophrenia quality of life scale (SQLS) [4] and the self-reporting questionnaire (SRQ-20, the 20 non-psychotic items on the SRQ-24) [6]. Patients were also asked to rate their general health on a 4-point scale: excellent, good, fair or poor, and whether they had achieved their expectations as yes or no. The last 2 items were adopted from SF-36 health survey [7]. Patients who were illiterate were assisted by the research team.

The modified schizophrenia quality of life scale [4] consists of 30 items that tap 3 dimensions, psychosocial aspects, symptoms and side-effects of medications. Each item is answered as yes (= 1) or no (= 0). The total score ranges from 0 to 30, the higher the score, the poorer the quality of life. The scale has high reliability and validity.

The self-reporting questionnaire SRQ-24 [6] was originally developed by the World Health Organization as a screening instrument for the detection of psychiatric morbidity across different cultures [6]. It consists of 24 items that require a yes or no response according to the presence or absence of symptoms. The respondent is considered to potentially have a psychiatric disorder if the total number of positive responses to the first 20 (non-psychotic) questions reaches a certain value (cut-off point), or if there is at least 1 positive response to any of the 4 remaining (psychotic) items, or if both criteria are met. A variety of cut-off points, ranging from 3 to 10, have been used for the 20 (non-psychotic) items to screen for the presence or absence of a potential non-psychotic disorder. We used 11 as the cut-off point to categorize patients with a severe psychotic illness, schizophrenia, into those with severe and less severe non-psychotic symptoms.

Patients were categorized into 3 groups by their total score on the SQLS, good quality of life, SQLS score ≤ 10; intermediate quality of life, SQLS score 11–20; and poor quality of life, SQLS score ≥ 21. Patients were also grouped by their total score on the first 20 items of the SRQ into those with severe non-psychotic symptoms (SRQ-20 ≥ 11) and those with less severe non-psychotic symptoms (SRQ-20 ≤ 10). A total psychotic score from the last 4 items on the SRQ-24 was calculated (range 0–4; score of 0 = free of symptoms). The influence of selected variables (sex, marital status, educational status, employment status, non-psychotic and psychotic symptoms) on quality of life was examined.

Analysis of variance, t-test, chi-squared test and correlation coefficient were used to test for differences in the quality of life between groups of patients classified by sociodemographic and psychopathology variables, and to test the significance of any association.

Results

The sample comprised 149 (70.6%) male and 62 female patients. Mean age was 33.1 years (standard deviation 11.3). Approximately 46% were never married, 36% married, and the rest were divorced, separated or widowed. Concerning employment status, 53.1% were unemployed, 20.5% were in partial employment and 6.3% were employed or performing their household duties in the case of female patients. Just under a quarter of our sample, 23.8%, were illiterate or had less than 6 years formal education, 23.3% had 7–12 years formal education and 52.9% had more than 12 years formal education.

Approximately 56% of the patients viewed their general health as acceptable with approximately 25% viewing it as poor (Table 1). Approximately 30% of the patients thought that they had achieved
their expectations; the rest did not because of their illness. Table 2 shows cross-tabulation of quality of life with severity of non-psychotic symptoms. It reveals that 26.6% \((n = 55)\) had good quality of life, 37.7% \((n = 78)\) had intermediate quality of life and 35.7% \((n = 74)\) had poor quality of life. It is interesting to note that 74.5% of patients with less-severe non-psychotic symptoms has good quality of life, compared with 25.5% with severe non-psychotic symptoms. The difference was significant \((\chi^2 = 94.6, df = 2, P \leq 0.001)\).

None of the patients with less severe non-psychotic symptoms had poor quality of life. There was no significant difference in the quality of life of patients in Jordan and those in Saudi Arabia.

Regarding the psychotic profile (positive), 15.3% \((n = 32)\) were found to be asymptomatic or free from positive symptoms \((\text{score} = 0)\); 24.4% \((n = 51)\) mildly psychotic; 26.8% \((n = 56)\) moderately psychotic, 20.6% \((n = 43)\) severely psychotic and 12.9% \((n = 27)\) very severely psychotic \((\text{score} = 4)\). There was a statistically significant positive relationship between the summed SQLS score and the global psychotic score \((r = 0.64, P \leq 0.001)\), indicating that the greater the psychotic symptoms, the worse the quality of life. There was no significant difference regarding quality of life between male \([\text{SQLS mean score 15.8 standard deviation (SD) 7.9}]\) and female \([\text{SQLS mean score 17.0, SD 6.6}]\) patients, nor in the SQLS mean scores for different marital status \((F = 0.48, P = 0.75)\). Table 3 shows that quality of life of employed patients \([\text{SQLS mean score 12.1, SD 8.6}]\) was significantly better than that of unemployed patients \([\text{SQLS mean score 18.3, SD 6.9}]\) \((F = 12.4, P \leq 0.001)\). Similarly patients with higher level of education reported a better quality of life than less-educated patients \((F = 10.6, P < 0.001)\).

### Discussion

The deinstitutionalization of psychiatric services and the drift from a more symptom-focused view on outcome of treatment to a more holistic view has increased interest in quality of life issues. Studies on subjective quality of life among community-based patients with severe mental illness have indicated they have a better subjective quality of life compared to patients in hospital settings. Studies of deinstitutionalization programmes have also generally reported improvement in subjective quality of life as patients move from inpatient care settings to community care [8].

An extensive MedLine search on the quality of life of patients from our Region with schizophrenia revealed no single research report that would allow us to compare our findings with those of others. This is the first report on the quality of life of non-institutionalized patients with schizophrenia, and it is legitimate to consider it the first database set on quality of life of patients with severe mental illness in this Region. Since our study is cross-sectional by design, it does not provide information on the effectiveness of our care programme as we have no baseline quality of life assessment ratings.

### Table 1 Schizophrenic patients' view of their general health

<table>
<thead>
<tr>
<th>View of health</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>10</td>
<td>4.7</td>
</tr>
<tr>
<td>Good</td>
<td>31</td>
<td>14.7</td>
</tr>
<tr>
<td>Fair</td>
<td>118</td>
<td>55.9</td>
</tr>
<tr>
<td>Poor</td>
<td>52</td>
<td>24.7</td>
</tr>
<tr>
<td>Total</td>
<td>211</td>
<td>100</td>
</tr>
</tbody>
</table>
The finding that nearly a quarter of our patients viewed their general health as excellent or good and approximately 30% achieved their expectations confirms previous reports of the good prognosis for a subset of patients with schizophrenia \([9,10]\). The question that needs answering is whether our findings in this regard represent the natural outcome of patients with schizophrenia, or if such an outcome has been influenced by our treatment programme, which mainly consists of pharmacotherapy and supportive psychotherapy. The World Health Organization international pilot study on schizophrenia and subsequent determinants of the outcome of severe mental disorders has consistently shown that patients in developing countries have more favourable outcome, course of the condition and higher recovery rates than patients in industrialized countries \([9,10]\).

The reason for the better outcome in the developing world is not completely understood. It may be due to the fact that many people with mental illness in villages in the developing world are better accepted, less stigmatized, and more likely to find work in the agricultural economy or to engage in meaningful labour \([9,11,12]\). A striking observation is that in Arab communities,

### Table 2 Cross-tabulation of quality of life with severity of non-psychotic symptoms

<table>
<thead>
<tr>
<th>Quality of life</th>
<th>Alla</th>
<th>%</th>
<th>Severeb</th>
<th>%</th>
<th>Less severeb</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good (SQLS (\leq) 10)</td>
<td>55</td>
<td>26.6</td>
<td>14</td>
<td>25.5</td>
<td>41</td>
<td>74.5</td>
</tr>
<tr>
<td>Intermediate (SQLS 11–20)</td>
<td>78</td>
<td>37.7</td>
<td>64</td>
<td>82.1</td>
<td>14</td>
<td>17.9</td>
</tr>
<tr>
<td>Poor (SQLS (\geq) 21)</td>
<td>74</td>
<td>35.7</td>
<td>74</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>207</td>
<td>100</td>
<td>152</td>
<td>73.4</td>
<td>55</td>
<td>26.6</td>
</tr>
</tbody>
</table>

\(a\)Some values missing.

\(b\)On the self reporting questionnaire, severe = score \(\geq\) 11, less severe = score \(\leq\) 10.

SQLS = schizophrenia quality of life scale.

\(***P < 0.001.\)

### Table 3 Cross-tabulation of quality of life with employment status

<table>
<thead>
<tr>
<th>Employment status</th>
<th>No.</th>
<th>Mean SQLS score</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>109</td>
<td>18.3</td>
<td>6.9</td>
</tr>
<tr>
<td>Partial employment</td>
<td>42</td>
<td>15.3</td>
<td>7.3</td>
</tr>
<tr>
<td>Employed</td>
<td>54</td>
<td>12.1</td>
<td>12.1***</td>
</tr>
<tr>
<td>Total</td>
<td>205</td>
<td>16.0</td>
<td>7.9</td>
</tr>
</tbody>
</table>

\(a\)Some values missing.

SQLS = schizophrenia quality of life scale.

SD = standard deviation.

\(***P < 0.001.\)

### Table 4 Cross-tabulation of quality of life with educational attainment

<table>
<thead>
<tr>
<th>Education (years in formal education)</th>
<th>No.</th>
<th>Mean SQLS score</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\leq) 6</td>
<td>49</td>
<td>18.9</td>
<td>6.3</td>
</tr>
<tr>
<td>7–12</td>
<td>48</td>
<td>18.3</td>
<td>7.1</td>
</tr>
<tr>
<td>(\geq) 13</td>
<td>109</td>
<td>13.9</td>
<td>8.1***</td>
</tr>
<tr>
<td>Total</td>
<td>206</td>
<td>16.1</td>
<td>7.8</td>
</tr>
</tbody>
</table>

\(a\)Some values missing.

SQLS = schizophrenia quality of life scale.

SD = standard deviation.

\(***P < 0.001.\)
individuals with schizophrenia are more likely to remain in the community with their families, which helps protect them from becoming socially isolated. There is a great deal of evidence for the better psychosocial adaptation and outcome of schizophrenia in Saudi Arabia and Algeria [13,14].

Despite the limited resources in terms of care in our set-up, the relatively high proportion of patients who perceived their quality of life as good or fair can only be explained by the psychosocial support our patients obtain from relatives. It is interesting to note that none of our patients was homeless, and a reasonable percentage of them was married and employed. To our surprise we did not find a relationship between sex, marital status and quality of life but this could be explained by the small sample size. Salokangas et al. studied the association of sex and marital status with quality of life and found that the quality of life of single men was poorer than others in almost all the areas in which it was measured [15]. Differences between single women and married men or women were much smaller. Women, independent of their marital status, were more satisfied with their life, had more close relationships and had more often done useful work than men [15].

Our findings of a positive association between the level of distress as measured by the SRQ-24 and poor of quality of life is consistent with the findings of Ritsner et al., who found that improved quality of life of patients with schizophrenia was related to reduction of distress and of paranoid symptoms [16]. Our findings regarding employment are also consistent with the findings of Bryson, Lysaker and Bell who reported a positive association between amount of participation in paid work activity and improvement in quality of life [17]. In studies investigating predictors of subjective quality of life in severely mentally ill persons, the results have mostly shown weak associations between sociodemographic characteristics and subjectively reported indicators of satisfaction [18]. Our findings regarding the association between psychopathology and quality of life supports the results of cross-sectional investigations of the relationship between psychopathology and subjective quality of life, especially concerning depressed mood and anxiety [19–21].

Finally, we believe that a collaborative effort is needed by the countries of the Region to evaluate the quality of life of patients with severe mental illness, and it would be of great interest to find out the impact of management programmes on the quality of life of these patients. We admit that our sample was relatively small to make valid generalizations, but our findings warrant further investigation by multiple centres and under the close supervision of the World Health Organization.

References


4. Al-Habeeb T, Daradkeh TK. The quality of life of patients with schizophrenia 1 (Jordan–Saudi Project): the reliability and
validity of the modified version of schizo-
phrenia quality of life scale (SQLS). Arab
5. Diagnostic and statistical manual of men-
tal disorders, 4th ed. Washington DC,
6. Harding TW et al. Mental disorders in
primary health care: a study of their fre-
cquency and diagnosis in four developing
countries. Psychological medicine, 1980,
10:231–41.
7. Ware YE, Snow KR, Kosinski M. SF-36
health survey: manual and interpretation
guide. Boston, Massachusetts, New Eng-
land Medical Center, 1993.
8. Barry MM, Zissi A. Quality of life as an
outcome measure in evaluating mental
health services: a review of the empirical
evidence. Social psychiatry and psychia-
tric epidemiology, 1997, 32:38–47.
9. Sartorius N, Gulbinat W, Harrison G.
Long term follow up of schizophrenia in
16 countries: a description of the interna-
tional study of schizophrenia conducted
by the World Health Organization. Social
psychiatry and psychiatric epidemiology,
31(5):249–58.
10. World Health Organization. Schizophre-
nia: an international follow up study.
11. Al Assra A, Amin H. Hospital admission
in a psychiatric division in Saudi Arabia.
12. Warmer R. Recovery from schizophrenia:
psychiatry and political economy, 2nd ed.
13. El Gaaly A. Outpatients in Canada and
Saudi Arabia: a comparison of two clinic
samples. Egyptian journal of psychiatry,
14. Robert P et al. Course of psychosis in
Algeria and France: about 342 cases ob-
served from 1975 to 1985. Psychopathol-
15. Salokangas PIC, et al. To be or not to be
married—that is the question of quality
of life in men with schizophrenia. Social
psychiatry and psychiatric epidemiology,
16. Ritsner M et al. Predictors of quality of life
in major psychoses: a naturalistic follow-
up study. Journal of clinical psychiatry,
17. Bryson G, Lysaker P, Bell M. Quality of
life benefits of paid work activity in schizo-
phrenia. Schizophrenia bulletin, 2002,
28(2):249–57.
18. Bobes J, Gonzàles MiP. Quality of life
in schizophrenia. In: Katschning H, Free-
man H, Sartorius N, eds. Quality of life in
mental disorders. New York, John Wiley &
19. Browne S et al. Quality of life in schizo-
phrenia: relationship to sociodemographic
factors, symptomatology and tardive dys-
kinesia. Acta psychiatrica scandinavica,
20. Corrigan PW, Buican B. The construct
validity of subjective quality of life for the
severly mentally ill. Journal of nervous
21. Dickerson FB, Ringel NB, Parente F. Sub-
jective quality of life in out-patients with
schizophrenia: clinical and utilization cor-
relates. Acta psychiatrica scandinavica,
Patient satisfaction and related factors in Kerman hospitals

A. Bahrampour$^1$ and F. Zolala$^1$

Eastern Mediterranean Health Journal, Vol. 11, Nos 5/6, 2005 905

ABSTRACT To determine the level of patient satisfaction in hospitals in Kerman and to determine the factors affecting satisfaction, we did an analytic cross-sectional study on 3017 patients from March 2002 to March 2003. We used a 4-part questionnaire covering demographics, satisfaction, patients’ needs and mental health status. Just over 50% of the patients were female. Mean age was 37.4 years (range 1–99 years). Just under 50% of patients were satisfied. There was a significant relationship between satisfaction and type of hospital ($P < 0.001$), ward ($P < 0.006$), education level ($P < 0.004$), history of hospitalization ($P < 0.001$), need for medical services ($P < 0.001$), health status ($P < 0.001$) and duration of hospitalization ($P < 0.002$).

Satisfaction des patients et facteurs secondaires dans les hôpitaux de Kerman

RÉSUMÉ Afin de déterminer le niveau de satisfaction des patients dans les hôpitaux à Kerman et les facteurs qui affectent cette satisfaction, nous avons réalisé une étude transversale analytique sur 3017 patients de mars 2002 à mars 2003. Nous avons utilisé un questionnaire en 4 parties couvrant la démographie, la satisfaction, les besoins des patients et l’état de santé mentale. Un peu plus de 50 % des patients étaient des femmes. L’âge moyen était de 37,4 ans (extrêmes : 1-99 ans). Un peu plus de 50 % des patients se déclaraient satisfaits. Il y avait une relation significative entre la satisfaction et le type d’hôpital ($P < 0.001$), le service d’hospitalisation ($P < 0.006$), le niveau d’instruction ($P < 0.004$), les antécédents d’hospitalisation ($P < 0.001$), le besoin de services médicaux ($P < 0.001$), l’état de santé ($P < 0.001$) et la durée de l’hospitalisation ($P < 0.002$).

$^1$Department of Biostatistics and Epidemiology, School of Health, Kerman University of Medical Sciences, Kerman, Islamic Republic of Iran (Correspondence to A. Bahrampour: abahrampour@yahoo.com)

Received: 15/04/04; accepted: 25/07/04


**Introduction**

In recent decades, determining the level of patient satisfaction has been found to be the most useful tool for getting patients’ views on how to provide care. This is based on 2 major principles: patients are the best source of information on quality and quantity of medical services provided and patients’ views are determining factors in planning and evaluating satisfaction.

Donabedian [1] has argued that client satisfaction is of fundamental importance as a measure of the quality of care because it gives information on the provider’s success in meeting client values and expectations, matters on which the client is the ultimate authority. The measurement of satisfaction is, therefore, an important tool for research, administration and planning [2]. Client satisfaction is a crucial index for determining the quality of services and the way in which they are provided by medical staff [3].

Many studies have been done throughout the world to achieve these aims. The results of a study done by Demir and Celik in Turkey indicated that satisfaction with physicians, nurses, equipment and food services were the main determinants of overall satisfaction in hospitalized patients. The type of clinic in which the patients were managed was also important [4]. Jaipaul and Rosenthal found that level of satisfaction increased with age and then declined. Satisfaction was also greater in patients who reported they had better health [5].

In a study done by Weisman et al. in the United States of America, patient satisfaction was related to different factors for males and females [6]. Women’s overall satisfaction was more dependent than men’s on information content and continuity of care; men’s overall satisfaction was more dependent on the personal interest shown in them by providers [6].

In an Iranian survey done by Ayatollahi et al., satisfaction level of patients who were treated by male doctors was greater than in the group who were treated by female doctors and level of satisfaction increased as age increased. There was an inverse relationship between patient satisfaction and education. Speciality was also important: the highest satisfaction level was in patients treated by paediatricians and the lowest for dermatologists. General health condition had a positive relationship with satisfaction [3].

One of the most important problems in health system in the Islamic Republic of Iran is patient satisfaction. Despite high expenditure and adequate facilities, we have observed that patients are often not satisfied. It is crucial that the health system provides services suitable for patients and which satisfy them because they are the main clients. As can be seen, level of satisfaction is associated with a number of factors, which may differ in different societies. This plays an important role in determining principles for planning and management.

The aim of this study was to establish the determining factors for patient satisfaction taking into account the above factors, which are of importance in planning, managing and evaluating. This is the first such study done in this field in Kerman, which is the second largest province in the Islamic Republic of Iran, area 18.2 m², population just over 2 million (1966 census).

**Methods**

The target population was patients who were hospitalized in Kerman province from March 2002 to March 2003. There are 2 types of hospital in Kerman province, the teaching hospitals (government hospitals), which are managed by the medical univer-
sity, and non-teaching (private and social security) hospitals. The sample population was selected by systematic random sampling. From a pilot study, sample size was determined as 3017. The method of sampling was proportional cluster sampling. All 7 hospitals were selected for the first cluster and different wards in each hospital were selected as the second cluster. Sample size in each cluster was determined according to the proportion of hospitalized patients in different wards. We selected every 2nd patient until the required sample size was met.

The participants were interviewed in the hospital when they were being discharged. The questionnaires were completed by the interviewer. Interviews were carried out on all days other than Fridays. If a patient who was selected refused to participate or was unable to answer the questions, the next person on the hospital registration form was selected as a replacement. There were just under 50 refusals. For children < 10 years old, parents answered the questions.

The questionnaire was developed by Ayatollahi and was in 4 parts: demographic characteristics; rate of patient needs to medical services; satisfaction (including behaviour of staff and doctors, availability of nurses and other services); and mental health status (anxiety, social behaviour and depression) [3].

For the analysis of data, descriptive statistics were used for determining indices, analysis of variance for comparing subgroups and logistic regression for determining factors which correlate with satisfaction. In logistic regression we have a binary variable as response and independent variables, which can be quantitative or qualitative. Using this method, the first variable was selected as the reference category and odds ratios were calculated for the other variables. The mathematical form [7] of this model is:

$$\ln \frac{p}{1-p} = \beta_0 + \sum_{i=1}^{n} \beta_i X_i$$

where $\beta_0$ is the intercept, $\beta_i$ is the coefficient of the independent variable, $X_i$ is the independent variable and $p$ is the probability of satisfaction.

To produce binary variables related to satisfaction, the mean of the scores was calculated for each patient; scores 1 and 2 were classed as unsatisfied and 4 and 5 as satisfied. For scores between 2 and 4, first the median was calculated; scores less than the median were classed as unsatisfied and the rest as satisfied, i.e. half the scores between 2 and 4 were “satisfied” and half “unsatisfied”. We applied the logistic regression and ENTER method for finding determining factors. In the ENTER method, variables are entered in the model one after another as listed and finally the model includes only significant variables. Minitab statistical software was used for data analysis. $P < 0.05$ was considered significant.

Results

Of the total of 3017 participants, 1562 (51.8%) were females; characteristics of the participants are shown in Table 1. Mean age was 37.4 years, range 1–99 years. We found 49.4% of patients were not satisfied, 49.6% were satisfied; values were missing for 1.0%.

Looking at the significant differences between satisfied and unsatisfied categories, factors such as age and sex were not significant and so were not determining factors ($P > 0.05$).

We used analysis of variance on original data without grouping, and logistic regression on binary variables. Independent variables were: level of health, sex, job, hospital, insurance, ward, hospitalized
The odds ratios for teaching hospitals and the social security hospital were the same but satisfaction was significantly greater in private hospitals ($P < 0.001$). In gynaecology and orthopaedics wards, the level of satisfaction was greater than in other wards (Table 2).

The logistic equation is:

$$Y = -1.81 + 0.034x_1 + 0.16x_2 + 0.39x_3 + 0.41x_4$$
$$+ 0.0039x_5 + 0.76x_6 + 0.508x_7 - 0.018x_8$$
$$+ 0.0019x_9 - 0.049x_{10} + 0.311x_{11}$$

where: $Y =$ satisfaction, $x_1 =$ type of hospital, $x_2 =$ sex, $x_3 =$ ward, $x_4 =$ duration of hospital stay, $x_5 =$ age, $x_6 =$ need for medical services, $x_7 =$ health level, $x_8 =$ education, $x_9 =$ job, $x_{10} =$ insurance, $x_{11} =$ history of hospitalization ($x_6$ and $x_7$ were calculated from the scores on the questionnaire).

**Discussion**

We found no significant relationship between patient satisfaction and sex; this is consistent with the survey of Weisman et al. [6]. Patient satisfaction rose with increasing need for medical services. This could be because patients with greater needs in fact use more medical services. This provides a kind of mental safety for the patients, so they may feel they were treated with more consideration and care. Providing medical equipment can also increase satisfaction, as found in a previous study [8]. We also found that satisfaction rose with increasing patient health level, and this is consistent with the findings of other studies [5,9].

The effect of the age variable on satisfaction was not significant but it showed interesting results. The greatest level of satisfaction was in the group 15–24 years old, then it decreased gradually and increased again in the group who were over 60 years old.

### Table 1: Demographic and other characteristics of participants ($n = 3017$)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Participants (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>51.8</td>
</tr>
<tr>
<td>Male</td>
<td>48.2</td>
</tr>
<tr>
<td><strong>Work status</strong></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>55.3</td>
</tr>
<tr>
<td>Unemployed</td>
<td>44.7</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>17.7</td>
</tr>
<tr>
<td>&lt; school diploma</td>
<td>30.6</td>
</tr>
<tr>
<td>School diploma</td>
<td>36.1</td>
</tr>
<tr>
<td>University degree</td>
<td>15.6</td>
</tr>
<tr>
<td><strong>Duration of hospitalization (days)</strong></td>
<td></td>
</tr>
<tr>
<td>&lt; 1</td>
<td>9.5</td>
</tr>
<tr>
<td>1–4</td>
<td>76.9</td>
</tr>
<tr>
<td>5</td>
<td>13.6</td>
</tr>
<tr>
<td><strong>Type of hospital</strong></td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td>74.5</td>
</tr>
<tr>
<td>Private or social security</td>
<td>25.5</td>
</tr>
<tr>
<td><strong>History of hospitalization</strong></td>
<td></td>
</tr>
<tr>
<td>Insured</td>
<td>98.5</td>
</tr>
</tbody>
</table>
Table 2 Logistic regression coefficients for factors affecting patient satisfaction in Kerman province, 2002–03

<table>
<thead>
<tr>
<th>Factor</th>
<th>Regression coefficient</th>
<th>SE</th>
<th>OR</th>
<th>P-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female*</td>
<td></td>
<td></td>
<td></td>
<td>&gt; 0.210</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>−0.09</td>
<td>0.11</td>
<td>0.91</td>
<td>&gt; 0.418</td>
<td>0.73–1.14</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
<td>&gt; 0.323</td>
<td></td>
</tr>
<tr>
<td>1–14(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–24</td>
<td>0.13</td>
<td>0.27</td>
<td>1.13</td>
<td>&gt; 0.635</td>
<td>0.67–1.95</td>
</tr>
<tr>
<td>25–35</td>
<td>−0.06</td>
<td>0.29</td>
<td>0.95</td>
<td>&gt; 0.844</td>
<td>0.54–1.66</td>
</tr>
<tr>
<td>36–45</td>
<td>−0.17</td>
<td>0.30</td>
<td>0.84</td>
<td>&gt; 0.558</td>
<td>0.47–1.50</td>
</tr>
<tr>
<td>46–60</td>
<td>−0.26</td>
<td>0.29</td>
<td>0.77</td>
<td>&gt; 0.383</td>
<td>0.43–1.27</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>−0.09</td>
<td>0.31</td>
<td>0.91</td>
<td>&gt; 0.765</td>
<td>0.49–1.67</td>
</tr>
<tr>
<td><strong>Education level</strong></td>
<td></td>
<td></td>
<td></td>
<td>0.004</td>
<td></td>
</tr>
<tr>
<td>Illiterate*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary</td>
<td>−0.41</td>
<td>0.17</td>
<td>0.66</td>
<td>&lt; 0.012</td>
<td>0.48–0.91</td>
</tr>
<tr>
<td>Middle school</td>
<td>−0.43</td>
<td>0.16</td>
<td>0.65</td>
<td>&lt; 0.006</td>
<td>0.48–0.88</td>
</tr>
<tr>
<td>Diploma</td>
<td>−0.61</td>
<td>0.15</td>
<td>0.55</td>
<td>&lt; 0.001</td>
<td>0.40–0.74</td>
</tr>
<tr>
<td>Technician</td>
<td>−0.41</td>
<td>0.23</td>
<td>0.67</td>
<td>&lt; 0.083</td>
<td>0.43–1.05</td>
</tr>
<tr>
<td>Bachelor &amp; higher degree</td>
<td>−0.65</td>
<td>0.23</td>
<td>0.52</td>
<td>&lt; 0.005</td>
<td>0.33–0.82</td>
</tr>
<tr>
<td><strong>Job</strong></td>
<td></td>
<td></td>
<td></td>
<td>&gt; 0.414</td>
<td></td>
</tr>
<tr>
<td>Unemployed*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>0.44</td>
<td>0.26</td>
<td>1.55</td>
<td>&gt; 0.09</td>
<td>0.93–2.60</td>
</tr>
<tr>
<td>Self employed</td>
<td>0.19</td>
<td>0.15</td>
<td>1.21</td>
<td>&gt; 0.20</td>
<td>0.89–1.64</td>
</tr>
<tr>
<td>Government employee</td>
<td>0.14</td>
<td>0.15</td>
<td>1.15</td>
<td>&gt; 0.37</td>
<td>0.84–1.56</td>
</tr>
<tr>
<td>Private sector employee</td>
<td>0.47</td>
<td>0.38</td>
<td>1.61</td>
<td>&gt; 0.21</td>
<td>3.76–3.40</td>
</tr>
<tr>
<td>Student</td>
<td>−0.05</td>
<td>0.18</td>
<td>0.94</td>
<td>&gt; 0.76</td>
<td>0.65–1.36</td>
</tr>
<tr>
<td><strong>Duration of hospitalization (days)</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.002</td>
<td></td>
</tr>
<tr>
<td>&lt; 1(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1–4</td>
<td>−0.18</td>
<td>0.17</td>
<td>0.84</td>
<td>&gt; 0.29</td>
<td>0.60–1.16</td>
</tr>
<tr>
<td>5</td>
<td>0.30</td>
<td>0.20</td>
<td>1.34</td>
<td>&gt; 0.135</td>
<td>0.91–1.99</td>
</tr>
<tr>
<td><strong>History of hospitalization</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>0.42</td>
<td>0.13</td>
<td>1.52</td>
<td>&lt; 0.001</td>
<td>1.18–1.95</td>
</tr>
<tr>
<td><strong>Need for medical services</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Low(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderate</td>
<td>0.66</td>
<td>0.11</td>
<td>1.92</td>
<td>&lt; 0.001</td>
<td>1.55–2.38</td>
</tr>
<tr>
<td>High</td>
<td>0.94</td>
<td>0.16</td>
<td>2.52</td>
<td>&lt; 0.001</td>
<td>1.88–3.46</td>
</tr>
<tr>
<td><strong>Health level</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Good(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>−0.51</td>
<td>0.11</td>
<td>0.60</td>
<td>&lt; 0.001</td>
<td>0.48–0.70</td>
</tr>
<tr>
<td>Poor</td>
<td>−1.2</td>
<td>0.13</td>
<td>0.20</td>
<td>&lt; 0.001</td>
<td>0.23–0.38</td>
</tr>
</tbody>
</table>
Table 2 Logistic regression coefficients for factors affecting patient satisfaction in Kerman province, 2002–03 (concluded)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Regression coefficient</th>
<th>SE</th>
<th>OR</th>
<th>P-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.001</td>
<td></td>
</tr>
<tr>
<td>Kerman Darman&lt;sup&gt;a,c&lt;/sup&gt;</td>
<td>1.17</td>
<td>0.24</td>
<td>3.21</td>
<td>&lt; 0.001</td>
<td>1.99–5.17</td>
</tr>
<tr>
<td>Shafa&lt;sup&gt;c&lt;/sup&gt;</td>
<td>−0.02</td>
<td>0.14</td>
<td>0.98</td>
<td>&gt; 0.887</td>
<td>0.75–1.28</td>
</tr>
<tr>
<td>Bahonar&lt;sup&gt;a&lt;/sup&gt;</td>
<td>−0.55</td>
<td>0.13</td>
<td>0.58</td>
<td>&lt; 0.001</td>
<td>0.45–0.75</td>
</tr>
<tr>
<td>Razieh Firooz&lt;sup&gt;d&lt;/sup&gt;</td>
<td>−0.75</td>
<td>0.19</td>
<td>0.47</td>
<td>&lt; 0.001</td>
<td>0.33–0.69</td>
</tr>
<tr>
<td>Kashani&lt;sup&gt;e&lt;/sup&gt;</td>
<td>−0.92</td>
<td>0.18</td>
<td>0.40</td>
<td>&lt; 0.001</td>
<td>0.28–0.56</td>
</tr>
<tr>
<td>Ward</td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.006</td>
<td></td>
</tr>
<tr>
<td>Internal&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gynaecology</td>
<td>0.292</td>
<td>0.148</td>
<td>1.33</td>
<td>&lt; 0.048</td>
<td>1.00–1.78</td>
</tr>
<tr>
<td>Orthopaedics</td>
<td>0.154</td>
<td>0.195</td>
<td>1.17</td>
<td>&gt; 0.429</td>
<td>0.80–1.71</td>
</tr>
<tr>
<td>Surgery</td>
<td>−0.094</td>
<td>0.144</td>
<td>0.91</td>
<td>&gt; 0.514</td>
<td>0.69–1.20</td>
</tr>
<tr>
<td>Urology</td>
<td>−0.179</td>
<td>0.282</td>
<td>0.83</td>
<td>&gt; 0.526</td>
<td>0.48–1.45</td>
</tr>
<tr>
<td>Neurology</td>
<td>−0.2</td>
<td>0.214</td>
<td>0.82</td>
<td>&gt; 0.351</td>
<td>0.53–1.24</td>
</tr>
<tr>
<td>Ear, nose &amp; throat</td>
<td>−0.211</td>
<td>0.222</td>
<td>0.81</td>
<td>&gt; 0.343</td>
<td>0.52–1.25</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>−0.273</td>
<td>0.231</td>
<td>0.76</td>
<td>&gt; 0.237</td>
<td>0.48–1.19</td>
</tr>
<tr>
<td>Emergency</td>
<td>−0.3</td>
<td>0.251</td>
<td>0.74</td>
<td>&gt; 0.232</td>
<td>0.45–1.21</td>
</tr>
<tr>
<td>Burn</td>
<td>−0.39</td>
<td>0.664</td>
<td>0.67</td>
<td>&gt; 0.552</td>
<td>0.18–2.47</td>
</tr>
<tr>
<td>Dermatology</td>
<td>−0.403</td>
<td>0.404</td>
<td>0.67</td>
<td>&gt; 0.318</td>
<td>0.30–1.47</td>
</tr>
<tr>
<td>Cardiology</td>
<td>−0.41</td>
<td>0.176</td>
<td>0.66</td>
<td>&lt; 0.019</td>
<td>0.46–0.93</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>−0.515</td>
<td>0.324</td>
<td>0.60</td>
<td>&gt; 0.112</td>
<td>0.31–1.13</td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td></td>
<td></td>
<td>&gt; 0.45</td>
<td></td>
</tr>
<tr>
<td>Social security&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aided</td>
<td>0.69</td>
<td>0.57</td>
<td>1.99</td>
<td>&gt; 0.23</td>
<td>0.64–6.18</td>
</tr>
<tr>
<td>Welfare</td>
<td>0.298</td>
<td>0.4</td>
<td>1.34</td>
<td>&gt; 0.46</td>
<td>0.61–2.98</td>
</tr>
<tr>
<td>Governmental</td>
<td>0.21</td>
<td>0.27</td>
<td>1.23</td>
<td>&gt; 0.43</td>
<td>0.72–1.20</td>
</tr>
<tr>
<td>Medicare</td>
<td>0.02</td>
<td>0.22</td>
<td>1.02</td>
<td>&gt; 0.92</td>
<td>0.65–1.60</td>
</tr>
<tr>
<td>Rural</td>
<td>−0.01</td>
<td>0.23</td>
<td>0.98</td>
<td>&gt; 0.94</td>
<td>0.61–1.56</td>
</tr>
<tr>
<td>Private</td>
<td>−0.4</td>
<td>0.43</td>
<td>0.66</td>
<td>&gt; 0.34</td>
<td>0.28–1.55</td>
</tr>
<tr>
<td>Other</td>
<td>−0.18</td>
<td>0.27</td>
<td>0.83</td>
<td>&gt; 0.49</td>
<td>0.48–1.40</td>
</tr>
</tbody>
</table>

SE = standard error of regression coefficient.
OR = odds ratio.
CI = confidence interval.
<sup>a</sup>Reference category.
<sup>b</sup>Married women who worked in the home were classified as unemployed and children under 10 years were classified under their fathers' job as the parents answered the questions.
<sup>c</sup>Teaching hospital.
<sup>d</sup>Private hospital.
<sup>e</sup>Social security hospital.
old. This means that older people were more satisfied, similar to the findings of Jaipaul and Rosenthal [5].

Level of satisfaction in different types of hospital varied. The greatest level of satisfaction was observed in private hospitals and after that in training hospitals. The lowest level of satisfaction was in the social security hospital. These differences may be related to the kind of services provided: crowding, medical services, experience of staff, advanced equipment and better facilities. These results confirmed those of a survey done in Jordan [10].

Level of satisfaction was related to type of ward: satisfaction was greater in gynaecology and orthopaedic wards than other wards. The special circumstances of patients hospitalized in gynaecology wards (delivery and childbirth and being happy with the outcome) could be a factor. In the orthopaedic wards the reason could be related to the longer duration of hospitalization (confirmed in the duration of hospitalization variable); patients may have become familiar with the staff and health systems during their stay and also have acquired more knowledge about particular problems that could not be resolved as well as the better facilities and more experienced staff in this ward [11]. Level of satisfaction was significantly related to history of hospitalization and duration of hospitalization, and increased with both. Patients may have become familiar with the health system and medical staff and so felt less scared than if they were in a new and strange place. This factor has not been studied in previous research.

In our study, education was a determining factor in level of satisfaction (the highest satisfaction score was for those who were illiterate and the lowest for those with a university degree) but there was no trend in the odds ratio. In a study done by Ayatollahi et al., level of education was inversely correlated with satisfaction. In general, we found that patient satisfaction was more related to treatment and disease factors than demographic factors such as age, sex, and job.

In this study we had some restrictions. In the paediatric wards, parents were questioned instead of their children. The questionnaire was filled when the patients were discharged so patients who died in hospital were not included in the sample. Patients who were in intensive care could not answer the questions.

We recommend that more studies be done in this field in other provinces and countries to compare with the results of this study.

References


---

**Establishment of the Palestinian Medical Journal**

The Human Resources Development of the Ministry of Health in Palestine has recently launched the *Palestinian Medical Journal*. The first issue can be accessed at: [http://www.moh.gov.ps/pmj/](http://www.moh.gov.ps/pmj/)

We welcome this new journal and congratulate all those who have contributed to its establishment. We wish it every success.
Patient satisfaction with dental services at Ajman University, United Arab Emirates

R. Hashim

ABSTRACT To provide information about the level of patient satisfaction with the dental care provided at the Faculty of Dentistry at Ajman University, 135 randomly selected patients, 50 males and 85 females, were surveyed. A questionnaire was used to collect data on personal details and information regarding current visit and use of the dental service. Most patients were Arabs; a minority were Indian. Most were satisfied with the care provided except for explanation of treatment options and the remoteness of the clinic. Measuring level of satisfaction is an important factor towards improving the service provided and should be monitored regularly.
Introduction

Ajman University, the only university in the Emirate of Ajman, has a history of more than 12 years teaching faculties such as engineering, computer science, business and pharmacy. In 1997, the Faculty of Dentistry was established as the first dental school in the United Arab Emirates. Dental services commenced from mid-September 2000.

The cost of the dental services is heavily subsidized by the university. Dental appointments are always fully booked and the usual waiting time to get an appointment for treatment depends on each patient’s case and on the student schedule for the clinics. Patients with acute problems can, however, make an emergency appointment and are seen on the same day.

Although the university aims at providing a good dental service for its patients and spends a considerable amount of money and human resources, little information on patient satisfaction is available. Patient satisfaction with dental care is an important aspect of the quality of care [1], and will influence the future utilization of the service. It is, therefore, an essential element in assessing the quality of care. A major issue for careful monitoring of consumer satisfaction is recognition of the complex relationship between patients’ views of the health care system and their health and illness behaviour [2]. Dentist–patient interactions during a consultation, including cognitive and emotional aspects, have been demonstrated to affect patient compliance with clinical advice and follow-up visits.

Over the past 10 years, consumer satisfaction has gained widespread recognition as a measure of quality in many public sector services. Satisfaction is the fulfilment of desire or need. Pascoe defined patient satisfaction as a health care recipient’s reaction to salient aspects of the context, process, and result of their service experience [3]. The consumer is the central figure of accountability in public services. If a patient is to be adequately served, then he or she must have a voice in the process of care.

While measures of satisfaction with medical care are abundant, only a small number of dental satisfaction questionnaires have been reported in the literature. Ware and Snyder [4] devised a patient satisfaction questionnaire for measuring satisfaction with medical care. The dental satisfaction questionnaire of Davies and Ware [5] was adapted from this by changing item references from medical to dental and adding pain management items. It has the advantage of having a manageable number of items (19) over a broader range of subscales than other dental satisfaction questionnaires, and is measured on a 5-point Likert scale.

If satisfaction influences compliance, and better compliance means healthier (and less costly) patients in the long term, then perhaps the most effective way to improve compliance for younger patients is to increase their general satisfaction with the dental practice [6].

Because of the importance of these relations for obtaining patient feedback on dental services, this survey to evaluate patient satisfaction was conducted at the Dental Faculty of Ajman University.

Methods

The Davies and Ware questionnaire was considered to have items useful for the current study (pain management was not considered in this study). Accordingly, items were adapted from that instrument and used in combination with the 5-item Dental Satisfaction Scale developed for use in Australia [7].
The questionnaire was designed in English and translated into Arabic and then translated back into English to ensure that the meaning of the questions stayed the same.

A pilot study was conducted on 16 patients to pre-test the data collection methods and the questionnaire. The participants were invited to complete a questionnaire and their opinion about the wording of that version was requested. The questionnaire appeared to be easily understood and was finalized with no changes.

As this was the first survey conducted at the university to measure level of patient satisfaction, it was decided to select at least 50% of the patients over the study period. A total of 151 patients were randomly selected from all (282) patients who had undergone care at the female dental student clinic in the Faculty of Dentistry in March 2003. Randomization was done using a computer program. Only 6 patients refused to participate. Ajman University has 2 separate sections, 1 for female students only, the other for male students, both sections getting their patients from the same source. The patients were distributed randomly according to the student availability.

The patients were invited to complete a questionnaire that required them to supply personal details and information regarding their current visit and use of the dental service. The items on the questionnaire were mainly categorized under 3 dimensions: access, the physical process of arranging for and getting to dental care; convenience, the location of clinics; and quality, defined as how good the care is, both in term of technical and interpersonal aspects of the process. Cost of treatment was not considered as the treatment in our faculty is heavily subsidized by the university. Naturally, all our patients were expected to be satisfied with this item.

The questionnaire contained a list of 9 statements about various aspects of dental care and the participants were asked to indicate their degree of agreement with the statements on a 5-point Likert scale (strongly agree; agree; neutral; disagree; strongly disagree). This scaling method has been employed in other surveys [8,9] and has the advantage of being relatively easy for respondents to complete. The questions were randomly arranged and asked in either a positive or negative way to minimize the inertia response given by the respondents. The answers to the questions given a negative slant were reversed by recoding during analysis so the direction of all responses was the same. For young patients, their caregivers were asked to fill in the form, and for patients who were illiterate, dental students assisted in filling in the forms.

Questionnaires were not marked in any way that might permit identification of the patient. Questions were scored 1–5. The responses were coded and data were transferred to the computer for analysis using SPSS. Following the computation of the initial descriptive statistics, bivariate associations were examined using analysis of variance and chi-squared tests. Factor analysis was used to confirm the factor structure of the dental satisfaction scales. Patients with missing responses for a given question were excluded from that category in the data analysis.

Results

Questionnaires were distributed to 151 patients, and responses were received from 135 (response rate 89.4%), of whom 50 were male (Table 1). The age range was between 11 and just over 60 years. A sizeable proportion (40.7%) had university level education and only 8.1% were illiterate.
Most of the patients (65.9%) were non-Emirati Arabs.

The major reason for admission (80.0%) was relief of pain (Table 2). A high proportion of the patients (83.0%) visited the dentist only when they had a problem: just 7.4% came twice a year. The largest category for treatment received (23.0%) was operative treatment, followed by endodontic (19.3%).

There was a statistically significant association between the level of education and the dental satisfaction scale. The most highly educated patients were the least satisfied with the treatment provided (Table 1).

Table 2 Dental satisfaction scale score by type of patient, frequency of dental visit and type of treatment received

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. (n = 135)</th>
<th>%</th>
<th>Mean dental satisfaction score (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of carea</td>
<td>Routine care 26</td>
<td>19.3</td>
<td>18.0 (4.0)</td>
</tr>
<tr>
<td>Relief of pain</td>
<td>108</td>
<td>80.0</td>
<td>19.0 (3.3)</td>
</tr>
<tr>
<td>Frequency of dental visitb</td>
<td>Twice a year 10</td>
<td>7.4</td>
<td>18.0 (2.3)</td>
</tr>
<tr>
<td></td>
<td>Once a year 11</td>
<td>8.1</td>
<td>6.2 (2.7)</td>
</tr>
<tr>
<td></td>
<td>Every 2 years 2</td>
<td>1.5</td>
<td>17.5 (2.1)</td>
</tr>
<tr>
<td></td>
<td>Only when having a problem 112</td>
<td>83.0</td>
<td>19.2 (3.5)</td>
</tr>
<tr>
<td>Type of treatment receivedc</td>
<td>Surgery 20</td>
<td>14.8</td>
<td>19.3 (3.5)</td>
</tr>
<tr>
<td></td>
<td>Prosthodontic 24</td>
<td>17.8</td>
<td>17.2 (3.7)</td>
</tr>
<tr>
<td></td>
<td>Orthodontic 5</td>
<td>3.7</td>
<td>20.4 (2.9)</td>
</tr>
<tr>
<td></td>
<td>Periodontal 21</td>
<td>15.6</td>
<td>18.3 (3.5)</td>
</tr>
<tr>
<td></td>
<td>Endodontic 26</td>
<td>19.3</td>
<td>18.0 (3.5)</td>
</tr>
<tr>
<td></td>
<td>Operative 31</td>
<td>23.0</td>
<td>20.0 (3.2)</td>
</tr>
<tr>
<td></td>
<td>Paedodontic 8</td>
<td>5.9</td>
<td>20.0 (1.5)</td>
</tr>
</tbody>
</table>

*SD = standard deviation.

aSignificant at P < 0.01; one-way analysis of variance.

bSignificant at P < 0.05; one-way analysis of variance (least significant difference): scores for those who visited the dentist only when they had a problem differed significantly from those who visited the dentist once a year.

cSignificant at P < 0.05; one-way analysis of variance (least significant difference): those who received surgical treatment differed from those having prosthodontic and orthodontic treatment, and those who received endodontic treatment differed from those who received operative treatment, but the difference was not statistically significant. Those who received prosthodontic treatment were the least satisfied.

1. Patients who visited the clinic for pain relief were significantly more satisfied than those who visited the clinic for routine care (P < 0.01) (Table 2). The dental satisfaction levels were also significantly higher among patients who visited the clinic only when they had problems (P < 0.05).
Table 3 shows descriptive statistics of the dimensions of dental satisfaction with the university dental service. The dimension on quality was split into interpersonal and technical aspects of the care process. Most of the patients were satisfied with the service provided except for dental care could be better (25.9%), explanation for treatment options (37.0%) and remoteness of the clinic (57.0%). Most participants agreed that the clinic is located too far from the city centre.

Discussion

Evaluation of the quality of health care has emerged as a key issue for all health services, and for some time it has been recognized that the patients’ views are an essential component of such evaluations [10,11]. Patients can participate in the evaluation of quality of oral health care in 3 ways: by defining what is desirable or undesirable (i.e. setting standards of care); by providing information that permits others to evaluate the quality of care; and by expressing satisfaction or dissatisfaction with care. In the present study, the patients’ contribution was in providing information and expressing satisfaction or dissatisfaction with oral health care.

Since the present study aimed to evaluate patient satisfaction and identify the major problems of the dental services, a response from 135 of the 151 patients selected was considered to be adequate.

It should be noted that the results of this survey are valid only for the group of patients participating in this study and not for the entire dental patient population of the United Arab Emirates. To maximize participation rate, the questionnaires were collected during patient treatment, but prior to the finalization of that treatment. It should be noted, however, that the results might have varied if the responses had been

<table>
<thead>
<tr>
<th>Questionnaire item (abbreviated)</th>
<th>Positive response No.</th>
<th>%</th>
<th>Content category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentist explained the treatment needed well</td>
<td>127</td>
<td>94.1</td>
<td>Quality (interpersonal)</td>
</tr>
<tr>
<td>Dentist did not explain treatment options clearly</td>
<td>50</td>
<td>37.0</td>
<td>Quality (interpersonal)</td>
</tr>
<tr>
<td>Dentist treated patient with respect</td>
<td>113</td>
<td>83.7</td>
<td>Quality (interpersonal)</td>
</tr>
<tr>
<td>Receptionist courteous and professional</td>
<td>115</td>
<td>85.2</td>
<td>Quality (interpersonal)</td>
</tr>
<tr>
<td>Did not wait long in waiting room</td>
<td>101</td>
<td>74.8</td>
<td>Access</td>
</tr>
<tr>
<td>Dental clinic clean and tidy</td>
<td>124</td>
<td>91.9</td>
<td>Quality (technical)</td>
</tr>
<tr>
<td>Satisfied with dental care received</td>
<td>125</td>
<td>92.6</td>
<td>General satisfaction</td>
</tr>
<tr>
<td>Dental care could be better</td>
<td>35</td>
<td>25.9</td>
<td>General satisfaction</td>
</tr>
<tr>
<td>Dental clinic too far away</td>
<td>77</td>
<td>57.0</td>
<td>Convenience</td>
</tr>
</tbody>
</table>

aThe answers for all items were recoded so that a higher percentage indicates higher dental satisfaction.
In previous studies, the effect of sociodemographic characteristics of the patients on satisfaction with general dental care has been unclear. Some reports pointed to a direct effect of sex \( [12–14] \) and age \( [12,14] \). Others failed to show such associations \( [13,15] \). In this study, also, no significant differences were observed between the satisfaction score and background variables (sex and age) of the patients. The only significant finding observed for the dental satisfaction scale was in relation to education level; the more highly educated patients were less satisfied with the care provided. It is possible that the more-educated patients had higher expectations of the service, whereas the less-educated patients might have appreciated getting any dental care. This finding is not consistent with that of another study where it was shown that highly educated people are more satisfied than those with a lower level of education \( [16] \).

Some previous reports have shown a relationship between patient satisfaction and ethnicity \( [17,18] \). Black patients tended to be the least satisfied; Hispanic patients were only moderately satisfied when compared to non-Hispanic patients. In the current study, no association was found between nationality and level of patient satisfaction, so this is probably not a valid predictor of patient satisfaction.

We found that patients who visited the dentist only when having a problem tended to be more satisfied than those who visited the dentist regularly. This may be because those patients with problems get immediate relief after treatment compared to those who come for a check-up only. Goedhart, Eijkman and ter Horst \( [19] \) and Tuominen and Tuominen \( [15] \) declared that for a significant number of patients, the ultimate goal of the treatment is “the cure.” The rest of the steps in the process contributing to this result appear to be disregarded by these patients. Thus, they prefer to see the end result to express their (dis)satisfaction, ignoring the efforts of oral diagnosticians and radiologists, and any other dental personnel along the way.

In Ajman University, the dental clinics for female dental students are separated from the ones for male students, mainly for cultural reasons, although female dentists can treat both sexes. This survey was performed in the female dental student clinic. This might have influenced the patients to give more positive responses. Douglas, Reisine and Cipes reported that the patients responded more positively to female dentists than to male dentists, even when they assumed non-interactive behaviour \( [20] \).

Most of the patients who participated in this study were dissatisfied with the explanation of treatment options received and the remoteness of the clinic. The importance of interpersonal factors for dental patient satisfaction was supported by Murtomaa and Masalin in a study in Finland \( [21] \), and by Strauss et al. in the United States of America \( [22] \). The latter reported that the 2 issues cited by patients as most important in evaluating dental care were the dentist’s awareness of discomfort, and explanation of treatment. Similarly, Kress and Silversin found interpersonal factors (personality and communication) to be the most frequently cited by their focus groups as important to satisfaction with dental care \( [23] \). Providing the patient with further explanation of their treatment options should be highlighted to
our students to achieve high level of satisfaction with service provided.

The patients were satisfied with technical aspects of the treatment, a criterion that is met fairly often in real practice [24]. It has been reported that patients prefer a caring and pleasant dentist to a skilled one alone [25]. Some patients may have difficulty evaluating the technical quality of the dental service they had received, and would base their judgment on other factors, such as physical settings and the ability to solve problems [26].

The dental care delivery system in our faculty is based on scheduled appointments, and dental interns carry out dental treatment under the supervision of experienced clinicians. These factors probably lengthen the treatment period compared to the patient’s expectations. Additionally, as reported by Feine, Awad and Lund, disappointment with treatment assignment could also have negatively affected the mean satisfaction scores [27].

Dental service is a dynamic process between the provider and the recipient, with the goal of improving health [28], and recognition of the complex nature of this relationship by dental health care providers will enable the patients to accept and comply with the proposed dental care, eventually leading to a successful outcome for both dentists and patients. As long as our patients are unhappy about the explanation of treatment options, the importance of establishing social relationship and verbal communication should be strongly emphasized to our students. To obtain adequate consumer feedback in a reasonable time, regular surveys monitoring patient satisfaction in both male and female faculties are needed to determine the main weakness in the new service provided in Ajman University. Data from such surveys would also help in evaluating the effects of efforts made to improve the service and in monitoring changes in satisfaction levels.

Acknowledgements

We are grateful to Dr Saied Salman, president of Ajman University, for supporting research activities in the Faculty of Dentistry and to Dr Salem Abu Fanas, Dean of the Dental Faculty of Ajman University. The effort made by Dr Amal Al-Safar in collecting the data is highly appreciated. All participants are thanked for their input.

References

6. Skaret E et al. Reliability and validity of the dental satisfaction questionnaire in


**Training package for BMJ peer reviewers**

We would like to draw our readers’ attention to this very useful training pack on peer review. The material was designed by the *British medical journal* to help reviewers to learn more about peer review, and to understand what makes a review really useful to editors and authors. The pack includes PowerPoint presentations and written exercises and much of the material relates to the general art of peer review.

We hope our readers, whether reviewers or researchers, will find this website both interesting and helpful. It can be accessed at: http://bmj.bmjournals.com/advice/peer_review/
Compliance with good practice in prescription writing at outpatient clinics in Saudi Arabia

Y. M. Irshaid,1 M. Al Homrany,2 A. A. Hamdi,1 K. K. Adjepon-Yamoah1,4 and A. A. Mahfouz3

1Department of Clinical Pharmacology; 2Department of Internal Medicine; 3Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Saudi Arabia (Correspondence to Y. Irshaid: yacoubmf@yahoo.com).
4Centre for Tropical Clinical Pharmacology and Therapeutics, University of Ghana Medical School, Accra, Ghana.

Received: 15/09/03; accepted: 14/06/04

ABSTRACT A sample of prescription orders received from outpatient departments by a hospital pharmacy in Asir, Saudi Arabia, were analysed over 1 year for the essential elements of prescriptions. The prescriber’s name, address and signature were on 83.3%, 9.6% and 81.9% of prescriptions respectively. The patient’s name, age and sex were on 94.6%, 77.3% and 51.3%. No prescription contained the patient’s address and weight. Generic drug names were used in only 15.1% and strength of medication and dose units were included in 26.6% and 55.6% of prescriptions. Most prescriptions (94.0%) had no quantity indicated and had only partial instructions for patient use (90.7%); the diagnosis was included in about two-thirds. The prescriber’s handwriting was illegible in 64.3% of prescriptions. Measures to improve the situation are suggested.

Respect des bonnes pratiques de rédaction des ordonnances dans les services de consultations externes en Arabie saoudite

RÉSUMÉ Un échantillon d’ordonnances reçues en provenance des services de consultations externes par une pharmacie hospitalière à Asir (Arabie saoudite) a été analysé sur une période d’un an en ce qui concerne les éléments essentiels des ordonnances. Le nom, l’adresse et la signature du prescripteur se trouvaient sur 83,3 %, 9,6 % et 81,9 % des ordonnances respectivement. Le nom, l’âge et le sexe du patient figuraient sur 94,6 %, 77,3 % et 51,3 %. Aucune ordonnance ne comportait l’adresse et le poids du patient. Les noms de génériques n’étaient utilisés que dans 15,1 % des ordonnances et la concentration des médicaments et les unités de prise n’étaient mentionnées que dans 26,6 % et 55,6 % des ordonnances. La plupart des ordonnances (94,0 %) n’avaient pas d’indications de quantité et ne comportaient que des instructions partielles en ce qui concerne l’utilisation par le patient (90,7 %); le diagnostic était inclus dans environ deux tiers des ordonnances. L’écriture du prescripteur était illisible dans 64,3 % des ordonnances. Des mesures sont suggérées pour améliorer la situation.

References

1Department of Clinical Pharmacology; 2Department of Internal Medicine; 3Department of Family and Community Medicine, College of Medicine, King Khalid University, Abha, Saudi Arabia (Correspondence to Y. Irshaid: yacoubmf@yahoo.com).
4Centre for Tropical Clinical Pharmacology and Therapeutics, University of Ghana Medical School, Accra, Ghana.

Received: 15/09/03; accepted: 14/06/04
Introduction

A drug prescription is often the endpoint of a patient’s visit to a medical practitioner. As an instruction from a prescriber to a dispenser, it is considered to be a medico-legal document that should be written legibly, accurately and completely [1,2]. Prescribing physicians as well as those involved in the execution of the prescription hold legal responsibility for the prescription [1–4].

Although the prescription format may vary slightly from one country to another, most countries agree on the core elements that should be included in the prescription order [1–4]. These are: prescriber’s name, address, telephone number and signature; patient’s name, address, age and weight (important at the extremes of age); prescription date; drug name (preferably generic), formulation, strength, dose, frequency of administration, quantity prescribed, reason for prescribing and instructions for use [1–4]. In Saudi Arabia, all of these requirements are recommended and are available in local regulations. In addition, the physician is required to stamp the prescription. The stamp usually contains the name, title and address of the physician.

As good quality prescriptions are extremely important for minimizing errors in the dispensing of medications, physicians should adhere to the guidelines for prescription writing for the benefit of the patient [5]. Proper documentation of prescribing practice allows the identification of acceptable and non-acceptable prescribing habits. Such information is needed to set up continuous medical education programmes to encourage rational prescribing among physicians. It also helps in setting up monitoring systems to ensure good pre-scribing habits and to maintain them. Health professionals may also utilize this information to develop guidelines for safe and cost-effective prescribing.

The purpose of this study was to screen drug prescriptions written by physicians in outpatient clinics of Asir Central Hospital for the essential elements of prescriptions mentioned above. The results would be used by health officials for health care planning and monitoring at the institution.

Methods

Outpatient prescriptions kept by the pharmacy department at Asir Central Hospital during the period 8 April 2000 until 7 April 2001 were analysed retrospectively. This period was divided into 4 seasons: spring, summer, autumn and winter. Asir Central Hospital is located in Abha city and is the main referral hospital in Asir Region, which has a population of 1.2 million people. It is utilized by the College of Medicine, King Khalid University for training of medical students.

The target of the study was all outpatient prescriptions from within the hospital, irrespective of the clinic of origin, received by and kept in the pharmacy. In each season prescriptions from one week (5 working days) were sampled systematically by taking every other prescription.

Prescriptions were analysed for the essential elements to be included in the prescription order [1–4] and the data were recorded using a coding key. Compliance with these elements was the degree to which the physician had met the obligation of including all the elements of a prescription in the prescription order. The information written within the prescription was judged “unclear” if one word or the dose unit was not written clearly and “unreadable” if none of the 3 investigators present during the screening session could read it.

Physicians did not know about the study but the local ethics committee at Asir Central Hospital gave approval.
Simple descriptive statistics were generated by the SPSS program version 9.

Results

The number of prescriptions sampled was 3796, about 7.7% of the total prescriptions during the 1-year period. The number of drugs prescribed ranged between 1 and 7 and 90.8% of prescriptions included 3 or less drugs. The department of origin of the prescriptions was not provided in 61.5% of prescriptions; general practitioners and emergency room doctors (who are also general practitioners) wrote 6.7% and 17.3% respectively.

None of the prescriptions included the telephone number of the prescriber or the address and weight of the patient. Only 9.6% of prescriptions included the address of the prescriber. The name and signature of the prescriber were included in 83.3% and 81.9% of prescriptions, respectively (Table 1). Both the name and signature of the prescriber were included in 71.7% of prescriptions. The name of the patient was present on 94.6% of prescriptions, whereas the patient’s age and sex were present in only 77.2% and 51.3% respectively (Table 1). Of prescriptions that included the patient’s age, 6.2% were for patients < 1 year, 13.4% for those aged 1–5 years and 1.8% for those aged > 60 years of age.

The date of the prescription was provided in only 35.7% of prescriptions. The handwriting of the prescriber was not clear in 64.3% of prescriptions. The generic drug name was used in 15.1% and the brand name in 50.1% of prescriptions, while both were used on the same prescription in 28.3% of cases. In the rest (6.5% of prescriptions), the drug names were unreadable (Table 2).

With regard to the strength of medication, it was included in about one-quarter of the prescriptions (26.6%) and was included for some drugs within the prescription in 20.7%. In the rest of prescriptions (52.8%), the strength of medication was missing. The dose units were not mentioned in almost one-fifth (19.4%) of prescriptions and mentioned for some drugs within the prescription in one-quarter of cases (25.0%). The units were mentioned for all drugs in 55.6% of prescriptions. Most of the prescriptions (94.0%) did not contain the quantity that the pharmacist should dispense. The directions for patient use were complete in only 2.3% of prescriptions, while in the majority of cases (90.7%) prescriptions contained partial instructions either among the drugs prescribed or for certain drugs. The space provided for the diagnosis within the prescription was filled clearly in 66.0%, filled unclearly in 18.9% and unfilled in 15.1% of prescriptions (Table 2).

Discussion

The study was performed to identify the degree to which physicians conform to guidelines for prescription writing during their

Table 1 Review of 3796 prescriptions issued at Asir Central Hospital: analysis of prescriber and patient information present on prescriptions

<table>
<thead>
<tr>
<th>Information present</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prescriber</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>3162</td>
<td>83.3</td>
</tr>
<tr>
<td>Address</td>
<td>364</td>
<td>9.6</td>
</tr>
<tr>
<td>Telephone number</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Signature</td>
<td>3109</td>
<td>81.9</td>
</tr>
<tr>
<td><strong>Patient</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>3591</td>
<td>94.6</td>
</tr>
<tr>
<td>Address</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Age</td>
<td>2929</td>
<td>77.2</td>
</tr>
<tr>
<td>Sex</td>
<td>1947</td>
<td>51.3</td>
</tr>
<tr>
<td>Weight</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
clinical practice. A total of 3796 outpatient prescriptions from a teaching hospital in south-western Saudi Arabia were screened for the essential elements of prescriptions according to published guidelines [1–4]. This is the third study reviewing prescriptions from hospital outpatient clinics in Saudi Arabia. Our observations showed that prescriptions were deficient. None of the prescriptions contained the telephone number of the prescriber and only 9.6% had the prescriber address. These elements should be included according to WHO [1]. However, the hospital does not require that the telephone number and address of the prescriber be included in the prescription. The pharmacy department fills prescriptions coming from within the hospital, where the physician can be reached through the telephone directory or the hospital pager system. Also, in this case, the address might not be relevant because physicians are required to stamp the prescription. The stamp usually contains the name, title and address of physicians. Unfortunately in many cases, the stamp was unclear. Our findings of 16.7% of prescriptions deficient in the prescriber name and 18.1% deficient in the prescriber signature are somewhat similar to results from other hospitals in Saudi Arabia. Balbaid and Al-Dawood [6] reported that prescriptions from some Ministry of Health hospitals in Jeddah city were deficient in physician’s name and signature in 14% and 16.3% of cases, respectively. Meyer [5] from a hospital and clinic in Texas mentioned that a survey of outside provider pharmacies requesting information on problems related to prescriptions indicated that 96% of responders believed that failure to print the prescriber name was one of the main problems. Our finding that the prescriber was identified by both name and signature in 71.7% of prescriptions is in contrast to the 7.5% figure reported by Francois et al. [7] from a university hospital in France. Blatt et al. [8] have shown that 20%–30% of prescriptions from a central hospital in Yaounde, Cameroon, did not include the name and the function of the prescriber. Anderson and Beurling [9] from Copenhagen University Hospital reported that among the most frequent errors of omission in prescriptions was inadequate identifica-

### Table 2 Review of 3796 prescriptions issued at Asir Central Hospital: analysis of information present on prescriptions

<table>
<thead>
<tr>
<th>Element</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Date of prescription</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not provided</td>
<td>2441</td>
<td>64.3</td>
</tr>
<tr>
<td><strong>Drug names</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generic</td>
<td>573</td>
<td>15.1</td>
</tr>
<tr>
<td>Brand</td>
<td>1902</td>
<td>50.1</td>
</tr>
<tr>
<td>Mixed</td>
<td>1074</td>
<td>28.3</td>
</tr>
<tr>
<td>Not readable</td>
<td>245</td>
<td>6.5</td>
</tr>
<tr>
<td><strong>Strength of medications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included for all drugs</td>
<td>1010</td>
<td>26.6</td>
</tr>
<tr>
<td>Included for some drugs</td>
<td>786</td>
<td>20.7</td>
</tr>
<tr>
<td>Not included for all drugs</td>
<td>2004</td>
<td>52.8</td>
</tr>
<tr>
<td><strong>Dose units</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included for all drugs</td>
<td>2111</td>
<td>55.6</td>
</tr>
<tr>
<td>Included for some drugs</td>
<td>949</td>
<td>25.0</td>
</tr>
<tr>
<td>Not included for all drugs</td>
<td>736</td>
<td>19.4</td>
</tr>
<tr>
<td><strong>Quantity of medications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included for all drugs</td>
<td>125</td>
<td>3.3</td>
</tr>
<tr>
<td>Included for some drugs</td>
<td>103</td>
<td>2.7</td>
</tr>
<tr>
<td>Not included for all drugs</td>
<td>3568</td>
<td>94.0</td>
</tr>
<tr>
<td><strong>Instructions for patient use</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Included for all drugs</td>
<td>87</td>
<td>2.3</td>
</tr>
<tr>
<td>Included for some drugs or partial instructions</td>
<td>3443</td>
<td>90.7</td>
</tr>
<tr>
<td>Missing for all drugs</td>
<td>270</td>
<td>7.1</td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not clear</td>
<td>717</td>
<td>18.9</td>
</tr>
<tr>
<td>Missing</td>
<td>573</td>
<td>15.1</td>
</tr>
<tr>
<td><strong>Prescriber’s handwriting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not clear</td>
<td>2441</td>
<td>64.3</td>
</tr>
</tbody>
</table>
tion of the physician. These deficiencies indicate how things are made difficult for the dispensing pharmacist to contact the prescriber in case of any clarification.

Concerning patient information, our finding that prescriptions were deficient in patient’s name, age and sex in 5.4%, 22.7% and 48.7% of prescriptions, respectively, are in contrast with the results of Balbaid and Al-Dawood [6]. Their corresponding figures were 14.5%, 10% and 4.1% respectively. However, Bawazir [10], in a large study from 22 major hospitals from all health regions within Saudi Arabia, reported that patient age was missing in 18.6% of prescriptions, while patient name and sex were missing in 0.2% of prescriptions. Our results are somewhat similar to what is reported by Makonnen et al. [11] about the quality of prescriptions at a tertiary care pharmacy in Addis Ababa, Ethiopia, where 50% of prescriptions did not contain the sex and age of the patient. Francois et al. [7] reported that complete patient information was provided in only 35.3% of prescriptions. None of the prescriptions we reviewed contained the address and weight of the patient. The address of the patient is among the elements that should be included in the prescription according to WHO [1], while inclusion of weight is recommended for patients at the extremes of age [1–4] because of the implication it has on drug pharmacokinetics and pharmacodynamics. Omission of patient address from prescriptions is a serious deficiency when problems in the prescription are discovered and the patient needs to be contacted to correct the problem. This is even more serious when the name of the patient is also omitted.

Our finding that almost two-thirds (64.3%) of prescriptions were not dated contrasts with Balbaid and Al-Dawood [6] and Francois et al. [7], who found that only 8.7% and 4.5% of prescriptions were not dated, respectively.

Our finding that 50.1%, 15.1% and 28.3% of prescriptions contained brand names, generic names and both generic and brand names, respectively, is peculiar in the sense that some physicians prescribed drugs within the same prescription utilizing both generic and brand names. Blatt et al. [8] reported that 16% of outpatient clinic prescriptions and 73% of emergency room prescriptions contained brand names. We did not find striking differences between prescriptions from emergency room and all other outpatient clinics in this regard. Using generic names in prescriptions gives flexibility to the dispensing pharmacist and may be of economic benefit to the patient. However, use of brand names may be acceptable when problems of drug bioavailability are expected [1,3].

The medication information provided in prescriptions was worse than those reported previously. Balbaid and Al-Dawood [6] reported that the dose, frequency and duration of medications were deficient in 7.6%, 6.9% and 10.2% of prescriptions, respectively. Bawazir [10] reported that the dose of the drug was missing in 4% of prescriptions. We found that more than half (52.8%) of prescriptions did not include the strength of medication, the dose units were not included in 19.4% and the quantity of medications was not included in 94.0% of prescriptions. Apparently, these parameters are left to the pharmacist to decide upon and the implications for the duration of therapy will be dependent on the individual pharmacist. The strength of medication is particularly needed when the pharmaceutical product exists in more than one strength. We did not look at the proportion of drugs which are available in only one strength. Francois et al. [7] reported that medication information was complete in only 24% of
cases, whereas Blatt et al. [8] recorded that medication information was stated in 85% of outpatient and 50% of emergency room prescriptions. We did not find significant differences between outpatient and emergency room prescriptions on this matter.

We also found that the prescriptions were seriously deficient in instructions for patient use and the majority (90.7%) contained only partial instructions, a finding that certainly will affect the adequacy of therapy. Bawazir [10] reported that instructions for use were missing in 4% of prescriptions. Our finding that the diagnosis was missing or unreadable in one-third (34.0%) of prescriptions is in contrast with what was found by Balbaid and Al-Dawood [6] who found the diagnosis missing in only 6.8% of prescriptions, and Bawazir [10] who found that the diagnosis was missing in 9.8% of prescriptions. Anderson and Beurling [9] reported that omitting the indication for use was among the most frequent errors in prescriptions. Also our finding that almost two-thirds (64.3%) of prescriptions suffered from poor handwriting is in contrast with what was found by Balbaid and Al-Dawood [6] who reported illegible handwriting in only 7.2% of prescriptions. The high percentage of poor handwriting we found could be due to the fact we considered the presence even of a single unclear word or a dose unit as poor handwriting for the whole prescription. Poor handwriting is a serious problem that might lead to dispensing the wrong medication to the patient with serious or even fatal results [12]. Meyer [5] found that 15% of prescriptions studied had illegible handwriting. Furthermore, in a survey of outside provider pharmacies, 69% of respondents stated that illegible handwriting was one of the main problems they encountered. Makonnen et al. [11] also reported illegible prescriptions in 15% of cases.

In conclusion, the prescriptions we reviewed suffered from serious deficiencies and were not properly written. The need for physician education on appropriate prescription writing is obvious and follow-up on the matter is needed for newly qualified physicians. Furthermore, inclusion of tutorials about prescription writing in the final clinical year curriculum of medical students before graduation is necessary. Administrative monitoring of the prescription habits of physicians is needed both to improve the process and to maintain the improvement.

Acknowledgements

The authors greatly appreciate the cooperation of the staff of the Pharmacy Department at Asir Central Hospital during the review of prescription, Mr Andy Rolex for entering the data into SPSS and Mr Riyad Alessa for helping revise the data entry.

References


Adherence to universal precautions among laboratory personnel in Lebanon

J.G. Kahhaleh¹ and A.R. Jurjus²

¹Faculty of Public Health, Lebanese University, Beirut, Lebanon.
²Faculty of Medicine, American University of Beirut, Beirut, Lebanon (Correspondence to A.R. Jurjus: aj00@aub.edu.lb)

Received: 11/03/04; accepted: 06/07/04

ABSTRACT To evaluate the present situation and plan future directions with regard to implementation of universal precautions in laboratories testing blood samples, we carried out a national cross sectional study in 2003 on a representative sample of laboratories in Lebanon. We compared the results with those of a 1993 study. We found that the education profile of staff had improved, being now more specialized in laboratory science. The discrepancies between what technicians knew, believed in and practised and what was observed in the field improved to some extent in most variables. Disposal of needles and syringes had improved greatly but disposal of blood-contaminated material had not. Given the risks of improper practice, a policy of universal precautions is essential and regular training should be carried out so that staff know and practise the universal precautions and correct laboratory procedures.

Respect des précautions universelles par le personnel de laboratoire au Liban

RÉSUMÉ Afin d’évaluer la situation présente et d’établir les orientations futures concernant l’application des précautions universelles dans les laboratoires qui testent les échantillons de sang, nous avons réalisé une étude transversale nationale en 2003 sur un échantillon représentatif de laboratoires au Liban. Nous avons comparé les résultats avec ceux d’une étude similaire réalisée en 1993. Nous avons constaté que le profil de formation du personnel s’était amélioré, celui-ci étant maintenant davantage spécialisé en sciences des laboratoires. Les écarts entre les connaissances, les croyances et les pratiques des techniciens et les observations sur le terrain se sont réduits dans une certaine mesure pour toutes les variables. L’élimination des aiguilles et des seringues s’est beaucoup améliorée, ce qui n’a pas été le cas pour l’élimination des matériaux contaminés par du sang. Étant donné les risques que comportent des pratiques inadéquates, une politique de précautions universelles est essentielle et une formation régulière devrait être mise en œuvre de sorte que le personnel connaisse et applique les précautions universelles et les procédures de laboratoire correctes.

¹Faculty of Public Health, Lebanese University, Beirut, Lebanon.
²Faculty of Medicine, American University of Beirut, Beirut, Lebanon (Correspondence to A.R. Jurjus: aj00@aub.edu.lb)

Received: 11/03/04; accepted: 06/07/04
Introduction

The transmission of blood-borne pathogens from patients to health care workers via occupational exposure has been well known for many years [1]. The term health care worker refers to any person working in health care settings and who has the potential for exposure to infectious materials including body substances, contaminated medical supplies and equipment, contaminated environmental surfaces or contaminated air [2]. They include, but are not limited to, physicians, nurses, technicians, therapists, pharmacists, nursing assistants, laboratory personnel, autopsy personnel, emergency medical service personnel, dental personnel, students and trainees, contractual staff not employed by the health care facility and persons not directly involved in patient care but potentially exposed to infectious agents (e.g. volunteer, dietary, housekeeping, maintenance and clerical personnel) [3]. All these people are potentially exposed, directly or indirectly, to blood-borne pathogens. As a result, health care workers are at increased risk of acquiring human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV), which can all be transmitted through percutaneous injury.

In this study, our concern was limited to laboratory personnel who perform blood sampling (risk of needle-sticks) and deal with blood or body fluid samples or reagents on an almost daily basis.

The true rate of sharps injuries in health care workers is not known and impossible to calculate because of differences from institution to institution in case ascertainment, compliance with reporting and type of service [1]. Data from EPINet, the Exposure Prevention Information Network of Hospitals in the United States of America, reported an overall rate of sharps injuries at 27 per 100 occupied beds [1]. Causes of occupational sharps injuries include recapping needles, disassembling equipment, accessing intravenous (IV) tubing devices, disposing of contaminated sharps, disengaging pre-filled cartridge and needle units from reusable holders and pipetting [1,4].

Data from EPINet revealed that 68.5% of injuries were linked to hollow-bore needles (syringes, butterfly needles, phlebotomy needles, needles on IV lines and blood gas syringes) [1]. In a retrospective survey done in 1989–90 to investigate the incidence of needle-sticks and other exposures to patients’ blood or body fluids among medical students and residents, 71% of respondents had 1 or more needle-sticks or other exposures during the training year, while the surgical residents had a > 6-fold greater risk of occupational exposure [5]. Other studies reported that > 60% of residents and students had sustained contact with blood, mucous membranes and broken skin or other potentially infectious sources [5–10]. In addition, health care workers in general, and laboratory personnel in particular, are at risk of acquiring a wide variety of pathogens, including HBV, HCV and HIV type I, through occupational exposure to blood and certain body fluids [11]. It was recently reported that annually worldwide injections cause an estimated 8–16 million cases of HBV infection, 2.4–4.5 million cases of HCV infection and 80 000–160 000 cases of HIV infection [12]. Laboratory-associated infections could also be caused by aerosolization of specimens, mouth pipetting or percutaneous injury [2].

Although data in the literature indicate that the risk of acquiring a blood-borne pathogen after accidental exposure is in some cases low, approximately 0.4%, it is important to note that researchers and health care workers with frequent occupational exposure to high concentrations of viruses
would be at increased risk, especially after working for many years [13]. The occupational risk of contracting HIV by health care personnel is also a well-documented reality. Several studies have consistently indicated that the risk of acquiring HIV infection after percutaneous exposure to infected blood is approximately 0.4% [11,14]. In addition, 6 aggregated studies in the United States of America estimated the risk after a mucous membrane exposure at 0.1%. Despite reports of low incidence after occupational exposure, seroconversion can occur. This is a source of concern because of the high mortality rate and the current lack of curative treatment, and because the overall risk is dependent on the rate of transmission per episode and cumulative exposure over time [11].

In Lebanon, the number of reported cases of HIV/AIDS has been increasing steadily since 1985, when the first locally treated case was reported [15]. By December 1997, the cumulative number of reported cases had reached 580; by December 2001 this was 650 and by July 2003 it was 706 [14]. Therefore, the increasing prevalence of HIV in Lebanon would probably lead to an increase in the risk of exposure of health care workers to blood from patients infected with the virus, especially when blood and body fluid precautions are not followed for all patients. Thus, there is a need to consider all patients as potentially infected with HIV and other bloodborne pathogens and to adhere rigorously to infection-control precautions to minimize the risk of exposure to blood and fluids [12].

Hepatitis C has a worldwide distribution and an estimated overall prevalence of 3%; the prevalence in the United States of America is around 1.8% compared to more than 20% in Egypt [16]. Although the incidence of acute hepatitis C has declined from 175 000 cases per year in 1989 to about 30 000 in 1997, HCV is still the most common cause of chronic viral hepatitis in the United States of America; 85% of people infected with HCV remain persistently infected [17]. Because of the high rate of chronic infection and because many infected people are asymptomatic and unaware of their infection health care workers are at risk of infection. From a random needle-stick in the hospital the risk is about 0.1%, and from patients known to be infected the risk is 5%–10% [18]. Bizri reported that the epidemiological society of Lebanon has calculated the prevalence of HCV in the general population to be 0.7% (range 0.4%–1.0%) by screening 3000 serum specimens from major laboratories in Lebanon for antibodies to HCV [16]. He also compared that to a similar study done in 2001 on 3000 samples from blood donors and found a similar (0.7%) prevalence [16].

Hepatitis B virus was one of the first blood-borne pathogens to be recognized as an occupational risk among health care workers [19]. The risk of contracting occupationally-acquired HBV in non-immune health care workers is 2%–40%, depending on the hepatitis Be-antigen (HBeAg) status in the source patient [1]. When a needle is used on a patient who is HBeAg positive, the exposure-associated attack rate is 20%–40%, while in HBV-negative cases it drops to 2%.

In hepatitis C, the rate ranges between 1% and 10% and for HIV it is much lower, 0.1%–0.4 % [20,21]. These infections lead to chronic disease, disability and death. Clinical laboratory technicians, like others, if not more, are subject to occupationally-acquired infection.

Universal precautions exist to prevent transmission of infection among health care workers [22]. In Lebanon, an assessment study in 1993 showed that the willing-
ness of health care personnel, particularly laboratory technicians, to follow universal precautions was not adequate [19]. Wide discrepancies existed between what the technicians knew, what they believed in and what they practised. Extensive training workshops and curriculum modifications followed in an attempt to improve the situation [4]. Consequently, it was felt that an update on the situation was in order to evaluate the present situation and plan future directions in light of internationally recognized data [20,21].

The objectives of this national reassessment study are: 1) to depict the degree of adherence of clinical laboratories in Lebanon to the implementation of universal precautions and prevention of occupational risk of transmission of pathogens which are blood-borne or associated with other body fluids, 2) to reassess knowledge, attitudes and practices of laboratory technicians regarding the implementation of universal precautions, 3) to identify unsafe practices that may lead to infection, 4) to determine whether a facility that deals with blood and body fluids meets the necessary requirements for equipment, supplies and waste disposal, 5) to compare new data with previous data and evaluate achievements and identify lacunae, and 6) to outline educational and training needs and focus on possible activities and interventions oriented to remedial action.

Methods
This cross-sectional study included laboratory personnel throughout Lebanon. Variables included the knowledge, attitudes and practices of laboratory technicians concerning blood-borne pathogens (e.g. HIV, HBV and HCV) and adherence to universal safety precautions in relation to experience, formal training and workplace setting among technicians dealing with blood and body-fluids, as well as laboratory directors in hospital-based and non-hospital-based laboratories (private, governmental and those belonging to nongovernmental organizations).

To obtain a representative sample of the laboratories in Lebanon, we used a 2-stage cluster-sampling technique where self-weighting was ensured through selecting all 6 provinces of the country. Clusters were selected in proportion to the number of laboratories per province, and in respective numbers of sampling units within each cluster using a list of all licensed, registered laboratories provided by the Syndicate of Laboratories in Lebanon.

In the first stage, we used the provinces as administrative sections: these were non-overlapping and exhaustive (all the geographic areas were included). We determined the number of licensed laboratories for each province using the latest list submitted from the Syndicate of Laboratories in Lebanon, then selected 1 cluster of 12 laboratories from each province using random numbers and an additional cluster from the provinces that had more than 50 laboratories, a total of 8 clusters (Table 1).

The sample size selected was 12 × 8 = 96 licensed laboratories out of a total of 183 and up to 3 technicians per laboratory = 288 technicians. Of the 93 laboratories, 73 actually participated. The 68 directors interviewed reported that they had 475 technicians working in their laboratories. We distributed the questionnaire to almost all of them but only 222 completed the survey form.

In order to obtain accurate information and to avoid reporting bias and observer-induced changes in practice, we used the combination of interview and structured observation.

A survey form was developed for technicians and an interview form for the
laboratory directors. These were pretested in at least 5 laboratories, then adjusted and modified before running the actual survey.

Field workers visited the laboratories included in the study. They explained the purpose of the study to the respondents, interviewed the laboratory director, distributed the questionnaire to the technicians, and checked off on a separate observation list the availability of certain safety materials and equipment in the laboratory and the practices of technicians.

The information was collected by 3 instruments: structured observation of practices, equipment, and supplies (observation list); structured interview on available supplies, knowledge and enforcement of implementation of universal precautions (with the laboratory owners/directors); and survey of knowledge, attitudes and practices of the laboratory technicians concerning universal precautions (self-completed by technicians). All participants signed a consent form before proceeding. Results were combined to address specific questions and to allow for cross verification.

The interview with the laboratory directors covered professional background, attitudes and behaviour concerning implementation of universal precautions as well as relations with patients and physicians. The questionnaire for the laboratory technicians consisted of 3 major sections. The first covered parameters of knowledge, attitudes, practices and safety precautions; the second section dealt with material resources available in the laboratory and the disposal of medical waste; the last section included questions about education, training and relations with patients and physicians. The observation list included items dealing with basic practices, safety precautions and waste disposal.

The proposed instruments were pilot-tested and adapted to ensure that they were suitable to the particular circumstances and that the right nomenclature was used. The data collection procedure was standardized in laboratories located in the capital city, one of the 6 provinces, because it has the largest population. Then the team was distributed into groups. Data coding, computer processing and statistical analysis were done according to standard statistical methods. The recorded answers were cleaned, coded, processed and analysed using SPSS, version 11.0, and then compared with the data from 1993.

The questionnaire for the technicians was tested for reliability. We randomly

<table>
<thead>
<tr>
<th>Province</th>
<th>No. of licensed laboratories</th>
<th>No. of clusters</th>
<th>No. of laboratories included</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beirut</td>
<td>53</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Mount Lebanon</td>
<td>58</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>North Lebanon</td>
<td>25</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>South Lebanon and Nabatieh</td>
<td>31</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Bekaa</td>
<td>16</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>183</td>
<td>8</td>
<td>73</td>
</tr>
</tbody>
</table>
chose 30 technicians from Beirut and Mount Lebanon provinces. We introduced the questionnaire using different researchers and then matched the results for agreement.

The population proportion found in the 2003 sample was compared to that of 1999. We calculated \( z \) at 95% confidence interval; the difference was considered to be significant if computed \( z \) was \( \geq 1.645 \).

**Results**

**Profile of laboratory manpower**

Among the professional directors of the laboratories, 59 out of the 68 interviewed (86.8%) were full-time, i.e. always present in the laboratory, while the other 9 (13.2%) were present for only part of the day. Their educational background varied: 63 (92.6%) of the directors reported their education (we were unable to interview 5 directors) (Table 2). A far greater proportion of directors had a medical background compared with those in 1993 (\( P < 0.0001 \)).

The directors we interviewed (68/73) reported that out of 475 technicians in their laboratories:
- 400 performed tests on blood in general
- 375 performed blood sampling
- 369 performed tests on body fluids
- 329 performed hepatitis testing
- 244 performed HIV testing.

It was also reported that some technicians could be carrying out all these procedures.

The education profile of laboratory technicians also varied; 195 (90.3%) had a technical professional degree or higher (Table 3). Compared with 1993, the general level of education among the technicians had increased significantly (Table 3). It was also reported that 69 (31.1%) of the technicians had attended education sessions on AIDS and hepatitis prevention and transmission and 45 (20.3%) had training on how to perform HIV testing. In addition, of the 222 technicians, 177 (79.7%) said they would be willing to participate in future training sessions; 45 did not respond. Of the 177, 145 indicted what they would want from training—to get new information (118, 66.7%), more awareness and protection at work (17, 9.6%), or more information about

<table>
<thead>
<tr>
<th>Table 2 Comparison of the education profile of laboratory directors in 1993 and 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education level</strong></td>
</tr>
<tr>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>Pharmacy background</td>
</tr>
<tr>
<td>Medical background</td>
</tr>
<tr>
<td>Bachelor of science</td>
</tr>
<tr>
<td>High school diploma</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

*Information was missing for 1 director.

<table>
<thead>
<tr>
<th>Table 3 Comparison of the education profile of technicians in 1993 and 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Education level</strong></td>
</tr>
<tr>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>High school diploma and/or training on the job</td>
</tr>
<tr>
<td>Technical degree</td>
</tr>
<tr>
<td>Bachelor of medical laboratory science</td>
</tr>
<tr>
<td>Bachelor of Science</td>
</tr>
<tr>
<td>Master degree (MSc or MPH)</td>
</tr>
<tr>
<td>Doctorate degree</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

\( \chi^2 = 56.49, P < 0.0001 \).

*Information was missing for 6 technicians.
the testing procedures and the protection measures (10, 5.6%)—32 did not respond.

The technicians reported that they acquired their knowledge about the various aspects of AIDS, hepatitis and the prevention techniques and measures mostly in discussions with physicians, from medical literature or from lectures (Table 4).

**Knowledge of the technicians about universal precautions and safety measures**

Almost all the technicians knew that while working they should take protective measures by wearing laboratory gowns or gloves and that they should dispose of used needles and syringes in special containers (Table 5). Their level of knowledge about the modes of transmission of each of HIV (90.1%), HBV (92.3%) and HCV (88.3%) through blood and its components was also very good overall.

Only 23 (31.5%) of the laboratories had the list of universal precautions posted, and some laboratory technicians did not even know about the existence of such a list. As for deactivation of HIV, 118 (53.2%) technicians considered heat the most effective method, 54 (24.3%) did not agree and 50 (23.0%) said they did not know. Similarly, 113 (50.1%) did not agree that methods that deactivate hepatitis B virus or other viruses could also deactivate HIV. In addition, 216 (97.3%) knew that blood or other contaminated material must be disposed of in special containers. However, the field workers noted that only in 55 (75.3%) of the laboratories that they visited was this actually done.

**Beliefs, attitudes and practices in testing**

The behaviour of laboratory technicians seemed to be very much affected by the spread of AIDS and hepatitis. Most of the technicians (88.3%) reported changing their practices after hearing about AIDS or hepatitis, either by becoming more aware when performing tests on body fluids (187, 84.2%), when sampling, (168, 75.7%) or when dealing with patients (108, 48.6%). One technician reported that he stopped performing HIV or hepatitis testing. In some laboratories only 8 of the 73 (11.0%) technicians showed some behavioural laxity inside the laboratory: eating, drinking, smoking or pipetting by mouth. However, 218 (98.2%) did not work with reusable syringes. With respect to disposing of contaminated syringes and needles in a special box, a significant difference was found between what was observed in laboratories and what technicians reported they practised (Table 5).

With regard to beliefs, 37 (16.7%) believed that pregnant technicians should not perform blood testing. Only 98 (44.1%) believed that virus testing should be done in specialized laboratories, 101 (45.5%) did not agree and 12 (5.4%) said they did not know; the other 11 did not respond. The great majority (90.1%) also believed that proper disinfection of all materials was an important measure for prevention and protection from disease transmission in the

| Table 4 Sources of information on HIV/AIDS-related safety measures reported by the technicians |
|-----------------------------------------------|----------|-----|
| Source                                        | No. (n = 222) | %    |
| Conferences and meetings with physicians      | 153      | 68.9 |
| Medical journals and books                    | 140      | 63.1 |
| Lectures                                      | 116      | 52.3 |
| Media                                         | 97       | 43.7 |
| Other sources                                 | 19       | 8.6  |

*Categories are not mutually exclusive.*

ملحَّنة الصحة الشرق الأوسط، منظمة الصحة العالمية، المجلة الجراحية، العدد 5-6، 2005.
Table 5: Comparison of knowledge, use and availability of protective devices between 1993 and 2003

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wearing lab coats</td>
<td>115</td>
<td>219</td>
<td>113</td>
<td>219</td>
<td>113</td>
<td>219</td>
<td>113</td>
<td>219</td>
<td>113</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>Wearing gloves</td>
<td>109</td>
<td>218</td>
<td>103</td>
<td>209</td>
<td>94.1</td>
<td>52.2</td>
<td>93.2</td>
<td>34</td>
<td>34</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Disposal of syringes &amp; needles in special boxes</td>
<td>110</td>
<td>216</td>
<td>97.3</td>
<td>206</td>
<td>92.8</td>
<td>104</td>
<td>93.7</td>
<td>70</td>
<td>60.9</td>
<td>167</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>115</td>
<td>222</td>
<td>115</td>
<td>222</td>
<td>115</td>
<td>222</td>
<td>115</td>
<td>222</td>
<td>73</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

*We observed each laboratory (73) to check what protective devices were available and if all the technicians were using them in all the visits and scored the laboratory accordingly.

Significant P = 0.0322.

Significant P = 0.0401.

Significant P > 0.0001.

Significant P > 0.0202.

Significant P = 0.003.
health care setting. Almost all believed in wearing laboratory coats or gloves while working. Gloves were reported to be available by 95.0% of technicians and by 92.6% of laboratory directors; these were latex in 83.3% of laboratories rather than nylon or dishwashing gloves which are sometimes used as a substitute. It was, however, observed that the technicians actually wore gloves in only 27 laboratories and laboratory coats in only 63 (Table 5).

Sterilization, disinfection of laboratory materials and waste disposal
The field workers observed that 64 (87.7%) laboratories had an adequate liquid disinfectant present on the bench and in 66 (90.4%) there was an autoclave available. However, only 61 (89.7%) laboratory directors reported that they used the autoclave (once per week 13.2%, once per day 17.6%, 3 times per week 25.0%). The rest either did not specify, or gave different frequencies. Furthermore, 61 (83.6%) of the laboratories reported sterilizing material for repeated usage: 57 (93.4%) by autoclaving, 9 (14.8%) by boiling, 21 (34.4%) by washing and 19 (31.1%) by immersion in disinfectants.

On the other hand, 28 (46.6%) of the laboratories disposed of their blood-contaminated waste separately in their laboratory after autoclaving it, but they did not know how it was disposed of once it left the laboratory (Table 6). Twenty-one (35.0%) reported disposing of contaminated waste the same way as non-contaminated waste, 16 (26.7%) would incinerate it, and 10 (16.7%) said they would dump it and cover it with soil.

Dealing with blood spillage
Observations showed that spillage of blood on the floor or bench was handled by pouring disinfectants in 48 (65.8%) of the 73 laboratories, or by cleaning with dry napkins in 22 (30.1%).

Management of residual blood in Vacutainer® tubes was mostly by sterilizing before disposal with normal waste or separating inside the laboratory then disposal with normal waste (Table 7). On the other hand, the handling of spillage from broken blood samples was more conservative; 52 (71.2%) of the 73 laboratories would wash and disinfect the blood, while 19 (26.0%) would clean with dry napkins without disinfecting.

Technician–patient relations
In 28 (38.4%) laboratories, the technicians deal directly with clients, and in the other laboratories 33 (45.2%) of the technicians do not have to deal with patients; they receive blood already collected in tubes. On the other hand, only 21 (9.9%) would give results directly to the patient. In the other 12 it was not specified.

Table 6 Comparison of disposal of blood-contaminated waste in the laboratories between 1993 and 2003

<table>
<thead>
<tr>
<th>Disposal and supervision measures</th>
<th>1993</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>In special containers</td>
<td>71.1</td>
<td>46.6</td>
</tr>
<tr>
<td>With non-contaminated garbage</td>
<td>28.9</td>
<td>35.0</td>
</tr>
<tr>
<td>Incineration</td>
<td>–</td>
<td>26.7</td>
</tr>
<tr>
<td>Dumping in soil</td>
<td></td>
<td>16.7</td>
</tr>
<tr>
<td>Supervision of garbage disposal</td>
<td>30.0</td>
<td>91.7</td>
</tr>
<tr>
<td>Until the end (incineration or scientific dumping)</td>
<td>–</td>
<td>45.0</td>
</tr>
<tr>
<td>Until the door of the laboratory</td>
<td>–</td>
<td>46.7</td>
</tr>
</tbody>
</table>

*Information was missing for 13 laboratories. n = total number of respondents.
Discussion

The data collected in the survey indicated that the education profile of professional laboratory directors improved between 1993 and 2003. The number with a medical background exceeded the number with a pharmacy background. In addition, the profile of the technicians also improved. There were more university graduates in the laboratories (43.2% in 2003 compared to 35.6% in 1993), and more had a technical degree in laboratory sciences (36.5% in 2003 compared to 23.4% in 1993) [4].

Laboratory facilities for HIV and hepatitis testing were adequate in the country, and almost all the laboratories do the testing. However, the distribution of laboratories was not equitable between the various provinces. In the peripheral provinces, the facilities could be increased and strengthened. In addition, many laboratories, all over Lebanon, are working illegally without being registered with the Syndicate of Laboratory Owners in Lebanon. Such laboratories are not supervised and their adherence to universal precautions is not known. Thus our results may be an underestimate of any problems that may exist.

The major findings of this study provide some interesting insights into the question of preventing the transmission of pathogens (HIV, hepatitis virus etc.) through preventive measures used by laboratory technicians in Lebanon. Despite their relatively high level of education, and the advanced level of knowledge about the modes of transmission of the pathogens, there were great disparities among technicians in knowledge, attitudes and practices [4].

On the one hand, protection techniques such as regular hand washing or use of barrier protection, including gloves of the proper quality and protective body clothing, were available and used to various extents to prevent skin and mucous membrane contamination with blood or body fluids. This is good laboratory practice reducing exposure from prolonged or extensive contamination of skin with infectious fluids [13,21].

On the other hand, despite the wide availability of gloves reported both by laboratory directors and technicians, the excellent knowledge of the protective efficiency of wearing gloves, the high rate of belief in this practice, and the reports by 92.8% of technicians that they practice this protection

### Table 7 Comparison of management by laboratories of residual blood in Vacutainers®

<table>
<thead>
<tr>
<th>Disposal</th>
<th>1993 (n = 59)</th>
<th>2003 (n = 65*)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterilization before disposal with normal waste</td>
<td>16.7%</td>
<td>41.5%</td>
<td>0.0006</td>
</tr>
<tr>
<td>Separation then disposal with general waste</td>
<td>0%</td>
<td>33.8%</td>
<td></td>
</tr>
<tr>
<td>Pouring blood into the sink</td>
<td>60.0%</td>
<td>20.0%</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Throwing with regular garbage without treatment</td>
<td>23.3%</td>
<td>4.6%</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

Categories are mutually exclusive.

*Information for 8 laboratories was missing.

n = total number of respondents
measure, it was observed that in only 37% of the laboratories the technicians actually strictly follow this measure. Compared with the previous study, we noticed a slight increase (7.3%) in this practice, which is not sufficient. We noted that within a laboratory either all or none of the technicians wore gloves.

Gloves need not be changed during laboratory activities that routinely result in contaminated gloves. Rather, gloves should be changed when these tasks are completed [13,21]. Among the recommendations published by the Centers for Disease Control in 1987, updated in 1988 and reviewed in 1991, was “blood and body-fluid precautions” that should be used consistently for all patients [23]. This approach of “universal precautions” was added to our lexicon and has eliminated the need for the category-specific blood and body fluid isolation [13]. In our study, it was evident that such a comprehensive approach was not clear in the minds of most laboratory staff. Therefore, the concept, use and effectiveness of universal precautions need to be clearly presented to all technicians and laboratory directors.

The practice of mouth pipetting decreased from 43.4% to about 11% of the technicians. Although this is a low percentage, careful consideration should also be given to this issue, particularly since HIV shares routes of infection with HBV and HCV, and in relation to the prevalence of HIV and HBV in the population. Actually, HIV, HBV and presumably HCV may be transmitted in the laboratory directly through mucosal membranes [23]. Contamination of mucosal surfaces with infectious blood, plasma, serum or other body fluids may occur with mouth pipetting or spattering of oral or nasal mucosa. For this reason mechanical pipetting devices should be used for all liquids in the laboratory and mouth pipetting must not be practised at all [13,21].

Another problem that emerged from the survey related to the utilization and disposal of used syringes and needles. Although technicians knew that direct percutaneous transmission of HIV is possible, that it could occur by parenteral inoculation of infected blood by needle-sticks accidents, and that they should dispose of needles and syringes in special needle containers, which 93.7% of them claimed to do, observation showed that only 44 (60.3%) laboratories had containers available for this purpose as observed by us. This was higher than 10 years previously when the availability of containers was observed only in 57.6% of the laboratories. Needle containers should be available in all laboratories and accessible to all technicians, since the major source of occupationally-acquired HIV infection reported is from needle-sticks [21].

There was some negligence in handling blood-contaminated material. It was reported that 46.6% of the laboratories disposed of their contaminated garbage in special containers, 35.0% of them discarded their contaminated waste the same way as non-contaminated and 16.7% of them dump it in soil.

Complete supervision of garbage disposal (incineration or dumping) was reported to be practised in 40.2% of laboratories and supervision to the door of the laboratory in 41.2%. Laboratories reported that they supervise only the disposal of proven infected material done in their laboratory. Comparing these results to those of 1993, there is more supervision especially inside the laboratory but the end point of waste outside the laboratory is unknown. Laboratory provision of special containers has decreased, probably due to the high cost of these items.
Awareness should be raised about this problem, stressing the importance of developing and following guidelines for correct handling of laboratory wastes, particularly contaminated waste. Medical waste could be classified into general refuse, special medical waste and potentially infectious categories and processed accordingly.

Autoclaves were available in 90.4% of the laboratories. The practice of on-site autoclaving is becoming standard. Medical waste may be decontaminated on-site as long as guidelines are followed. When “potentially infectious” waste is decontaminated, it becomes “general domestic” waste and may be disposed of with general waste. This requires a national policy that should be adopted and implemented by the health authorities.

The decontamination of spills by the technicians seemed to be inadequate. However, the management of residual blood in Vacutainers® or other containers has improved since 1993. Sterilization and separation had improved and pouring residues down the sink or throwing them out with general waste had decreased. This, along with other issues of medical waste disposal, still needs to be improved by developing appropriate policies, mechanisms and monitoring.

The attitudes of the technicians towards HIV testing were not consistent. They were fully aware of the risks when dealing with body fluids or when sampling. Although 98 (44.1%) technicians said they would prefer that HIV testing be done in a specialized laboratory, less than 1% reported refusing to work with blood. Meanwhile, the same people would test for HBV, HCV or other viruses. Such attitudes and practices were not consistent with the high rate of knowledge about the very important measures for prevention and self-protection from pathogen transmission. Technicians also showed some laxity in their behaviour, e.g. eating, drinking or smoking in the laboratory, as well as receiving visitors sometimes. Such practices should be limited to assigned areas in the facility.

Since in about 38% of the laboratories technicians dealt directly with patients, some pre-counselling should be provided.

The education profile of the human resources in the great majority of laboratories was adequate, except for the 3.2% of laboratories lacking a professional director or the 9.5% of technicians who had only a high school diploma or on-the-job experience. Furthermore, the majority of the technicians did not have training on how to perform HIV testing with educational sessions on AIDS and hepatitis transmission and prevention. This deficiency was found mostly in peripheral/remote laboratories.

Conclusion

Discrepancies between what the technicians knew, believed and practised have decreased since 1993 but these should still be addressed by stressing the benefits of correct practice to the laboratory directors and administrators to enforce such measures and then to technicians to make them more aware of the risks of neglecting correct safety measures.

In addition, since it is known that illegal laboratories exist, the health authorities should enforce registration and licensing of laboratories as well as optimal laboratory practices. In cooperation with the professional directors and administrators, they should write comprehensive guidelines promoting the implementation and monitoring of universal precautions. They should develop policies and procedures which will effectively protect laboratory personnel from infectious diseases in general. This is
consistent with the fact that the employer must provide for the employee a safe working environment and appropriate barriers and ensure their appropriate use.

Implementation of a universal precautions policy is not without difficulties. Health care workers unaccustomed to routine use of gloves or masks may find them inconvenient and choose not to comply. Others may overreact and use barrier precautions unnecessarily when contact with blood or body fluids is not likely. Both problems can be addressed by providing in-service training programmes and incentives to encourage compliance. The universal precautions system will add to costs, especially for disposable gloves, masks and aprons, but may also save money in laundry costs and employee workdays lost due to illness.

In short, given the current status of HIV, hepatitis and other pathogen infection and testing, a policy of universal precautions is much more likely to serve both patients’ and providers’ interests.

Lastly, regular training should include the universal precautions, initial biohazard handling, safety policies, safety activities, safety equipment and materials, ongoing monitoring and potential exposure of staff.

Acknowledgement

This study was technically and financially supported by a grant from the World Health Organization Regional Office for the Eastern Mediterranean Small Grants Programme (SGS 02/182).

References


Planning dental manpower in Lebanon: scenarios for the year 2015

B. Doughan, K. Kassak and D. Bourgeois

ABSTRACT The requirements for dentists in Lebanon for the year 2015 were estimated using the World Health Organization/World Dental Federation planning model. The aim was to help decision- and policy-makers in Lebanon to plan strategically for the supply of dental personnel in line with the recommendations of the Oral Health National Plan guidelines from 1995. Assumptions based on previous research in selected populations were taken to support the simulation. The number of dentists required for Lebanon in the year 2015 was estimated to be 2715 while the projected supply will be 6176. Urgent measures are needed to reduce the potential oversupply of dentists in this country.

Planifier le personnel dentaire au Liban : scénarios pour l’an 2015

Introduction

Despite the complexity of planning human resources for dental services, it is essential for a nation to adjust for the future supply of dental personnel and services [1]. Several industrialized countries have documented their experiences of dental planning, projections, forecasting and evaluating dental human resources during the past 2 decades [2]. The oversupply and the underemployment of dentists have been reported in many American and Scandinavian studies [3–5]. However, the topic has gained attention in only a few countries of the Eastern Mediterranean Region [6]. In 1988, the World Health Organization (WHO) and the Federation Dentaire International (FDI) set guidelines as a model for the planning and monitoring of oral health services and care [7]. The model was intended to assist in the prediction of dental workforce requirements using a needs-based, demand-weighted assessment method.

In Lebanon, the number of dentists is increasing steadily. The dentist to population ratio was 1:1000 in 1994 and was described as being the highest in the Eastern Mediterranean Region [8]. Currently, it is estimated that there are 4111 dentists registered in the 2 Lebanese dental associations of Beirut and North Lebanon [9].

The purpose of this study was to estimate the need for dentists in Lebanon for the year 2015 using the WHO/FDI model. This would help decision- and policy-makers in Lebanon to plan strategically for the supply of dental personnel in line with the recommendations of the Oral Health National Plan that was drawn up in 1995 after the National Workshop for Development of National Strategies on Oral Health [unpublished report].

Methods

Data were collected on the dental needs of the Lebanese population, demand for dental services in the population and the annual working time of a dental practitioner. The data for dental needs and demands were derived from 2 main surveys: the national oral health survey implemented in 1994 [8] and the oral health survey among 35–44-year-old adults [10]. The data for the estimates of annual working time were derived from a survey of dentists carried out in 1997 [11].

Assumptions: definitions and justifications

In order to forecast the future needs of dentists in Lebanon, different scenarios were tested based on the following factors:

- The oral health status of the population to be achieved according to specific objectives.
- The percentage of the population to be covered by dental services.
- The annual working time of dentists.
- The period of replacement of dental restorations and prostheses.

Oral health status

Estimates of the future oral health status of the population was based on the following assumptions:

- Caries treatment: stable situation. The Lebanese national oral health survey performed in 1994 showed that the mean decayed, missing and filled teeth (DMFT) index at 12 years of age was 5.7, the highest in the Eastern Mediterranean Region [8]. In the absence of any preventive strategy, it can be assumed that the DMFT index for all ages would not vary in the years following the study.
• Caries treatment: improved situation. An alternative assumption was an improvement in the oral health of the Lebanese population, with a corresponding fall in the DMFT indices. DMFT values of the National Oral Health Plan objectives for the year 2015 estimated a DMFT of 2.0 at 12 years of age [unpublished report]. In the absence of data on the DMFT index for the 30–64-year-old cohort, values were estimated by extrapolating the theoretical curve for each level [12].

• Prostheses calculation. It is important to estimate the future needs of the population for dental prostheses. If there is an improvement in the oral health status of the population in the coming years, we can assume there will be a decrease in prosthetic needs. However, this decrease is expected to be minimal, because the high DMFT index at age 12 years means that prosthetic needs will remain important despite an improvement in the oral health of the population.

Percentage of the population to be covered by dental services
Although the norms for the percentage of the population requiring dental treatment are difficult to verify, we applied the figures from the WHO/FDI methodology for developing countries [7]. Table 1 shows the results of 3 different scenarios of patient demand (maximal, intermediate and minimal).

Annual working time of dentists
Data derived from a dentists’ survey in 1997 show that the annual working time of Lebanese dentists is on average 1050 hours a year [11]. Two scenarios were applied (a 20% underestimation and a 20% overestimation) resulting in a rough estimate of annual working times of 900 and 1200 hours respectively.

Period of replacement of dental restorations and prostheses
The criteria for calculating the period of replacement of dental restorations and prostheses was based on information from the literature. We assumed that the period of replacement of restorations and prosthetics could vary between 10 and 20 years.

Results
Tables 2 and 3 show the dentist to population ratio and minutes of treatment required according to different scenarios of patient demand, annual working hours and restorations and prostheses replacement periods.
Table 2  Stable oral health situation: dentist to population ratio and minutes of treatment required according to different scenarios of patient demand, working hours and prosthesis replacement periods

<table>
<thead>
<tr>
<th>Patient demand and dentist working hours/year</th>
<th>Restoration and prosthesis replacement period</th>
<th>10 years</th>
<th>15 years</th>
<th>20 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time required (min./ person)</td>
<td>Ratio (dentists: population)</td>
<td>Time required (min./ person)</td>
<td>Ratio (dentists: population)</td>
</tr>
<tr>
<td>Maximal demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900 h/yr</td>
<td>46.4</td>
<td>1:1164</td>
<td>42.3</td>
<td>1:1277</td>
</tr>
<tr>
<td>1050 h/yr</td>
<td>46.4</td>
<td>1:1358</td>
<td>42.3</td>
<td>1:1489</td>
</tr>
<tr>
<td>1200 h/yr</td>
<td>46.4</td>
<td>1:1552</td>
<td>42.3</td>
<td>1:1702</td>
</tr>
<tr>
<td>Intermediate demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900 h/yr</td>
<td>39.5</td>
<td>1:1367</td>
<td>36.0</td>
<td>1:1500</td>
</tr>
<tr>
<td>1050 h/yr</td>
<td>39.5</td>
<td>1:1595</td>
<td>36.0</td>
<td>1:1750</td>
</tr>
<tr>
<td>1200 h/yr</td>
<td>39.5</td>
<td>1:1823</td>
<td>36.0</td>
<td>1:2000</td>
</tr>
<tr>
<td>Minimal demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900 h/yr</td>
<td>32.7</td>
<td>1:1651</td>
<td>29.8</td>
<td>1:1812</td>
</tr>
<tr>
<td>1050 h/yr</td>
<td>32.7</td>
<td>1:1927</td>
<td>29.8</td>
<td>1:2114</td>
</tr>
<tr>
<td>1200 h/yr</td>
<td>32.7</td>
<td>1:2202</td>
<td>29.8</td>
<td>1:2416</td>
</tr>
</tbody>
</table>

Table 3  National plan 2015 objectives: dentist to population ratio and minutes of treatment required according to different scenarios of patient demand, working hours and prosthesis replacement periods

<table>
<thead>
<tr>
<th>Patient demand and dentist working hours/year</th>
<th>Restoration and prosthesis replacement period</th>
<th>10 years</th>
<th>15 years</th>
<th>20 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time required (min./ person)</td>
<td>Ratio (dentists: population)</td>
<td>Time required (min./ person)</td>
<td>Ratio (dentists: population)</td>
</tr>
<tr>
<td>Maximal demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900 h/yr</td>
<td>34.9</td>
<td>1:1547</td>
<td>34.8</td>
<td>1:1552</td>
</tr>
<tr>
<td>1050 h/yr</td>
<td>34.9</td>
<td>1:1805</td>
<td>34.8</td>
<td>1:1810</td>
</tr>
<tr>
<td>1200 h/yr</td>
<td>34.9</td>
<td>1:2063</td>
<td>34.8</td>
<td>1:2069</td>
</tr>
<tr>
<td>Intermediate demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900 h/yr</td>
<td>30.6</td>
<td>1:1765</td>
<td>29.9</td>
<td>1:1806</td>
</tr>
<tr>
<td>1050 h/yr</td>
<td>30.6</td>
<td>1:2059</td>
<td>29.9</td>
<td>1:2107</td>
</tr>
<tr>
<td>1200 h/yr</td>
<td>30.6</td>
<td>1:2353</td>
<td>29.9</td>
<td>1:2408</td>
</tr>
<tr>
<td>Minimal demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>900 h/yr</td>
<td>25.4</td>
<td>1:2126</td>
<td>24.9</td>
<td>1:2169</td>
</tr>
<tr>
<td>1050 h/yr</td>
<td>25.4</td>
<td>1:2480</td>
<td>24.9</td>
<td>1:2530</td>
</tr>
<tr>
<td>1200 h/yr</td>
<td>25.4</td>
<td>1:2835</td>
<td>24.9</td>
<td>1:2892</td>
</tr>
</tbody>
</table>
The results of the stable oral health situation are presented in Table 2. The values of the dentist to population ratio vary between 1:1164 (for a maximal demand and a period of restoration replacement of 10 years) and 1:2535 (for a minimal demand and a replacement period of 20 years).

The results of an improved oral health situation according to the Lebanese national plan for 2015 are presented in Table 3. Assuming that restorations and fillings should be changed every 10 years, the results show that the annual working time per dentist is 34.9 minutes for a maximal demand (100% of dental coverage for the 0–14 years), and an estimated dentist to population ratio of 1:1805 when using the average dentists’ working time. An under- or overestimation of the dentists’ working time will lead to a dentist to population ratio of 1:1547 and 1:2063 respectively.

According to the Central Administration for Statistics [13], the Lebanese population has an annual growth rate of 1.65%. The projected population will therefore be 4.2 million by the year 2015. Based on this projection, and the previous determinants of workforce requirements, the estimated dentist to population ratio obtained using the WHO/FDI model is 1:1547, yielding a need for 2715 dentists.

Projection of the number of dentists

In the absence of any health strategy, we can assume that the behaviour of dentists within their profession will not change. This situation is known as status quo where the same patterns of inflow and outflow of dentists will be observed. The annual number of new dentists entering the market will be equal to the number of new graduates from national and foreign universities minus the number of dentists leaving the profession because of retirement, death or immigration. This number can be calculated graphically using a linear regression of the evolution of the number of dentists during the last 20 years (Figure 1). The results of this forecast show that the number of dentists by year 2015 will be 6176, assuming the stability of patterns observed, and hence an oversupply of more than 3400 dentists, with a dentist to population ratio of 1:680.

![Figure 1](image-url)
Impact of reducing the number of new graduates

Figure 2 shows the impact of reducing the number of new graduates on the overall number of dentists. A 25% and a 50% reduction in the number of new graduates from national and foreign universities will lower the number of dentists to 5689 and 5197 respectively.

Discussion

Data analysis showed that the highest dentist to population ratio (1:1164) was obtained when applying the scenario of a stable oral health situation and a high demand for care. This ratio decreased to 1:1547 in the scenario based on the 2015 national plan. The improvement in the oral health of the population will lead to a reduced need for dental personnel.

The results showed a positive impact of the annual dentists’ working time on the dentist to population ratio. Assuming that the period of replacement for dental restorations and prostheses is constant, an increase in the annual working time of dentists will lead to a reduction in the number of dentists required to serve the community. It is therefore important when planning dental manpower to take into account socioeconomic factors that can modify the behaviour and practice of dentistry. These factors include an increase in the number of female dentists [5], a restriction in the number of new graduates (numerus clausus), changes in taxes, changes in the administration of dental clinics and changes in the lifestyle of citizens [14].

Furthermore, the period of replacement for restorations and prostheses is an important factor in the planning of dental manpower. Assuming that this period varies between 10 to 20 years, the activity of dentists will decrease 14% in the case of a stable situation scenario. The quality of care plays a key role in the determination of the replacement period. Restorations of high quality will last longer than restorations of lower quality. Changes would be observed in the near future not only because of improvements in dental materials and research, improved training of future dentists but also because of the willingness of the
dental profession to reinforce preventive policies leading to longer lasting restorations [14].

Another factor that should be taken into consideration in dental manpower planning is the percentage of the population to be covered by dental care. Full coverage of children aged 0–14 years is mandatory for the improvement of the oral health of the population. Demand for dental services of 85%, 65% and 30% for the age cohorts 15–29, 30–64 and 65–79 years respectively is considered to be maximal demand and an objective to be reached. These percentages are recommended by WHO and FDI for developing countries [7].

Our results showed that dentists’ activity varies according to the percentage of the population covered by dental care. In the stable oral health scenario, dentists’ activity dropped 30% when the demand moved from the maximal to the minimal level (from 46.4 to 32.7 minutes/person).

According to the data derived from the Lebanese Dental Association, 4111 dentists are registered in Lebanon. The number of dentists has increased considerably during the last 20 years, by 2.5 between 1980 and 1990 and has doubled between 1990 and 1999. The current average dentist to population ratio is 1:800, which is the highest in the Eastern Mediterranean Region [8]. In addition, a severe maldistribution of dental manpower is observed in the country. This ratio reaches 1:387 and 1:459 in Beirut, the capital, and Mount Lebanon respectively. On the other hand, the dentist population is young, with half of them aged between 32 and 46 years.

It is imperative to try to solve this growing problem. The current dentist to population ratio is far different from the desired ratio obtained with the WHO/FDI model. Lebanon is facing a major oversupply of dentists. The highest dentist to population ratio obtained using the model was 1:1164 in the most unfavourable situation, i.e. assuming a stable oral health status, a 10-year period of restoration replacement, a maximal demand and an under-estimation of dentist working time. If no action is taken to solve this problem, the number of dentists in the year 2015 will rise by 70% and the number of dentists will be approximately 6176, with a dentist to population ratio of 1:680. If Lebanon adopts a national oral health strategy according to the national plan for 2015, the need for dental personnel will be lower still. According to the model, the highest dentist to population ratio needed is 1:1547, when applying the hypothesis of maximal demand, the minimum annual working hours per dentist and a minimum period of restoration replacement. When adopting the graphical projection, the number of dentists needed was 2715 according to the national plan objectives for year 2015.

Although some may believe that an oversupply of dentists may benefit the public by delivering better services at lower prices in a free market [15], the imbalance in dental manpower can lead to undesirable consequences at the professional, economic, health and social levels [16]. Dentist oversupply may adversely affect conditions of practice and patterns of work. Dentists may experience unemployment, underemployment or reduced opportunities for employment. Dentists can experience a drop in their real income. There may be increasing competition between professionals. There may be a deterioration in the quality of care. There could even be a threat to ethical principles, for example if there is a temptation to over-treat patients, introduce unnecessary services or fail to refer when indicated [16].
The imbalance in dental manpower seems to be an international issue. The oversupply of dentists has been a major concern in various industrialized countries for the last decade and several studies on dental manpower planning have been published. Lewis reported that the shortage of dentists increased from 32% in 1978 to 46% in 1984 in Canada [17]. Dental schools in North America reduced class sizes due to a perceived oversupply of dentists [18]. The oversupply of dentists in America has been described in many publications [2–4]. Beagrie reported that Scandinavian countries have also reported severe underemployment and unemployment problems for dentists with a dentist to population ratio lower than 1:1000 [5]. However, and in contrast to developing countries, oral health in these countries has improved considerably (and dental caries decreased) during the previous decades.

Some ideas to solve this problem have been suggested in the literature. Restricting the number of undergraduate students has been implemented in many countries [3,5,18,19]. This solution might prove to be insufficient in Lebanon, if it is not coupled with other measures. Projections showed that a 25% and a 50% reduction in the number of undergraduates will lead to a reduction of 8% and 16% in the number of dentists respectively in 2015. The dentist to population ratio will become 1:743 and 1:813 respectively. The oversupply can be controlled by reducing the inflow of graduates of foreign dental schools [20].

Mann et al. cited a number of solutions that can help solve the problem of oversupply [15]. Increasing demand for services might be the most convenient and reasonable approach. Financing dental services or the presence of a third party payment is an additional approach to increase demand on services. An improved geographical distribution of dentists might be considered as a short-term solution.

Because of the long training time of dentists and because repercussions of a decision arise 6 to 10 years after it has been taken, measures should be taken urgently in order to reduce the supply of dentists [21].

Conclusion

Given the situational analysis on the utilization of dental services and the current oral health status in Lebanon, a theoretical assessment of the need for oral health providers has been presented. Using the WHO/FDI planning model, it is believed that the country is facing an oversupply of dental human resources. As such, this calls for an urgent need to monitor closely the supply and demand for dental services. The establishment of such a monitoring and evaluation system should help the decision-makers in better formulating appropriate policies and strategies to improve the oral health of the Lebanese population.

References

4. Douglass CW, Furino A. Balancing dental service requirements and supplies: epi-
demiologic and demographic evidence. 
6. Ahmed AA, Fateha B, Benjamin S. 
Demand and supply of doctors and dentists in Bahrain, 
7. World Health Organization/Fédération 
Dentaire Internationale. Health through oral health: 
guidelines for planning and monitoring for oral health care. 
Beirut, Lebanese University, 1995.
9. Naltchayan L. Panorama du système 
dentaire au Liban—recommandations. Association for Comparative Economic 
10. Doughan B, Kassak K, Bourgeois DM. 
Oral health status and treatment needs of 
11. Doughan B. Contribution à la planification des besoins en personnels de santé 
13. Bulletin no.1. Beirut, Central Administra-
14. Bourgeois D et al. The application of the 
theoretical model WHO/FDI planning sys-
tem to an industrialized country: France. 
International dental journal, 1993, 43: 
50–8.
15. Mann J et al. Dental underemployment:
a study of uncontrolled dental manpower 
immigration. International dental journal, 
16. Bankowski Z, Meija A. Health manpower 
out of balance. Conflicts and prospects. 
Geneva, Council for International Organiza-
tions of Medical Sciences, 1986.
17. Lewis JM, Morgan MV, Wright FAC. The 
validity of CPITN scoring and presenta-
tion method for measuring periodontal 
18. Stangel I. Factors affecting the future 
need for dental manpower in Canada and 
Quebec. Journal of the Canadian Dental Association, 
19. L’offre des soins. La santé bucco-dentaire 
20. House RK, Johnson GC, Edwards FA. 
Manpower supply study scenarios for the 
future: dental manpower to 2001. Journal of the Canadian Dental Association, 
Needs, demands and manpower balance. 
Dentists/Populations FDI Commission 1996. International dental journal, 1996, 
Smoking prevalence, knowledge and attitudes among medical students in Karachi, Pakistan

F.M. Khan,1 S.J. Husain,1 A. Laeeq,1 A. Awais,1 S.F. Hussain1 and J.A. Khan1

1Section of Pulmonary Medicine, Aga Khan University, Karachi, Pakistan (Correspondence to J.A. Khan: javaid.khan@aku.edu).

ABSTRACT A survey of smoking prevalence and attitudes was made among medical students randomly selected from classes at the Aga Khan University, Karachi, Pakistan. Of 271 respondents, 14.4% were current smokers (22.0% male and 3.8% females) and 3.3% ex-smokers. A majority of students recognized the dangers associated with active as well as passive smoking although only 55% of current smokers planned to quit in the near future. Most smokers (96%) believed that they as well as other health professionals needed training on smoking cessation and 95% of all students believed that doctors should play a role model in smoking cessation by not smoking themselves. Specific training and counselling should be a part of the required curriculum at medical schools.

Prévalence du tabagisme, connaissances et attitudes en la matière chez les étudiants en médecine à Karachi (Pakistan)

RÉSUMÉ Une enquête sur la prévalence du tabagisme et les attitudes en la matière a été réalisée auprès d’étudiants en médecine de l’Université Aga Khan de Karachi (Pakistan) choisis au hasard. Sur les 271 répondants, 14.4 % étaient fumeurs au moment de l’enquête (22,0 % d’hommes et 3,8 % de femmes) et 3,3 % des ex-fumeurs. Une majorité d’étudiants reconnaissaient les dangers associés au tabagisme actif et passif même si seulement 55 % des fumeurs au moment de l’enquête prévoyaient d’arrêter de fumer dans un avenir proche. La plupart des fumeurs (96 %) pensaient qu’ils avaient besoin, eux-mêmes ainsi que d’autres professionnels de la santé, d’une formation au sevrage tabagique et 95 % de l’ensemble des étudiants pensaient que les médecins devaient montrer l’exemple en matière de sevrage tabagique en ne fumant pas eux-mêmes. Une formation et des conseils spécifiques devraient faire partie du programme d’études des écoles de médecine.

1Section of Pulmonary Medicine, Aga Khan University, Karachi, Pakistan (Correspondence to J.A. Khan: javaid.khan@aku.edu).

Received: 05/10/03; accepted: 17/05/04

المجلة الصحية لشرق المتوسط، منظمة الصحة العالمية، الجلد الحادي عشر، العددان 5-6، 2005
Introduction

The harmful consequences of smoking on health have been well documented. Data from recent studies have confirmed the quantitative relationship between smoking and many diseases such as coronary artery disease, lung cancer, bladder cancer, pulmonary emphysema, peripheral vascular disease and neonatal mortality \cite{1-3}. In 2000, an estimated 4.83 million premature deaths were attributable to smoking, of which almost 50% were in developing countries \cite{4}. Most high-income countries are showing a continuous and steady decline in the prevalence of smoking \cite{5}. In contrast, tobacco use in developing countries such as Pakistan continues to rise each year. Globally during the past 2 decades cigarette production has increased at an average of 2.2% each year, outpacing the population growth rate of 1.7% \cite{5}. Out of a total population of 78 million in Pakistan in 1995, 36% males and 9% females aged 15 years or older were found to be smokers \cite{6}.

Data on the smoking habits of medical students is of particular interest. As doctors, they will be responsible for providing health care to the population and can influence the future health policies of their country. A study conducted in 1993 among medical students of the Aga Khan University, Karachi, showed that 11% of the medical students were smokers (males 17%, females 4%) \cite{7}. The present study aimed to establish the prevalence of smoking and knowledge and attitude towards smoking among the students of a medical university.

Methods

A survey was conducted among medical students of the Aga Khan University, Karachi, Pakistan using a modified version of the questionnaire of the International Union Against Tuberculosis and Lung Disease (IUATLD) \cite{8}. In February 2000, 300 medical students were randomly selected from the total number of just over 400. The aim was to obtain completed questionnaires from at least 70% of the total number of medical students studying in the university at the time of the survey. Questionnaires were distributed to 300 students and replies received from 271 students. Complete confidentiality was assured to all the students participating in the survey.

The modified IUATLD questionnaire sought information about tobacco use, age, sex and place of residence. Information about whether a medical student lived at home or in a hostel aimed to determine if this affected the rate of tobacco use. Students were asked about the age at which they began smoking and whether or not they had smoked at least 100 cigarettes or an equivalent amount of tobacco. They were questioned about the reasons behind the decision to start smoking as well as their perception of the most convincing reason for stopping smoking.

The questionnaire sought respondents’ views about a proposed ban on smoking in the medical school campus, in hospitals and other public places; about a ban on cigarette advertising; and about social issues associated with smoking, e.g. the sale of tobacco to children and the low price of tobacco products in Pakistan (since carrying out this study a law was passed in Pakistan to ban the sale of tobacco products to under 18-year-olds). The students were asked whether smokers should have opportunities to attend smoking cessation programmes and whether health professionals should be given skills training in the core curriculum to help them with patients who wish to stop smoking. The medical students’ knowledge about the diseases caused by smoking was also tested.
A smoker was defined as someone who continued to smoke any amount of tobacco either regularly or occasionally, a never smoker was one who had never smoked and an ex-smoker was one who had smoked either occasionally or regularly in the past but had now quit completely.

All the data were entered and analysed using the Epi-Info program for Windows, version 6.0.

Results

We received 271 completed questionnaires from 300 students; 59% (n = 160) were male and 41% (n = 111) female. The mean age of the respondents was 19.9 years (range 17–28 years). Of the respondents, 39 (14.4%) were current smokers, 223 (82.3%) non-smokers and 9 (3.3%) ex-smokers (Table 1). The prevalence of smoking was much higher among males (22%) than females (4%).

Over half (59%) of all respondents lived away from their homes in the university hostel on campus; a higher proportion of current smokers (72%) lived on campus.

Profile of current smokers

The mean age of starting smoking among the 39 current smokers was 17.9 (range 13–24) years, with 63% of the smokers admitting to having smoked at least 100 cigarettes or tobacco equivalent. Of current smokers, 55% were regular smokers (2–10 cigarettes/day) while 45% were occasional smokers (≤ 1 cigarettes/day). Nearly half (55%) of the smokers started smoking before joining medical school and 45% during their stay in medical school. Both groups began smoking socially with friends but found it habit-forming over time.

The parental smoking habits of the current smokers were evaluated. It was noted that 38% of the parents were current smokers and 21% were ex-smokers. The majority (73%) of current smokers in our survey believed that parental habits had not influenced their decision to smoke. Over half (55%) of current smokers planned to quit smoking in the future and health reasons were the number one influencing factor (41%). Of the 45% current smokers who wanted to continue smoking, 63% said that they planned to stop within 5–10 years while the rest wanted to continue indefinitely. Of the current smokers, 46% had tried at least once in their life to quit smoking without any success.

When the ex-smokers and non-smokers were asked why they quit or did not ever take up smoking, the main reasons reported were health concerns (45%) followed by parental/family guidance or pressure (16%).

Beliefs about tobacco control

Regarding methods to control the increasing epidemic of tobacco use in developing countries, 86% of the 271 respondents thought that smoking should be banned in offices and public places and 95% favoured a

<table>
<thead>
<tr>
<th>Smoking status</th>
<th>% of respondents (n = 271)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current smoker</td>
<td>14.4</td>
</tr>
<tr>
<td>Regular (2–10 cigarettes/day)</td>
<td>7.9</td>
</tr>
<tr>
<td>Occasional (≤ 1 cigarette/day)</td>
<td>6.5</td>
</tr>
<tr>
<td>Never smoker</td>
<td>82.3</td>
</tr>
<tr>
<td>Ex-smoker</td>
<td>3.3</td>
</tr>
</tbody>
</table>

n = total number of respondents.
smoking ban on the medical school campus and in the hospital (Table 2). Having a limited number of designated smoking areas (open 24 hours) for smokers was supported by 88% of the students. Even 54% of current smokers also supported a smoking ban on the campus and in the hospital except for a few designated areas. A complete ban on cigarette advertisements, which included television, magazines, newspapers, billboards, and ban on sports sponsorship was favoured by 75% of all respondents. Nearly all the 39 smokers (96%) thought that health professionals should have specific training on how to support patients quitting smoking. Smoking warnings on cigarette packages were supported by 85% of the responders. Nearly half (58%) of the respondents wanted the price of tobacco products to be increased sharply in an effort to deter people from smoking cigarettes.

Knowledge and beliefs about health risks

Almost all the medical students believed that both active as well as passive smoking were injurious to health (Table 3). When questioned on the ensuing hazards related to smoking 100% of respondents recognized lung cancer. Nearly 5% believed that

<table>
<thead>
<tr>
<th>Item</th>
<th>% agreeing (n = 271)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking should be banned in offices and public places</td>
<td>86</td>
</tr>
<tr>
<td>Smoking should be banned on this university campus</td>
<td>95</td>
</tr>
<tr>
<td>Designated smoking areas should be available on campus</td>
<td>99</td>
</tr>
<tr>
<td>Health professionals should have special training on</td>
<td>96</td>
</tr>
<tr>
<td>how to support patients quitting smoking</td>
<td></td>
</tr>
<tr>
<td>All cigarette advertising and sponsorship should be</td>
<td>75</td>
</tr>
<tr>
<td>banned</td>
<td></td>
</tr>
<tr>
<td>Health warnings should be printed on cigarette packets</td>
<td>85</td>
</tr>
<tr>
<td>Price of tobacco products should be increased greatly</td>
<td>58</td>
</tr>
</tbody>
</table>

n = total number of respondents.

Table 3 Knowledge and beliefs of medical students in Karachi about hazards of smoking and role of physicians in helping patients to quit

<table>
<thead>
<tr>
<th>Item</th>
<th>% agreeing (n = 271)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both active and passive smoking are injurious to health</td>
<td>98</td>
</tr>
<tr>
<td>Smoking is a risk for:</td>
<td></td>
</tr>
<tr>
<td>Lung cancer</td>
<td>100</td>
</tr>
<tr>
<td>Oral and laryngeal cancer</td>
<td>95</td>
</tr>
<tr>
<td>Bladder cancer</td>
<td>72</td>
</tr>
<tr>
<td>Stroke and coronary artery disease</td>
<td>95</td>
</tr>
<tr>
<td>Neonatal death</td>
<td>89</td>
</tr>
<tr>
<td>Most smokers can stop if they want to</td>
<td>90</td>
</tr>
<tr>
<td>Physicians are responsible for educating patients to stop</td>
<td>90</td>
</tr>
<tr>
<td>Most people will not give up smoking even if their doctor advises</td>
<td>92</td>
</tr>
<tr>
<td>it</td>
<td></td>
</tr>
<tr>
<td>Doctors should set a good example by not smoking</td>
<td>95</td>
</tr>
<tr>
<td>Doctors are more likely to advise people to quit if they have had</td>
<td>98</td>
</tr>
<tr>
<td>adequate training</td>
<td></td>
</tr>
<tr>
<td>My own current knowledge is sufficient to counsel patients who</td>
<td>79</td>
</tr>
<tr>
<td>want to quit</td>
<td></td>
</tr>
</tbody>
</table>

n = total number of respondents.
there was no association between tobacco use and oral cancer, laryngeal cancer, stroke or coronary artery disease. The association of smoking with neonatal death was not recognized by 11%, and bladder cancer as a consequence of smoking was not known by 22%.

Nearly 90% of all respondents agreed that most smokers could stop if they wanted to and that it is the responsibility of physicians who provide care to educate patients to stop smoking. On the other hand, 92% of respondents believed that most people would not give up smoking even if their physicians counselled them to do so. Nearly 95% of respondents agreed that doctors should set a good example by not smoking themselves and needed to be more active in raising the level of public awareness regarding the risks of cigarette smoking. Almost all of the respondents (98%) believed that doctors would be more likely to advise people to quit if they had received adequate training in smoking cessation therapy and 79% of all respondents believed that their current knowledge was sufficient to counsel patients who wanted to quit smoking.

Discussion

We took medical students as the focus of our survey as the attitudes and practices towards tobacco use of these young health professionals can influence future policies and practice. If doctors and medical students are smoking then the credibility of anti-smoking messages to the public is lost. Medical students are a group that should be more aware than young people of the same age about the health hazards associated with smoking. The response rate was about 90%. The prevalence of current smokers among medical students in the year 2000 was 14.4%, which is higher than a similar study conducted in 1993 (11%) [7]. However, this is lower than the prevalence of current smokers in studies of European medical students (21%) [9] and other Asian medical students (18%-24%) [10,11]. The prevalence of smoking in medical students of this university was lower than the general population; a recent survey recorded the overall prevalence of current smoking in adult males in Karachi, Pakistan was 34% [12].

A higher proportion of the current smokers lived in the university hostel. Living away from the influence of their parents could have had a role in tobacco use, as 45% of smokers had started after joining university. Peer pressure also is an important reason for starting to smoke. Most of the smokers in our survey admitted to having started by smoking socially. Most of the smokers (73%) in our study did not think that their habit was influenced by parental smoking habits. Their beliefs contrast with another study showing a statistically significant positive correlation between parental tobacco use and the risk of smoking among students [13].

The majority of current smokers wanted to quit smoking in the future, with health reasons being the major concern. This was also the most common reason for giving up smoking among the ex-smokers and for not starting smoking among non-smokers. This shows that, probably due to the ongoing anti-smoking campaign in Pakistan, medical students are aware of many, if not all, of the health risks associated with smoking. Like smokers among the general public, a high proportion (45%) of medical students had also tried to quit smoking at least once in their lives but without success. Special training is therefore required for all health professionals and medical students to assist them in giving up smoking.
It was encouraging to see that almost all students thought that smoking, including passive smoking, was injurious to health. All of the students were aware of the association of lung cancer with smoking but 5% medical students thought that there was no association between tobacco use and oral cancer, laryngeal cancer, stroke or coronary artery disease. A significant minority did not associate smoking with increased risk of neonatal death (11%) and bladder cancer (22%). Better undergraduate medical training of medical students about all the health risks associated with smoking is required so that as physicians they are better prepared to counsel patients who smoke.

Nearly all the respondents agreed that physicians or medical students should not smoke as they are role models in society and it is part of their individual responsibility to curb the problem of smoking and to take an active part in raising awareness of the health risks in the general population. Medical students at the Aga Khan University Hospital were strongly in favour of having training about smoking cessation techniques and a curriculum that addresses the medical and social consequences of tobacco abuse. The majority of medical student respondents felt that a change in the curriculum, which addressed the issue of smoking and techniques of smoking cessation would provide health professionals with a more informed perspective about this deadly but preventable problem.

**Conclusion**

This study shows that despite the increasing awareness of the health problems due to tobacco use, smoking is still common among medical students. Smoking should be banned in hospitals and other public places and specific training in counselling about smoking should be a part of the required curriculum at medical schools. Future doctors should be better prepared to protect themselves and their patients from tobacco smoking, the single largest preventable cause of death and disease in the world today.

**References**


---

**International survey on health professionals and tobacco shows 23% of health professionals smoke**

In May, the World Health Organization Regional Office for the Eastern Mediterranean announced the results of the second stage of an important survey on smoking among health professionals which was developed by WHO in collaboration with the Centers for Disease Control and Prevention (USA), International Agency for Research on Cancer, Emory University (USA) and University of New South Wales (Australia).

In total, 11 000 health professionals in 5 countries of the WHO Eastern Mediterranean Region (Egypt, Jordan, Libyan Arab Jamahiriya, Qatar and Saudi Arabia) completed the second round of the Health Professionals Survey, the first round of which was administered in Bahrain, Islamic Republic of Iran, Kuwait, Oman and Sudan.

The vast majority (97.9%) of survey participants agreed that smoking is harmful to health. However 23% reported they were current smokers, 10% were former smokers and 67% had never smoked. Over 75% of health professionals in the countries surveyed consistently agreed with the need to implement the elements of comprehensive tobacco control. Health professionals are well positioned to advocate for and support the implementation of such tobacco control.

*Source: EMRO Press release No. 6 May 2005*
Prevalence and type of anaemia in young Egyptian patients with type 1 diabetes mellitus

N. Salah,1 F. Abd El Hamid,2 S. Abdelghaffar1 and M. El Sayem1

Departments of Paediatrics, Diabetic Endocrine and Metabolic Paediatric Unit (DEMPU); 2Department of Clinical Pathology, Faculty of Medicine, University of Cairo, Cairo, Egypt (Correspondence to S. Abdelghaffar: kshereen@link.net).

Received: 30/09/03; accepted: 15/03/04

ABSTRACT Over a 2-month period, 200 type 1 diabetic patients attending a paediatric diabetic clinic in Cairo, Egypt were screened for anaemia and other complications of diabetes. The mean age was 11.2 years and the mean duration of diabetes was 4.0 years. Anaemia was diagnosed in 75 patients (37.5%) overall: 45 had microcytic hypochromic anaemia, 18 normocytic normochromic and 12 macrocytic hypochromic. Of the 75, 41 patients (54.7%) had iron deficiency, 14 (18.7%) had folate deficiency and 14 (18.7%) had thalassaemia minor. Three patients (4%) had coeliac disease, and 18 patients (24%) had parasitic infections. None of the patients had hypothyroidism, renal failure or vitamin B12 deficiency.

Prévalence et type d’anémie chez de jeunes patients égyptiens atteints de diabète sucré de type 1

RÉSUMÉ Sur une période de 2 mois, 200 patients diabétiques de type 1 consultant dans une clinique du diabète pédiatrique au Caire (Égypte) ont été examinés à la recherche d’une anémie et d’autres complications du diabète. L’âge moyen était de 11,2 ans et la durée moyenne du diabète était de 4,0 ans. Une anémie a été diagnostiquée chez 75 patients (37,5 %) en tout : 45 avaient une anémie hypochrome microcytaire, 18 une anémie normochrome normocytaire et 12 une anémie hyperchrome macrocytaire. Sur les 75 patients, 41 (54,7 %) avaient une carence en fer, 14 (18,7 %) avaient une folatodéficiency et 14 (18,7 %) avaient une thalassémie mineure. Trois patients (4 %) avaient une maladie cœliaque, et 18 patients (24 %) avaient une parasitose. Aucun des patients n’avait d’hypothyroïdie, d’insuffisance rénale ou de carence en vitamine B12.

Department of Paediatrics, Diabetic Endocrine and Metabolic Paediatric Unit (DEMPU); 2Department of Clinical Pathology, Faculty of Medicine, University of Cairo, Cairo, Egypt (Correspondence to S. Abdelghaffar: kshereen@link.net).

Received: 30/09/03; accepted: 15/03/04

المراجعة: لم تكن سهيلة إلى أن انتهى وعصر الأرض، مطبوعة، الجريدة العالمية، المجيد الجدي 16، العدد 5، 2005.
Introduction

The etiology of anaemia in type 1 diabetes is diverse. Diabetic patients who, through neglect or ignorance, do not follow the appropriate dietary regimes, are at-risk of developing nutritional deficiency anaemia, especially iron and folate deficiency. Moreover, diabetics with poor glycaemic control are susceptible to recurrent attacks of ketoacidosis which may be accompanied by anorexia, severe vomiting with frequent hospitalization and excessive calorie loss [1]. The occurrence of diabetic nephropathy with ultimate renal failure is an important cause of anaemia in these patients [2]. The association of type 1 diabetes and coeliac disease has been widely reported, the latter being associated with iron, folic acid and vitamin B12 deficiencies. Hashimoto thyroiditis, resulting in acquired hypothyroidism, is strongly associated with type 1 diabetes and is commonly accompanied by anaemia [3]. Thalassaemia minor is relatively common in the Mediterranean area and should be considered in the differential diagnosis of anaemia [4].

The aim of this study was to record the prevalence of anaemia, its type as well as its possible causes among a group of young Egyptians with type 1 diabetes attending a paediatric diabetic clinic in Cairo.

Methods

Patients

The study was carried out at the Diabetic Endocrine and Metabolic Paediatric Unit of the University of Cairo, Children’s Hospital. This clinic receives patients referred from all over Egypt, all of whom are characterized by being of low or intermediate social class. There is no maximum age for follow-up in the unit for type 1 diabetics, as patients who start follow-up care in the children’s age group are allowed to continue follow-up indefinitely if they wish, in order not to change the protocol of therapy. Between January and December 2002, 200 patients attending the clinic were screened for the presence of anaemia. The patients were of different age groups and had been diagnosed with type 1 diabetes for different durations.

To obtain reference values for blood levels, a control group of 20 normal subjects (10 male, 10 female) were recruited from healthy relatives accompanying patients to the hospital. They were living in the same area and of the same socioeconomic class and the mean (SD) age was not significantly different from the study patients [11.2 (5.1) versus 11.7 (4.7) years].

Informed consent was taken from all patients before they entered the study.

Laboratory tests: all patients

Diabetic patients were screened for the following:

- Presence and type of anaemia. Complete blood count was performed on all 200 diabetic patients and 20 controls. The cut-off values for the diagnosis of anaemia were based on mean ± 2 SD values of controls. For microcytic hypochromic anaemia, the cut-offs were: haemoglobin (Hb) < 10.94 g/dL, mean cell volume (MCV) < 68.5 fL and mean cell haemoglobin concentration (MCHC) < 25.5 g/dL. For macrocytic hyperchromic anaemia, the cut-offs were: MCV < 84.5 fL and MCHC < 41.5 g/dL. Red cell distribution width (RDW) was calculated using an electronic cell counter utilizing the formula: RDW = SD / MCV × 100. Normal ranges of RDW were 11.5%–14.5% for children aged 0–2 years and 11.5%–15.0% for children aged 2–12 years according to
values obtained from control patients and other reference values [5].

- **Metabolic control.** Glycosylated haemoglobin (HbA1c) levels of diabetic patients were measured routinely every 3 months using an automated ion capture assay (Abbott IMx, Abbott Laboratories, Illinois, USA). Mean values over the preceding 6 months were calculated. The normal value in our laboratory is < 6.5%.

- **Microvascular complications.** Diabetic patients were screened for chronic microvascular complications of type 1 diabetes: microalbuminuria (urine albumin/creatinine ratio > 30 µg/mg); retinopathy (by fundus examination); peripheral neuropathy (using electrophysiological studies); and cardiovascular autonomic neuropathy (using the methods of Ewing and Clarke [6]).

**Laboratory tests: anaemic patients**

Diabetic patients with anaemia were screened for the following:

- **Iron deficiency.** Serum iron and total iron binding capacity (TIBC) were assessed using standard colorimetric kits (bioMérieux, Marcy l’Etoile, France). Cut-off points (based on ± 2 SD from the mean of control patients) were: decreased iron < 50.43 µg/dL and increased TIBC > 413.89 µg/dL.

- **Folate deficiency.** Serum folate and vitamin B12 levels were measured in patients with macrocytic or normocytic anaemia and the controls. A radioassay method designed for simultaneous measurement of both parameters in serum [7]. Cut-off points (± 2 SD of control means) for decreased levels were: serum folate < 3.04 ng/mL and serum vitamin B12 < 68.2 pg/mL.

- **Haemoglobinopathies.** All anaemic patients were given haemoglobin (Hb) electrophoresis to exclude the presence of haemoglobinopathies. Normal values were defined as: HbA1c > 95%, HbA2 1.5%-3.5% and Hbf < 2%. Thalassaemia minor was diagnosed by elevated HbA2 > 3.5%.

- **Coeliac disease.** All anaemic patients were assessed for the presence of anti-gliadin, anti-reticulin and anti-endomysium autoantibodies as a screening for coeliac disease. Anti-gliadin IgG antibodies were measured using an enzyme-linked immunosorbent assay (ELISA) kit (ImmuLisa, IMMCO Diagnostics, Buffalo, New York, USA). Anti-reticulin antibodies were analysed with an indirect immunofluorescence method using rat kidney sections (ImmuGlo, IMMCO Diagnostics). Antendomysium antibodies (EMA) were analysed with an indirect immunofluorescence method using monkey oesophagus tissue sections (ImmuGlo, IMMCO Diagnostics).

- **Chronic renal failure.** Serum creatinine levels were measured to exclude chronic renal failure as a cause of anaemia.

- **Thyroid status.** Serum thyroid stimulating hormone (TSH) levels were quantitatively measured using an immunoradiometric assay kit (DSL-5300, Diagnostic Systems Laboratories, Texas, USA). Free T3 and free T4 were quantitatively assessed using solid phase 125 radioimmunoassay kit (Coat-A Count, Diagnostic Products Corporation, Los Angeles, USA).

- **Stool analysis.** Stool samples were obtained to test for occult blood and parasites that may be a cause of anaemia.
Therapy
Iron supplementation was given to patients with iron deficiency in a dose of 6 mg/kg/day and follow-up of Hb levels as well as mean HbA1c levels (%) were compared before and 6 months after supplementation.

Statistical analysis
Quantitative data were expressed as mean and standard deviation (SD), while qualitative data were expressed as percentages. Comparison between mean values of patients and controls was done using Student t-test. P values less than 0.05 were considered significant.

Results
Of the 200 diabetic patients screened, 75 patients were anaemic (37 males, 38 females), giving a prevalence of anaemia among the diabetics of 37.5%. The mean (SD) age of anaemic patients was 11.2 (5.1) years (range 1.6 to 26.0 years) with a male to female ratio 1:1, while the mean (SD) age of controls was 11.7 (4.7) years (range 1.3 to 26.0 years) and their male to female ratio 1:1. There were no statistically significant differences in either mean age or sex distribution between anaemic diabetic patients and the control group (P > 0.05 for each). The mean (SD) duration of diabetes was 4.0 (3.3) years (range 0.1 to 15.3 years). The mean (SD) of the standard deviation score for height was –1.0 (0.75) (range –5.0 to –1.0) and for weight was –1.2 (1.5) (range –4.2 to 2.0).

Table 1 shows the demographic and clinical data of anaemic patients, as well as the morphologic and etiologic classification of anaemia in these patients. Of the 75 patients, 41 (54.7%) had iron deficiency, 14 (18.7%) had folate deficiency and 14 (18.7%) had thalassaemia minor. Three patients (4.0%) had coeliac disease. Among the 14 patients with thalassaemia minor, 8 (57.1%) had associated iron-deficiency anaemia.

In addition, 18 patients (24%) had evidence of parasitic infection in the form of Entamoeba histolytica (8 patients), Giardia spp. (4 patients) or Oxyuris spp. infection (6 patients). All patients with parasite infection had normocytic normochromic anaemia.

The mean (SD) serum iron level in iron-deficient anaemia patients was 57.0 (3.5) μg/dL, while mean (SD) serum folate in folate-deficient patients was 0.9 (1.5) ng/mL. None of the patients had vitamin B12 deficiency. The mean (SD) vitamin B12
level in serum was 371.2 (7.4) pg/mL, range 200–500 pg/mL.

By examining the red cell distribution width (RDW) in the blood picture of anaemic patients, it was apparent that RDW was increased in 95.1% (39/41) of patients with iron deficiency, 100% of patients with folate deficiency and 57.1% (8/14) of patients with thalassaemia minor. The latter patients had associated iron deficiency.

By observing the degree of anaemia in relation to the presence of chronic microvascular complications, it was found that mean levels of Hb did not differ statistically significantly between the groups with or without chronic complications \( (P > 0.05) \). All patients were similarly anaemic (Table 2). Table 3 shows that the mean age of patients with diabetic autonomic neuropathy was around 14.1 years, duration of diabetes was more than 5 years and mean HbA1c level was above 9%.

Of the 3 patients with coeliac disease, one case with normocytic normochromic anaemia had both iron and folate defi-

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Hb</em> level</td>
<td>10.6 (1.1)</td>
<td>50.0–125.0</td>
</tr>
<tr>
<td>Mean cell volume (fL)</td>
<td>114.7 (13.2)</td>
<td>50.0–125.0</td>
</tr>
<tr>
<td>Mean cell <em>Hb</em> (g/dL)</td>
<td>29.9 (9.1)</td>
<td>20.0–56.0</td>
</tr>
<tr>
<td>Glycosylated <em>Hb</em> (%)</td>
<td>9.3 (1.1)</td>
<td>7.5–11.3</td>
</tr>
</tbody>
</table>

\( SD = \) standard deviation.

Table 3 Descriptive data of diabetic patients with autonomic neuropathy

The patients had positive anti-gliadin IgG, anti-reticulin IgA and anti-endomysial IgA antibodies and intestinal biopsy revealed absent villi and hyperplastic crypts with increased numbers of intraepithelial lymphocytes and plasma cells and lymphocytes in the lamina propria. The patients were put on a gluten-free diet and received nutritional supplementation for the deficient elements.

HbA1c levels were statistically significantly higher in iron-deficient than in non-iron-deficient patients \( (P < 0.01) \) (Table 4). However, mean random blood glucose values in the previous 6 months did not show a statistically significant difference between the groups \( (P > 0.05) \). Table 4 shows that Hb concentration was statistically significantly increased after 6
months of iron supplementation in patients with iron deficiency ($P < 0.01$). On the other hand, HbA1c was significantly decreased after iron supplementation ($P < 0.01$). However, there was no significant difference in mean random blood glucose values before and after iron supplementation ($P > 0.05$).

**Discussion**

To our knowledge, the prevalence of anaemia in type 1 diabetes has rarely been precisely determined. This could be attributed to the heterogeneous nature of its etiology. Moreover, anaemia is not present in diabetes mellitus per se unless related to another disorder or complication. In fact, anaemia in diabetes is more often than not an example of the anaemia of chronic disorders [8].

In this study, the prevalence of anaemia in type 1 diabetics was 37.5%. More than two-thirds (70.7%) of the anaemic patients were post-pubertal, a figure which reflects the increased nutritional demands in this age group and points to the need for correct management of nutrition. The overall prevalence of anaemia among preschool children in a national survey of 488 children across Egypt in 1986 was 51.6%, declining from 74.4% in the first year of life to 35.1% at school entry at 6 years. In Egyptian adolescents, the figure was estimated at 47%, with little variation in levels of anaemia across socioeconomic status or between the sexes [9].

The morphological classification of anaemia in the screened patients showed that microcytic, hypochromic anaemia was the most prevalent type (54.7%) among the patients, followed by thalassaemia minor (18.7%). In Egypt, the prevalence of iron-deficiency anaemia was reported to be 60% in toddlers aged 18 to 24 months and 49% during the following 6 months in rural areas, and was related to low socioeconomic class and deficient intake of iron from animal sources and vitamin C [10]. Similarly, another study reported a prevalence of iron-deficiency anaemia of 48.4% in preschool age children in rural areas of Mansoura [11]. Others have reported that iron-deficiency anaemia affects approximately 30% of the world’s population [12] and 27% of Egyptian children [13]. Iron deficiency in type 1 diabetics may be due

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Non-iron-deficiency anaemia ($n = 34$)</th>
<th>Iron-deficiency anaemia ($n = 41$) Before supplements</th>
<th>Iron-deficiency anaemia ($n = 41$) After supplements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemoglobin (g/dL)</td>
<td>9.2 (2.1)</td>
<td>9.8 (2.5)</td>
<td>11.2 (1.6)*</td>
</tr>
<tr>
<td>Glycosylated haemoglobin (%)</td>
<td>8.6 (0.7)</td>
<td>10.1 (0.7)*</td>
<td>8.4 (0.7)*</td>
</tr>
<tr>
<td>Random blood glucose (mg/dL)</td>
<td>147.0 (23.6)</td>
<td>145.5 (20.0)</td>
<td>146.8 (20.1)</td>
</tr>
</tbody>
</table>

Values shown are mean (standard deviation).

*P < 0.01 iron-deficiency versus non-iron-deficiency patients; **P < 0.01 before versus after supplements.

$n = number of patients.
to inadequate dietary iron intake, malabsorption of iron due to associated coeliac disease or gastric autoimmunity, chronic blood loss, intravascular haemolysis due to associated ketoacidosis or associated parasitic or other infections [14].

The proportion of patients with normocytic and macrocytic anaemia was 24.0% and 16.0% respectively; a total of 30 patients. All were screened for folate and vitamin B\textsubscript{12} deficiency and only about half of them (14 patients) showed folate deficiency while none of the patients showed vitamin B\textsubscript{12} deficiency. The etiology of folate deficiency can be deficient intake mostly due to dietary restrictions caused by low socioeconomic standards, and less commonly due to malabsorption associated with coeliac disease (1 patient in our series).

Dietary deficiency in children occurs due to rapid growth or infection, which increase folic acid requirements. On the other hand, vitamin B\textsubscript{12} deficiency in children is rare because vitamin B\textsubscript{12} is present in many foods of animal origin. It may be seen in cases of extreme dietary restriction, such as strict vegetarians. Cases occur in breast-fed infants whose mothers have deficient diets or pernicious anaemia. In older children, pernicious anaemia has occasionally been reported in adolescent ages where there is vitamin B\textsubscript{12} malabsorption, atrophy of the gastric mucosa and achlorhydria [15].

Thalassaemia minor was diagnosed by Hb electrophoresis in 18.7% of patients. These patients presented with microcytic hypochromic anaemia and 8 of them had associated iron-deficiency anaemia. In Egypt, the prevalence of thalassaemia minor had been reported to be 10%–13% in different studies. Temtami et al. studied 40 children with microcytic anaemia (MCV < 80 fL) randomly selected from a paediatric haematology outpatient clinic: 5 cases had beta-thalassaemia trait (12.5%), and the other 35 had iron-deficiency anaemia [16]. Similarly, El Beshlawy et al. reported a rate of beta-thalassaemia trait in Egypt of 10% [17].

The RDW, a measure of red cell heterogeneity, can be used to differentiate thalassaemia traits from other non-thalassaemic conditions with microcytosis due to iron deficiency [18]. In this study, RDW was high in 95% of iron-deficient patients, in 100% of folate deficient patients and in only 57.1% of patients with thalassaemia minor; the latter were mostly the patients who had associated iron-deficiency as well. This was previously confirmed by El Bardisi who found that RDW levels measured in conjunction with MCV add specific information that allows the diagnosis of thalassaemia minor with almost complete certainty [19].

The prevalence of coeliac disease associated with type 1 diabetes in this study was 4%. This is in accordance with other studies reporting the prevalence of coeliac disease with type 1 diabetes at approximately 3%–8% [20,21]. It has been widely reported that nutritional deficiencies are common presentations of coeliac disease in older children and adolescents, anaemia being the most common deficiency [3]. The anaemia is most commonly due to iron deficiency, which frequently occurs in the absence of intestinal symptoms. Macrocytic anaemia due to folate deficiency is also common. Vitamin B\textsubscript{12} concentrations are only low in patients with extensive involvement of the small intestine and so are usually normal. Although the haemoglobin level is low, the mean corpuscular volume can be low (iron deficiency), high (vitamin B\textsubscript{12} or folate deficiency) or within a normal range due to mixed deficiency of iron and folate [22].

HbA\textsubscript{1c} levels were statistically significantly higher in iron-deficient than in non-iron-deficient patients and they decreased
significantly after iron supplementation. These findings are in agreement with Tarim et al. who concluded that among type-1 diabetic patients with similar levels of glycaemia, iron-deficiency anaemia is associated with higher concentrations of HbA1c [23]. In addition, iron replacement therapy leads to a decline in HbA1c level in both diabetic and non-diabetic patients. Therefore, the iron status of the patient must be considered during the interpretation of HbA1c concentrations in type 1 diabetes.

We can conclude that anaemia in patients with type 1 diabetes is a relatively common problem and has diverse aetiologies. Therefore, diabetic patients should be screened for the presence of anaemia yearly or at any time if they have suggestive symptoms or predisposing causes. Nutritional programmes should assure the supply of nutritional supplements to anaemic patients and improved awareness about the need for a healthy balanced diet for prevention of anaemia in type 1 diabetes. Moreover, study of the effect of anaemia on the interpretation of HbA1c levels can help with better monitoring of metabolic control and hence prevention of chronic complications of diabetes with the ultimate aim of a better lifestyle for diabetic patients.

References


19. El Bardisi HA. Discrimination between thalassemia minor and iron deficiency anemia using erythocyte measurements [MSc thesis]. Cairo, Egypt, Faculty of Medicine, Ain-Shams University, 1991.


Blood pressure distribution among healthy schoolchildren aged 6–13 years in Tehran

M.R. Ashrafi,1 M. Abdollahi,2 B.M. Ahranjani2 and R. Shabanian1

1Children's Medical Centre Hospital, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran.
2Department of Nutrition Research, National Nutrition and Food Technology Research Institute, Shaheed Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran (Correspondence to M. Abdollahi: morabd@yahoo.com).

Received: 20/01/03; accepted: 18/12/03

ABSTRACT To obtain blood pressure distribution for Iranian children, we assessed 10 288 students aged 6–13 years (4871 boys and 5417 girls) in Tehran. Mean systolic and diastolic blood pressure showed incremental increases with age, weight and height in both sexes. Mean increases in systolic blood pressure for boys and girls were 1.7 and 0.8 mmHg per year respectively and for diastolic blood pressure were 0.7 and 0.9 mmHg respectively. According to Second Task Force (STF) criteria, 4.9% of boys and 3.5% of girls had significant systolic hypertension and 10.1% of boys and 3.3% of girls had significant diastolic hypertension. Mean systolic and diastolic blood pressures were higher than STF reports, especially among boys.

Distribution de la pression artérielle chez des écoliers en bonne santé âgés de 6 à 13 ans à Téhéran

RÉSUMÉ Afin d’obtenir la distribution de la pression artérielle pour les enfants iraniens, nous avons évalué 10 288 élèves âgés de 6 à 13 ans (4871 garçons et 5417 filles) à Téhéran. La pression artérielle systolique et diastolique moyenne montrait une augmentation progressive avec l’âge, le poids et la taille chez les deux sexes. L’augmentation moyenne de la pression artérielle chez les garçons et les filles était de 1.7 et 0.8 mmHg par an respectivement pour la pression systolique et de 0.7 et 0.9 mmHg respectivement pour la pression diastolique. Selon les critères du deuxième Groupe de travail, 4,9 % des garçons et 3,5 % des filles présentaient une hypertension systolique significative et 10,1 % des garçons et 3,3 % des filles présentaient une hypertension diastolique significative. La pression artérielle systolique et diastolique moyenne était supérieure aux valeurs indiquées par le deuxième Groupe de travail, notamment chez les garçons.
Introduction

Systemic hypertension occurs commonly in adults and if untreated is a major risk factor for myocardial infarction, stroke and renal failure [1]. Although the prevalence of clinical hypertension is of far lesser magnitude in children than adults, there is ample evidence to support the concept that the roots of essential hypertension extend back into childhood, and if hypertension exists, it may track into adulthood [1–4]. Children and young adolescents with blood pressure greater than the 90th percentile for age are 3 times more likely to become adults with hypertension than are children with blood pressure at the 50th percentile [1].

Blood pressure measurement of children is important. Hypertension in children is mostly secondary and this may be due to renal disease, coarctation of the aorta, endocrine disorders or medication. The underlying disease process should be controlled in order to prevent and treat hypertension [1]. To increase early detection of hypertension, accurate blood pressure measurements should be a part of routine annual physical examinations for all children and not just isolated procedures [1].

Hypertension in children is diagnosed as high blood pressure for age, sex and body size [2]. Blood pressure increases gradually with age and varies with sex; therefore, standard nomograms for each age–sex group are necessary to interpret blood pressure values [2]. Moreover, the distribution of blood pressure levels varies in different ethnic groups [5,6]. Using Second Task Force recommended cut-off points, many countries have established curves for different age–sex groups [2,7–12].

Since there are only limited data available for blood pressure distribution in the Islamic Republic of Iran [13], we determined the distribution of blood pressure among schoolchildren aged 6–13 years in Tehran.

Methods

We selected 10 288 students (4871 boys and 5417 girls) by multistage cluster sampling from 125 schools of all the 19 departments of education and training in Tehran over 18 months during the 1998–1999 and 1999–2000 school years. A protocol was established for the examination of the children according to the Second Task Force and World Health Organization guidelines [2,3]. The Ethics Committee of the University of Tehran, the Medical Sciences Research Deputy and the Health Office of the Ministry of Education and Training approved the protocol of our study.

The protocol of our study was explained to the interviewers who were either general practitioners or medical students. In 3 sessions of 2 hours each, one of the investigators (a paediatrician) trained the interviewers so that they could take measurements in the same way and under similar circumstances. The inter-rater variation was determined to be negligible at the end of training. Four teams equipped with the necessary measuring tools visited the schools and a control set of equipment was kept at the university. At about 10-day intervals, measurements were taken with 2 sets, i.e. each team’s set and the set kept at the university, to verify consistency. During the study, differences between the readings were very small and all manometers functioned properly.

Measurements were taken in a quiet room in each school. The aim of the study and the procedure were described to the students. Height was measured to the nearest 0.5 cm without shoes. Weight with minimal clothing was recorded using a bath scale to
For each child, the data were recorded on a separate form and quality controlled by the investigators. Epi-Info, version 6 and SPSS, version 10 were used for data entry and statistical analysis.

Results

Table 1 shows the distribution of the children by age and sex. Figures 1 and 2 show that there was an overall incremental increase in diastolic and systolic blood pressure with age, height and weight for both girls and boys. However, among boys, the mean systolic blood pressure dipped slightly at 8 years. Mean systolic blood pressure in girls showed an increasing trend for all ages. Diastolic blood pressure in boys increased with age until 11 years when it dipped slightly, then rose at 12 years and dipped again at 13 years. Also among girls aged 12–13 years, mean diastolic blood pressure was less than among those aged 10 years at the 90th centile. The average increase in systolic blood pressure levels per year was 1.7 mmHg and 0.8 mmHg in girls and boys.
Figure 1 Systolic and diastolic percentiles of blood pressure in girls by age

respectively and for diastolic blood pressure it was 0.7 mmHg and 0.9 mmHg for boys and girls respectively. Frequencies of significant and of severe hypertension were calculated according to Second Task Force report criteria (Tables...
In our study, 4.9% of boys and 3.5% of girls had significant systolic hypertension; 10.1% of boys and 3.3% of girls had significant diastolic hypertension respectively. Severe systolic hypertension was found in 2.0% and 0.9% of boys and girls respectively and severe diastolic hypertension in 2.3% and 0.5% of boys and girls respectively.

The correlation coefficients for systolic and diastolic blood pressure with weight, height, age and pulse rate were calculated for each sex individually (Table 4). A significant correlation was found between

Figure 2 Systolic and diastolic percentiles of blood pressure in boys by age
Table 2 Frequency of significant and severe hypertension in girls

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Number</th>
<th>Significant hypertension</th>
<th>Severe hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Systolic</td>
<td>Diastolic</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>6</td>
<td>350</td>
<td>16</td>
<td>4.6</td>
</tr>
<tr>
<td>7</td>
<td>717</td>
<td>24</td>
<td>3.3</td>
</tr>
<tr>
<td>8</td>
<td>820</td>
<td>27</td>
<td>3.3</td>
</tr>
<tr>
<td>9</td>
<td>868</td>
<td>35</td>
<td>4.0</td>
</tr>
<tr>
<td>10</td>
<td>887</td>
<td>29</td>
<td>3.3</td>
</tr>
<tr>
<td>11</td>
<td>817</td>
<td>39</td>
<td>4.8</td>
</tr>
<tr>
<td>12</td>
<td>761</td>
<td>16</td>
<td>2.1</td>
</tr>
<tr>
<td>13</td>
<td>197</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Total</td>
<td>5417</td>
<td>187</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Table 3 Frequency of significant and severe hypertension in boys

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Number</th>
<th>Significant hypertension</th>
<th>Severe hypertension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Systolic</td>
<td>Diastolic</td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>6</td>
<td>457</td>
<td>31</td>
<td>6.8</td>
</tr>
<tr>
<td>7</td>
<td>727</td>
<td>36</td>
<td>5.0</td>
</tr>
<tr>
<td>8</td>
<td>715</td>
<td>29</td>
<td>4.1</td>
</tr>
<tr>
<td>9</td>
<td>774</td>
<td>57</td>
<td>7.4</td>
</tr>
<tr>
<td>10</td>
<td>684</td>
<td>24</td>
<td>3.5</td>
</tr>
<tr>
<td>11</td>
<td>649</td>
<td>25</td>
<td>3.9</td>
</tr>
<tr>
<td>12</td>
<td>639</td>
<td>32</td>
<td>5.0</td>
</tr>
<tr>
<td>13</td>
<td>226</td>
<td>3</td>
<td>1.3</td>
</tr>
<tr>
<td>Total</td>
<td>4871</td>
<td>237</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Table 4 Correlation coefficients between developmental variables and blood pressure in boys and girls

<table>
<thead>
<tr>
<th>Variable</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight</td>
<td>Height</td>
</tr>
<tr>
<td>Systolic BP</td>
<td>0.30</td>
<td>0.23</td>
</tr>
<tr>
<td>Diastolic BP (K4)</td>
<td>0.24</td>
<td>0.19</td>
</tr>
<tr>
<td>Diastolic BP (K5)</td>
<td>0.24</td>
<td>0.20</td>
</tr>
</tbody>
</table>

BP = blood pressure.

Weight, height, age and pulse rate all were significantly correlated with both systolic and diastolic blood pressure for both sexes (P < 0.05).
Table 5 Mean pulse rates of boys and girls

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Mean pulse rate (beats/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boys</td>
</tr>
<tr>
<td>6</td>
<td>99.97</td>
</tr>
<tr>
<td>7</td>
<td>99.03</td>
</tr>
<tr>
<td>8</td>
<td>97.01</td>
</tr>
<tr>
<td>9</td>
<td>94.69</td>
</tr>
<tr>
<td>10</td>
<td>93.40</td>
</tr>
<tr>
<td>11</td>
<td>90.49</td>
</tr>
<tr>
<td>12</td>
<td>88.97</td>
</tr>
<tr>
<td>13</td>
<td>88.22</td>
</tr>
<tr>
<td>Total</td>
<td>94.38</td>
</tr>
</tbody>
</table>

systolic and diastolic blood pressure and all these factors for both sexes.

Table 5 shows that the mean pulse rate of girls and boys in each age group decreased gradually with age.

**Discussion**

The prevention of high blood pressure may be viewed as part of the prevention of coronary artery disease and stroke. Blood pressure measurements should be included in physical examinations as part of continuing care for children, and not just as isolated procedures [7]. The goal in caring for children is surveillance, possible prevention and identification of fixed hypertension requiring treatment when such cases cannot be prevented [2].

In our study, blood pressure, weight, height and pulse rate of children aged 6–13 years were measured according to Second Task Force recommended cut-offs to establish normal blood pressure curves for Iranian children [2].

Blood pressure increased gradually with age for both boys and girls in our study. This was consistent with a study in Qazvin, a city near Tehran [13]. This also agreed with the Second Task Force report that blood pressure increases with age during the pre-adult years in all study populations [2]. Others have also reported that blood pressure increased with age [14–17]; however, some Japanese studies have only found correlations between diastolic blood pressure and age [10,18].

Systolic blood pressure in our study was higher among boys of all ages than girls (chi-squared test, \( P < 0.01 \)). The mean systolic blood pressure differences between boys and girls in the youngest and oldest age groups were about 5.5 mmHg and 1 mmHg respectively. In a study of children aged 8–16 years, mean blood pressure was higher among girls [16]. In contrast, Hansen et al. reported no significant difference in mean blood pressure between the sexes for children aged 8–10 years [17]. Others have reported no significant difference in blood pressure between boys and girls from 1 day to 6 years of age or among preschool children [10,14].

Blood pressure was positively correlated with weight and height in our study. According to the Second Task Force report in different study populations, larger children, i.e. heavier and/or taller children, had higher blood pressure than smaller children of the same age [2]. One study of children aged 8–16 years showed a positive correlation between blood pressure, body weight, height and an index of obesity [16]. Hansen et al. found that weight was an important determinant of blood pressure in Danish children aged 8–10 years [17]. In a 1992 study among children aged 9–11 years, those with high blood pressure, i.e. higher than or equal to the 95th percentile, were heavier and more obese than the normal group [19].
In our study, pulse rate decreased gradually with age. This was consistent with both the findings of a study of school children in Qazvin and a study of preschool children in Japan [10,13].

In our study, significant systolic hypertension was prevalent in 4.9% of boys and 3.5% of girls. In the Qazvin study, the prevalence of high blood pressure among children aged 7–12 years was 6.9% using Second Task Force recommended cut-offs [2,3]. In a study in Papua New Guinea, 5.1% of children aged 8–10 years had high blood pressure [16]. Furthermore, overall prevalence of hypertension has been reported at 2.93% among Indian children aged 5–14 years [9].

In our study, mean systolic and diastolic blood pressures of the sample were higher than reported by the Second Task Force, especially among boys. This agreed with reports of higher blood pressure among children of this age in the western part of our country and in Turkey compared with values reported by the Second Task Force [13,15]. Those 2 reports also indicated higher blood pressures and prevalence of hypertension among boys than among girls. It may be that the higher blood pressure of adult males compared with adult females originates from this age and may be attributed to different psycho-hormonal structures in males and females. Both the systolic and the diastolic blood pressures of Spanish children aged 2–14 years were lower than means reported by the Second Task Force [12]. However, in a study of first-grade schoolchildren in Germany, the data fit very well with Second Task Force recommended cut-offs [8].

**Conclusion**

We measured blood pressure, height and weight of schoolchildren aged 6–13 years in Tehran. Blood pressure was highly associated with age, height and weight. Our findings can help establish normal blood pressure curves to be used in paediatric clinics, because almost 20% of the Iranian population lives in Tehran and the sample of our study may be highly representative of Iranian children. Normal blood pressure values in our study are higher than reported by the Second Task Force, but this difference agrees with the STF recommendation regarding the importance of determining normal blood pressure in each country.

**Acknowledgements**

We are extremely indebted to the authorities of the Research Deputy of Tehran University of Medical Sciences for their financial and logistic support. We thank the authorities of the General Office of Education and Training in Tehran for their kind cooperation. We would like to thank also the staffs of the school and the students for their participation. We thank M. Hajizadeh, H. Jaafari, L. Salageghe and A. Mirzapour for their cooperation with the fieldwork.

**References**


Evaluation of a programme for control of Schistosoma haematobium infection in Yemen

M.A.M. Nagi

1National Schistosomiasis and Endemic Diseases Control Programme, Sana’a, Yemen (Correspondence to M.A.M. Nagi: nagi112000@yahoo.com).

Received: 11/05/03; accepted: 17/05/04

ABSTRACT An intervention study was conducted in Khamir, north of Sana’a, for control of urinary schistosomiasis using chemotherapy and health education. The validity and cost-effectiveness of reagent strips as a rapid diagnostic tool to screen for Schistosoma haematobium infection was also assessed along with visible haematuria. Prevalence of S. haematobium infection 14 months post-intervention fell from 58.9% to 5.8% and frequency of heavy infection from 40.0% to 18.9%. Health education sessions resulted in significant decrease in the frequency of contact with water sources and greater adherence to preventive measures. Mass chemotherapy plus health education is a feasible and effective method for reducing S. haematobium infection in Yemen. Reagent strips and visible haematuria could be cost-effective in remote areas with limited access to health services.

Évaluation d’un programme de lutte contre l’infestation à Schistosoma haematobium au Yémen

RÉSUMÉ Une étude d’intervention a été réalisée à Khamir, au nord de Sanaa, pour la lutte contre la schistosomiase urinaire au moyen de la chimiothérapie et par l’éducation sanitaire. La validité et le rapport coût-efficacité des bandelettes réactives comme outil de diagnostic rapide pour la recherche d’une infestation à Schistosoma haematobium ont également été évalués parallèlement à l’hématurie visible. La prévalence de l’infestation à S. haematobium 14 mois après l’intervention a chuté de 58.9 % à 5.8 % et la fréquence de l’infestation massive a reculé, passant de 40.0 % à 18.9 %. Les sessions d’éducation sanitaire ont entraîné une diminution significative de la fréquence du contact avec les sources d’eau et un meilleur respect des mesures de prévention. La chimiothérapie de masse associée à l’éducation sanitaire constitue une méthode faisable et efficace pour réduire l’infestation à S. haematobium au Yémen. Les bandelettes réactives et l’hématurie visible pourraient être d’un bon rapport coût-efficacité dans les zones reculées où l’accès aux services de santé est limité.
**Introduction**

Schistosomiasis is the second most prevalent tropical disease in Yemen after malaria and is one of the most important public health problems. With the unification of the country, total population is now 20 million, of which 2–3 million are estimated to be infected \([1–4]\). Environmental factors and the expansion of agricultural facilities, with the associated improvement in irrigation systems and construction of dams, have generated the optimal environment for fresh-water snails, the intermediate host, resulting in an increase in the prevalence of schistosomiasis \([1–4]\). Yemen has so far received little attention from international health organizations even though millions of its inhabitants are at risk.

The economy of the country depends mainly on agriculture, most of the population being involved directly or indirectly in this field. During the past few years, many new agricultural projects have been established and many of the previous ones extended, so the irrigation system is extensive. In some places these irrigation projects serve as a source of drinking water for humans. Agricultural workers are at high risk of acquiring schistosomal infection and schistosomal disease because of their daily work in the fields and a continuing contact with schistosome-infected water. The health and labour of these groups should be of paramount importance since increasing food production to meet the requirements of a rapidly increasing population is a major issue for the developing world, particularly Yemen \([5–8]\).

High infection rates for urinary schistosomiasis were found in the years 1995, 1998 and 1999. An evaluation of the results of control efforts made in Yemen over the past 10 years shows a remarkable success in reducing the scale of the disease. Infection rates have fallen in Hajah, Sana’a and Marib provinces. \([5,8]\). There have been no previous reports on endemicity of schistosomiasis or other intestinal parasites in Khamir, or on integrated methods for schistosomiasis control in the country.

This study was therefore conducted with the aim of evaluating the impact of integrated surveillance and control methods on the burden of schistosomiasis in the north of Sana’a governorate. A further aim was to assess the validity and its cost-effectiveness of using visible haematuria (macroscopic haematuria) and reagent strip tests (microscopic haematuria) as screening tools for *Schistosoma haematobium* infection.

School enrolment rates in Yemen are relatively low, especially in females, in whom enrolment is below 30% \([9]\). To overcome this deficiency, non-enrolled as well as enrolled children (both pre-school and school-age) were targeted in addition to the community. It is envisaged that implementation of integrated methods for surveillance and control of schistosomiasis would assist in the development of an effective, school-based control programme sensitive to local social and cultural conditions. The study will also offer the opportunity to assess the validity of detecting urinary schistosomiasis in Yemen.

**Methods**

This was an intervention study targeting the community and schoolchildren in Khamir, located 90 km north of Sana’a. This is an agricultural area, depending on rain and groundwater for irrigation and domestic use.

**Baseline survey**

The community and school baseline surveys were conducted in October 1999. A
list of the houses in the study area (1000) was prepared and a random sample of 100 houses (863 individuals) was selected. Each individual was interviewed by a member of the intervention project team using a questionnaire. A urine sample was collected from each participant for examination. There were no refusals to participate.

The items on the questionnaire included demographic data; medical history, including schistosomiasis infection and treatment, whether participants passed blood in the urine and the results of any laboratory tests; and information on sources of water, use of water and whether they used any preventive measures. Parents supplied information for babies and young children. Urine samples were tested in the field by members of the project team.

A sample of 20% of schoolchildren (287 children), randomly selected from the 14 schools of the area was included in the study. These children were interviewed using the same questionnaire, and urine samples were collected for examination in the same way as for the community survey.

**Intervention**

The schistosomiasis control methods consisted of chemotherapy for *S. haematobium* and health education. Mass treatment was administered in October 1999; a total of 8540 individuals were treated with a single dose of praziquantel, 40 mg/kg body weight. These were schoolchildren, non-enrolled school-age children, and preschool children together with their parents and other community members.

Health education intervention sessions were given during the period September 1999–December 2001. Schoolteachers from all 14 schools in the district participated in a 2-day seminar. The teachers were educated about the disease and briefed about the study. They were also given detailed information regarding methods of health education for different groups, chemotherapy for schistosomiasis and dosage and record keeping. One teacher from each school was appointed as coordinator for the control activities in his/her school.

The teachers gave weekly health education classes in schools in which posters were distributed. Health education sessions were also held in schools for non-enrolled children and pre-school children along with their parents. Other classes were given in khat sessions and Friday prayer sessions.

**Community evaluation survey (14 months post intervention)**

The houses in the study area (1000) were listed and a sample of 100 houses (913 individuals) was randomly selected. The evaluation was performed via questionnaire and urine analysis. The same questionnaire was used with the following items added:

- Have you attended mass chemotherapy?
- Have you attended a health education session?
- How did you hear about the control programme?

**School evaluation survey (14 months post intervention)**

A post-intervention evaluation via questionnaire and urine analysis was done on 20% of all schoolchildren in the area, 323 schoolchildren. The questionnaire was the same as that for the community evaluation survey.

**Validation of reagent strips**

The reagent strips were compared to microscopic urine examination to determine their validity as rapid diagnostic tools for *S. haematobium*. Urine was examined immediately in the field using the Nucleopore® filtration technique. The reagent strips used...
in this study were Hemastix (Bayer Diagnostics, Fernwald, Germany) and Combur 9 strips (Roche Diagnostics, Mannheim, Germany) [14].

Results

Community survey
Prevalence of *S. haematobium* infection before the intervention measures and 14 months after intervention is shown in Table 1. Overall prevalence was 58.9% pre-intervention, falling to 5.8% in the post-intervention survey, a significant reduction. The prevalence of infection was 55.2% among people 16–39 years old, compared to 42.9% in older individuals.

The majority of infections overall (60.0%) pre-intervention were light (< 50 eggs/10 mL urine). The frequency of light infection in children ≤ 15 years was significantly higher than heavy infection. In contrast, the frequency of heavy infection was significantly higher than light infection in the older age groups (Table 2).

There was no significant difference between males and females, or between literate and illiterate individuals regarding the prevalence or intensity of infection (Tables 1 and 2).

There was a significant decrease in the prevalence of infection 14 months post-intervention. The overall prevalence dropped to 5.8%, ranging from 4.9% among children 6–15 years old to 7.8% among those aged 16–39 years. Furthermore, the majority of infections post-intervention were light infections (81.1%), regardless of age or sex (Tables 1 and 2).

Community evaluation survey
Prevalence of infection in participants who were literate was 60.0%; this decreased to

| Table 1 Prevalence of *Schistosoma haematobium* infection before and 14 months after intervention for inhabitants of 100 households (community-based study) |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|
| Age (years) | Pre-intervention | Post-intervention |
|             | Males | Females | Total | Males | Females | Total |
| < 6         | 60.5  | 66.2  | 63.6 | 6.5  | 5.3  | 5.9  |
| 6–15        | 69.2  | 65.7  | 67.6 | 5.0  | 4.8  | 4.9  |
| Enrolled    | 63.6  | 56.6  | 61.3 | 4.2  | 3.7  | 4.1  |
| Non-enrolled| 71.3  | 67.2  | 69.3 | 5.3  | 5.0  | 5.2  |
| 16–39       | 56.4  | 55.7  | 55.2 | 8.8  | 6.8  | 7.8  |
| Literate    | 52.9  | 50.0  | 51.8 | 4.3  | 0    | 3.8  |
| Illiterate  | 57.4  | 55.0  | 56.1 | 5.2  | 6.7  | 6.5  |
| ≥ 40        | 48.6  | 36.4  | 42.9 | 6.7  | 6.7  | 6.7  |
| Literate    | 33.3  | 33.3  | 33.3 | 6.7  | 6.7  | 6.7  |
| Illiterate  | 50.0  | 36.4  | 43.3 | 7.1  | 6.7  | 6.9  |
| Total       | 61.2  | 56.3  | 58.9 | 6.1  | 5.4  | 5.8  |
| Literate    | 60.5  | 54.8  | 58.0 | 4.1  | 3.3  | 3.9  |
| Illiterate  | 61.4  | 56.4  | 58.8 | 6.6  | 5.6  | 6.1  |

*Enrolled in school.*
*Individuals were not available or not examined.*
3.9% post-intervention. Heavy infection decreased from 42.0% of those infected to 0%. Similarly, for participants who were illiterate, prevalence of infection decreased from 58.8% to 6.1% and the rate of heavy infection decreased from 39.6% to 20.8% (Tables 1 and 2).

School evaluation survey
Prevalence and intensity of infection also decreased markedly in the school-based evaluation survey. Overall prevalence was 66.9% pre-intervention and fell to 4.3% 14 months post-intervention (Tables 3 and 4).

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males %</td>
<td>Females %</td>
</tr>
<tr>
<td>&lt; 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6–15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enrolled*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-enrolled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16–39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*aEnrolled in school.

bOne person.
Impact of health education
The frequency of contact with water sources significantly decreased in the community and the school surveys (Table 5). Similarly, adherence to preventive measures rose from almost 0% to well over 80% in both surveys.

### Table 4 Prevalence of *Schistosoma haematobium* infection classed as heavy infection (> 50 eggs/10 mL urine) before and 14 months after intervention for 20% of schoolchildren (school-based study)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Pre-intervention Males</th>
<th>Pre-intervention Females</th>
<th>Pre-intervention Total</th>
<th>Post-intervention Males</th>
<th>Post-intervention Females</th>
<th>Post-intervention Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>6–15</td>
<td>39.1</td>
<td>22.0</td>
<td>38.0</td>
<td>20.0</td>
<td>0</td>
<td>16.7</td>
</tr>
<tr>
<td>≥ 16</td>
<td>37.5</td>
<td>50.0</td>
<td>38.2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>38.8</td>
<td>33.3</td>
<td>38.0</td>
<td>16.7</td>
<td>0</td>
<td>14.3</td>
</tr>
</tbody>
</table>

### Table 5 Effect of education measures for schistosomiasis control (community-based study and school-based study)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pre-intervention (%)</th>
<th>Post-intervention (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with water sources</td>
<td>Community: 95.0</td>
<td>Community: 9.0</td>
</tr>
<tr>
<td></td>
<td>Schoolchildren: 98.0</td>
<td>Schoolchildren: 3.6</td>
</tr>
<tr>
<td>Application of preventive measures</td>
<td>Community: 0.9</td>
<td>Community: 97.0</td>
</tr>
<tr>
<td></td>
<td>Schoolchildren: 0</td>
<td>Schoolchildren: 88.0</td>
</tr>
<tr>
<td>Blood seen in urine</td>
<td>Community: 55.0</td>
<td>Community: 2.3</td>
</tr>
<tr>
<td></td>
<td>Schoolchildren: 60.0</td>
<td>Schoolchildren: 1.2</td>
</tr>
<tr>
<td>Had chemotherapy</td>
<td>Community: NA</td>
<td>Community: 95.0</td>
</tr>
<tr>
<td></td>
<td>Schoolchildren: NA</td>
<td>Schoolchildren: 97.3</td>
</tr>
<tr>
<td>Attended health education sessions</td>
<td>Community: NA</td>
<td>Community: 98.6</td>
</tr>
<tr>
<td></td>
<td>Schoolchildren: NA</td>
<td>Schoolchildren: 99.4</td>
</tr>
<tr>
<td><em>Heard about the programme through:</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mobile team of the programme</td>
<td>NA</td>
<td>90.0</td>
</tr>
<tr>
<td>school sessions</td>
<td>NA</td>
<td>25.3</td>
</tr>
<tr>
<td>community leaders</td>
<td>NA</td>
<td>88.1</td>
</tr>
</tbody>
</table>

NA = not applicable.

*Community and schoolchildren combined.*
Almost all the people interviewed had been treated and had attended health education sessions (≥ 95%). Most reported that they knew about the programme from the mobile team of the intervention programme or from leaders of the community; a smaller number reported school sessions as being the source of information (Table 5).

Validation and cost–effectiveness of reagent strips
Compared to parasitological examination of urine, the reagent strips recorded low sensitivity, low specificity, limited positive predictive value and low negative predictive value in both surveys (Tables 6 and 7).

Compared to detection of eggs, using strips as the screening method greatly reduced the cost of the control programme in the study area, which is a remote area with limited facilities (Table 8).

Discussion
Carefully targeted and infrequent delivery of mass chemotherapy offers a cheap and effective tool for control of schistosomiasis at low cost [10–12]. For a number of reasons schoolchildren have been the favoured target group in chemotherapy programmes for schistosomiasis. They are easy to approach with health education programmes, they usually carry most of the burden of infection in the community and they are easy to reach physically for chemotherapy. Moreover, schoolchildren represent the future of developing countries. Investment in their health will have a bearing on educational performance and their future contribution to development. Schools also offer an infrastructure for control programmes in areas where infrastructure of health institutions is deficient.

Using strips as the screening methods has greatly reduced the cost of control programmes elsewhere [13]. Yet, we need to assess their practicability and validity in Khamir; the findings of previous reports indicate that the validity of these screening methods has varied in different settings [14,15].

Lu-Guang et al. studied the effect of selected chemotherapy combined with health education to control schistosomiasis in marshland of the Yangtze River in China. The prevalence of schistosomiasis decreased by 82% [16]. In the present study, overall prevalence fell by 90.2% to 5.8%.

Mass chemotherapy was found to be a feasible and efficacious approach for schistosomiasis control in a study done in Upper

<table>
<thead>
<tr>
<th>Eggs</th>
<th>Strips</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. +ve</td>
<td>No. –ve</td>
</tr>
<tr>
<td>Present</td>
<td>252 (A)</td>
<td>96 (B)</td>
</tr>
<tr>
<td>Absent</td>
<td>194 (C)</td>
<td>129 (D)</td>
</tr>
<tr>
<td>Total</td>
<td>446</td>
<td>225</td>
</tr>
</tbody>
</table>

Sensitivity = A/(A + C) = 252/446 = 56.5%.
Specificity = D/(B + D) = 129/225 = 57.3%.
Positive predictive value = A/(A + B) = 252/384 = 72.2%.
Negative predictive value = D/(C + D) = 129/323 = 39.9%.
Egypt. Baseline prevalence was reduced by 83.6%, from 23.1% to 3.8% [17]. In Mali, where mass chemotherapy with praziquantel was used to control S. haematobium in an area of 87 villages, overall prevalence was reduced from 68.8% to 39.4% [18].

An analysis of cost-effectiveness of S. haematobium control by chemotherapy confirmed the cost advantage of school-age targeting over vertical programmes, but emphasized the importance of school attendance in selecting community-based over population-based approaches [19]. The rate of school enrolment and absenteeism from schools seem to be crucial factors in the effectiveness of school-based programmes [20]. In a school-based schistosomiasis control programme in Egypt it was reported that 80% of infected girls were not treated because they were not enrolled in schools [21]. After studying the impact of school-based mass chemotherapy on helminth egg production in a community in Kenya, Olsen concluded that school-based chemotherapy misses a significant proportion of transmission of schistosomiasis and intestinal helminths maintained by pre-school children, non-enrolled school-age children and adults [22]. In another school-based programme to control schistosomiasis and intestinal parasites in Kenya, it was noted that in some schools the prevalence of haematuria was not affected, or actually increased, after the first year of intervention due to enrolment of untreated children after mass treatment was given [23]. Thus, the outcomes of school-based programmes seem to be easily influenced by the pool of untreated children outside the school.

Reagent strips and visible haematuria could be cost-effective screening methods for the disease only if employed in remote areas with limited accessibility to health services and limited availability of facilities, such as the study area.

Savioli and Mott found the development of a simplified, indirect approach to the diagnosis of S. haematobium in Tanzania (based on a combination of observation of grossly bloody urine specimens, reagent strips for measuring haematuria, and treatment with praziquantel) reduced costs of schistosomiasis control compared with the more accurate but time-consuming parasitological methods [24]. Chen-Hong et al. found that the rate of infection of

<table>
<thead>
<tr>
<th>Variable</th>
<th>Cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Urine filtration</td>
</tr>
<tr>
<td></td>
<td>Urban</td>
</tr>
<tr>
<td>Screening per person</td>
<td>0.48</td>
</tr>
<tr>
<td>Treatment per person</td>
<td>1.85</td>
</tr>
<tr>
<td>Total</td>
<td>2.33</td>
</tr>
<tr>
<td>Screening per case detected (infected)</td>
<td>0.92</td>
</tr>
<tr>
<td>Treatment per infected person treated</td>
<td>1.00</td>
</tr>
<tr>
<td>Total</td>
<td>1.92</td>
</tr>
</tbody>
</table>

---

Table 8 Comparison of total cost of treatment using screening reagent strips (visible haematuria) and the urine filtration method (detection of eggs) for identification of infection in urban and rural areas
residents in a community was the determining factor for the cost-effectiveness of mass chemotherapy schemes [25]. Taylor et al. found that microhaematuria could be valuable in the diagnosis of S. haematobium in national control programmes and could replace parasitological examination as long as sensitivity and specificity continued to be evaluated [26].

The results of this study indicate that an integrated community and school-based programme combining chemotherapy and health education can be effective for control of S. haematobium infection in endemic areas. Reagent strips and visible haematuria could be used for screening for the disease in remote areas where there is limited access to health services. There was a significant impact on prevalence. The relative contribution of heavy infection among positive individuals was reduced and there was a change in the behaviour of the community, manifested by adopting preventive measures against the disease.

Recommendations

• Mass chemotherapy should be considered for high prevalence areas.
• Personnel involved in schistosomiasis control activities should be adequately trained to ensure quality of services. An appropriate surveillance system should be in place so that data are carefully recorded in the field and reported. Data analysis should be done at all levels to guide control operations and proper feedback of data ensured.
• Since school enrolment rates are relatively low in Yemen, especially in females, to be effective, any control programme must target non-enrolled as well as enrolled children.
• Health education is an important component of schistosomiasis control. The development of human resources and materials for health education must be ensured to decrease in the frequency of contact with water sources and encourage adherence to preventive measures.
• A national control programme must target both the community and school-children to obtain the best possible sustainable results and community participation should be incorporated into the activities of the national schistosomiasis control programme.
• Primary health care staff should be trained in communication skills in order to conduct health education programmes at community level.
• Support from nongovernmental organizations should be sought for schistosomiasis control activities, including chemotherapy, training, health education, sanitation and water supply.

Acknowledgements

This investigation received technical and financial support form the joint WHO Eastern Mediterranean Region (EMRO), Division of Communicable Disease (DCD) and the WHO Special Programme for Research and Training in Tropical Diseases (TDR): The EMRO/DCD/TDR Small Grants Scheme for Operational Research in Tropical and Communicable Disease.

References


18. Brinkmann UK. Korte R. Schmidt-Ehry B. The distribution and spread of schistosomiasis in relation to water resources


Prevalence of pediculosis capitis and determination of risk factors in primary-school children in Kerman

F. Kamiabi1 and F. Hosain Nakhaei2

1Division of Medical Entomology and Vector Control; 2Department of Epidemiology and Biostatistics, Faculty of Health, Kerman University of Medical Sciences, Kerman, Islamic Republic of Iran (Correspondence to F. Kamiabi: fkamiabi@yahoo.com).

ABSTRACT This descriptive, analytical study was carried out in 2003 to determine the prevalence of pediculosis capitis and some risk factors among primary-school pupils in Kerman. We selected 1200 pupils (53% girls) from 50 primary schools by multistage, systematic random sampling. Their hair was examined for head louse infestation: 45 (3.8%) were infected with lice, 43 (95.5%) girls and 2 (4.5%) boys. The highest rate of infestation was in 9-year-olds. There was a significant relationship between head louse infestation and sex (P < 0.0001), age (P < 0.05), parents’ education (P < 0.0001), father’s job (P < 0.01), family size (P < 0.01), length of hair (P < 0.0001) and having separate bathing facilities in the house (P < 0.0001).

Prévalence de la pédiculose de la tête et détermination des facteurs de risque chez des écoliers du primaire à Kerman

RÉSUMÉ Cette étude analytique et descriptive a été réalisée en 2003 pour déterminer la prévalence de la pédiculose de la tête et certains facteurs de risque chez des écoliers du primaire à Kerman. Nous avons sélectionné 1200 élèves (53% filles) dans 50 écoles primaires par échantillonnage aléatoire systématique à plusieurs degrés. Leurs cheveux ont été examinés à la recherche d’une infestation par des poux de tête : 45 (3,8 %) étaient infestés par des poux – 43 filles (95,5 %) et 2 garçons (4,5 %). Le taux d’infestation le plus élevé se trouvait chez les enfants âgés de 9 ans. Il y avait une relation significative entre l’infestation par les poux de tête et le sexe (P < 0.0001), l’âge (P < 0.05), le niveau d’instruction des parents (P < 0.0001), l’emploi du père (P < 0.01), la taille de la famille (P < 0.01), la longueur des cheveux (P < 0.0001) et le fait d’avoir des salles d’eau séparées dans la maison (P < 0.0001).
Introduction

Skin disorders are among the most frequently diagnosed conditions in schoolchildren in both developing and industrialized countries [1–5]. The school environment makes children vulnerable to cross-transmission of communicable skin diseases, which can then be passed on to family members [6]. Head louse infestation is a condition that has worldwide distribution and is seen in school-age children in many countries.

This study was carried out to determine the prevalence of pediculosis capitis and some of the factors affecting infestation among pupils in primary schools in Kerman city.

Methods

The present study was a descriptive, cross-sectional, analytical study. The study sample was selected from the students of 50 primary schools in Kerman city in the Islamic Republic of Iran, 1076 km southeast of Tehran. The sample size was 1200 students, using the formula

\[ N = \frac{z^2pq}{d^2} \]

where \( p = 0.08 \) (from previous Iranian studies), \( q = (1 - p) \) and \( d = 0.016 \). For 95% confidence \( (\alpha = 0.05) \) \( N \) is 1104. Considering attrition of 9%, \( N \) was calculated at 1200. In this study 50 primary schools were selected by classification cluster random sampling. First, all the primary schools in Kerman city were divided into 3 groups according to size:

- Group A: 62 schools (32 boys’ schools, 30 girls’ schools) having < 150 students
- Group B: 75 schools (34 boys’ schools, 41 girls’ schools) having 150–300 students
- Group C: 55 schools (32 boys’ schools, 23 girls’ schools) having > 300 students

Then, taking into consideration the population of each group, the number of samples from each group was determined and schools were chosen by random cluster sampling. From the first group, 144 students were selected from 10 schools, from the second group 420 students from 20 schools and from the third group 636 students from 20 schools (in total, 24 boy’s schools and 26 girl’s schools were sampled). In each cluster according to the population of the school, the number of students in the sample was determined and students were selected using simple random sampling at all levels.

At the beginning of the survey, parents were invited to the school by the principal. They were informed about the study and asked for consent for their children to participate. All agreed to give consent. The survey was carried out from 6 April to 2 June 2003.

For data collection, the students’ hair was examined carefully by one of the authors. The presence of nits, nymphs or adult lice in the hair were the criteria for diagnosis of head louse infestation. The data from this physical examination were recorded for each pupil along with the demographic information that was collected from the students or from school documentation.

Analysis of the data was performed using SPSS.

Results

A total of 1200 primary-school students were examined for this study, 636 girls (53%) and 564 boys (47%). Demographic data and prevalence of infestation are shown in Table 1. Only 30 students (2.5%) were living in families with family size > 10 and only 94 (7.8%) were living in a house.
### Table 1  Prevalence of head louse infestation in pupils of primary schools in Kerman city, 2002–03

<table>
<thead>
<tr>
<th>Variable</th>
<th>No.</th>
<th>%</th>
<th>Prevalence of infestation No. (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>636</td>
<td>53.0</td>
<td>43</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Male</td>
<td>564</td>
<td>47.0</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>7</td>
<td>195</td>
<td>16.3</td>
<td>7</td>
<td>3.6</td>
</tr>
<tr>
<td>8</td>
<td>223</td>
<td>18.6</td>
<td>4</td>
<td>1.8</td>
</tr>
<tr>
<td>9</td>
<td>213</td>
<td>17.8</td>
<td>14</td>
<td>6.6</td>
</tr>
<tr>
<td>10</td>
<td>224</td>
<td>18.7</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>11</td>
<td>259</td>
<td>21.6</td>
<td>13</td>
<td>5.0</td>
</tr>
<tr>
<td>&gt; 11</td>
<td>86</td>
<td>7.2</td>
<td>5</td>
<td>5.8</td>
</tr>
<tr>
<td><strong>Hair length</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Short</td>
<td>738</td>
<td>61.5</td>
<td>9</td>
<td>1.2</td>
</tr>
<tr>
<td>Long</td>
<td>462</td>
<td>38.5</td>
<td>36</td>
<td>7.8</td>
</tr>
<tr>
<td><strong>Family size</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>&lt; 5</td>
<td>690</td>
<td>57.5</td>
<td>18</td>
<td>2.6</td>
</tr>
<tr>
<td>5–10</td>
<td>480</td>
<td>40.0</td>
<td>23</td>
<td>4.8</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>30</td>
<td>2.5</td>
<td>4</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>Mother’s education</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Illiterate</td>
<td>126</td>
<td>10.5</td>
<td>9</td>
<td>7.1</td>
</tr>
<tr>
<td>Primary</td>
<td>345</td>
<td>28.8</td>
<td>23</td>
<td>6.7</td>
</tr>
<tr>
<td>Secondary to diploma</td>
<td>573</td>
<td>47.8</td>
<td>9</td>
<td>1.6</td>
</tr>
<tr>
<td>University education</td>
<td>106</td>
<td>8.8</td>
<td>0</td>
<td>–</td>
</tr>
<tr>
<td><strong>Father’s education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>105</td>
<td>8.8</td>
<td>12</td>
<td>11.4</td>
</tr>
<tr>
<td>Primary</td>
<td>324</td>
<td>27.0</td>
<td>14</td>
<td>4.3</td>
</tr>
<tr>
<td>Primary to diploma</td>
<td>540</td>
<td>45.0</td>
<td>16</td>
<td>3.0</td>
</tr>
<tr>
<td>University education</td>
<td>165</td>
<td>13.8</td>
<td>0</td>
<td>–</td>
</tr>
<tr>
<td><strong>Father’s job</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Skilled</td>
<td>346</td>
<td>28.8</td>
<td>8</td>
<td>2.3</td>
</tr>
<tr>
<td>Semi-skilled</td>
<td>314</td>
<td>26.2</td>
<td>21</td>
<td>6.7</td>
</tr>
<tr>
<td>Unskilled</td>
<td>467</td>
<td>38.9</td>
<td>14</td>
<td>3.0</td>
</tr>
<tr>
<td>Unemployed</td>
<td>26</td>
<td>2.2</td>
<td>1</td>
<td>3.8</td>
</tr>
<tr>
<td><strong>Bathing facilities in the house</strong></td>
<td></td>
<td></td>
<td></td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Yes</td>
<td>1106</td>
<td>92.2</td>
<td>31</td>
<td>2.8</td>
</tr>
<tr>
<td>No</td>
<td>94</td>
<td>7.8</td>
<td>14</td>
<td>14.9</td>
</tr>
</tbody>
</table>

*Hair which could not be collected and tied.
*In 9 cases the mother had died and data were missing for the others.
*In 21 cases the father had died and data were missing for the others.
which did not have a bath. Just over 60% of the students we examined had short hair that could not be collected and fastened.

Prevalence of pediculosis capitis among the primary-school pupils we studied in Kerman city was 3.8% overall (45 pupils). Of those infected, 95.5% were females. The highest prevalence of infestation was among 9-year-olds (6.6%). Students with short hair had a lower infestation rate (1.2%). Of the 636 girls, 462 had long hair and 36 (7.8%) of these were infested. Just 7 (4.0%) of the 174 girls with short hair were infested.

Prevalence of head louse infestation among pupils who were living in large families (> 10 family members) was greater (13.3%) than among others and the rate of infestation was also greater among students whose parents’ education level was low. In addition, the infestation rate was greater among pupils who were living in families with poor socioeconomic conditions and who did not have separate facilities for bathing in their house.

Based on chi-squared tests, the relationship between head louse infestation and all of the variables examined was statistically significant (Table 1).

Discussion

Comparing of the prevalence of pediculosis capitis is very difficult task both between different countries and between different areas within a country because many factors, e.g. socioeconomic, educational, hygienic, are involved.

Pediculosis capitis is the most prevalent condition in school and preschool age groups throughout the world, and especially in developing countries [4]. Head lice ranked third in frequency among all skin disorders among male schoolchildren in Amman [6]. In our study prevalence of head louse infestation was 3.8% in primary-school students in Kerman city. According to an accomplished investigation in Torine (France), more than 15% of students studied were infected [7]. Head louse infestation was 6.8% in 1007 primary-school children in Sierra Leone [8]. In a similar study in Nigeria, of 6882 primary-school pupils, 3.7% were infected [9]. Prevalence of infestation was 9.4% in 785 primary-school children in Turkey [10]. The rate of infestation was 81.5% among schoolchildren in Argentina [11].

Overall, 13.4% of students were infected with nits or immature or adult lice in northern Jordan, and girls showed a higher prevalence than boys [12]. In our study, the prevalence of head lice in girls was also greater than in boys. This is in agreement with results of a number of other studies [10,13,14].

In addition, in our study the highest rate of infestation was seen in 9-year-old students. Similar findings have been reported in a number of other studies [6–8,11,12,15,16]. In our study there was a relationship between the rate of infestation and parents’ education and socioeconomic and sanitary conditions. This is in agreement with results of a number of previous studies [4,10,11].

Conclusions

Improvements in socioeconomic and cultural conditions may reduce the prevalence of pediculosis capitis because these are factors which affect the rate of infestation. Implementing health education programmes for students, and possibly parents too, may help in controlling this health problem. These measures along with curing infected students and possible cases within the family will decrease the rate of infestation and lead to greatly improved control.
References


Serum interleukins and urinary microglobulin in children with idiopathic nephrotic syndrome

M.K. Rizk,1 A. El-Nawawy,2 E. Abdel-Kareem,3 E-S. Amer,1 D. El-Gezairy2 and A.Z. El-Shafei2

1Department of Paediatrics, Faculty of Medicine, University of Banha, Banha, Egypt. 2Department of Paediatrics; 3Department of Clinical Pathology, Faculty of Medicine, University of Alexandria, Alexandria, Egypt (Correspondence to A. El-Nawawy: dr_anawawy@yahoo.com).

Received: 22/03/01; accepted: 22/06/04

ABSTRACT We studied 60 children affected with idiopathic nephrotic syndrome (INS) plus 20 age and sex matched controls. The children with INS were divided into 3 groups of 20: first presentation, remission and relapse. A complete blood picture and complete urinalysis were done. Serum interleukin (IL)-1β, IL-6, tumour necrosis factor (TNF) and quantitative urinary β-2-microglobulin (β-2-m) excretion were estimated. IL-1β and IL-6 were significantly higher in the study groups, the first presentation and relapse groups having the highest concentrations. Serum TNF concentration and urinary β-2-m excretion were significantly higher in the first presentation and relapse groups. Serum IL-1β, IL-6 and TNF concentrations were able to select positively (100%) the first presentation and relapse groups, while these concentrations plus urinary β-2-m excretion selected negatively (100%) the control group.

Interleukines sériques et β microglobuline urinaire chez des enfants présentant un syndrome néphrotique idiopathique

RÉSUMÉ Nous avons étudié 60 enfants présentant un syndrome néphrotique idiopathique plus 20 témoins appariés selon l’âge et le sexe. Les enfants présentant un syndrome néphrotique idiopathique ont été répartis en trois groupes de 20 : première manifestation, rémission et récidive. Un hémogramme et un examen des urines complets ont été réalisés. On a estimé l’interleukine 1β, l’interleukine 6, la cachectine (TNF) et l’excrétion quantitative de β2-microglobuline urinaire. Les taux sériques d’interleukine 1β et d’interleukine 6 étaient significativement plus élevés dans les groupes de l’étude, les groupes de première manifestation et de récidive ayant les concentrations les plus fortes. La concentration sérique de TNF et l’excrétion de β2-microglobuline urinaire étaient significativement plus élevées dans les groupes de première manifestation et de récidive. Les concentrations sériques d’interleukine 1β, d’interleukine 6 et de TNF permettaient de sélectionner positivement (100 %) les groupes de première manifestation et de récidive alors que ces concentrations plus l’excrétion urinaire de β2-microglobuline urinaire sélectionnaient négativement (100 %) le groupe témoin.


**Introduction**

Nephrotic syndrome is neither a single disease nor even a heterogeneous group of related diseases. Rather, it is a clinical state characterized by heavy proteinuria and hypoalbuminaemia, often associated with oedema, hypercholesterolaemia and generalized hyperlipidaemia \[1\].

Idiopathic nephrotic syndrome (INS) accounts for 90% of nephrosis in childhood; minimal change nephrotic syndrome is found in approximately 85% of INS, mesangial proliferative glomerulonephritis in 5% and focal glomerular sclerosis in 10%. In the remaining 10% of children with nephrotic syndrome, it is largely mediated by some form of glomerulonephritis, membranous and proliferative being the most common \[2\].

Idiopathic nephrotic syndrome in childhood occurs at an annual incidence of 2 cases/100 000 population under the age of 18 years \[3\]; minimal change nephrotic syndrome is most common in children 2–4 years old, but may occur at any age \[4\].

The basic pathogenic abnormality in nephrosis is proteinuria, which results from an increase in glomerular capillary wall permeability. The mechanism of the increase in permeability is unknown but may be related, at least in part, to loss of negatively charged glycoproteins within the capillary wall \[2\]. The glomerular lesion, especially in minimal change nephrotic syndrome, may be mediated by circulating permeability factors. They are thought to be T-lymphocyte derived cytokines, which cause podocyte swelling, alterations in charge density, and foot process effacement with consequent increase in vascular permeability \[5\].

Interleukin (IL)-1 and tumour necrosis factor (TNF) are structurally unrelated cytokines, yet their spectra of biological effects are so similar that these 2 cytokines are almost interchangeable \[6\]. It has been suggested that IL-1 has a significant role in the immunopathogenesis of proteinuria \[7\] and that TNF-α plays a pathogenic role in the induction and/or maintenance of glomerular barrier dysfunction \[8\]. Interleukin-6 is involved in inflammatory responses and immune reactions in the host. It is produced by a variety of cells, including monocytes and mesangial cells in the kidney \[9\]. It is not possible at present to distinguish whether IL-6 contributes to renal dysfunction or whether it reflects renal damage \[10\].

β-2-microglobulin (β-2-m) is a low molecular weight protein found on the surface of all nucleated cells which synthesize it. About 95% of free β-2-m is filtered by the normal glomerulus and a normal kidney is able to reabsorb 99.9% through the proximal tubules. Malfunction of the proximal tubules with a normal glomerular filtration rate is accompanied by decreased tubular reabsorption and increased urinary excretion of β-2-m \[11\].

The aim of this study was the evaluation of serum concentrations of IL-1β, IL-6, TNF and urinary β-2-m in children suffering from idiopathic nephrotic syndrome in various situations: before treatment, during remission and on relapse before reinstitution of therapy. An additional aim was the comparison of these levels to those in a matched control group.

**Methods**

This study was carried out at Alexandria University Children’s Hospital from January 1998 to December 1999 (2 years).

Eighty children were included in the study, 60 had idiopathic nephrotic syndrome (INS) and 20 were healthy children who were randomly selected from those
attending the growth and development follow-up clinic who were included as a control group. The sick children were recruited in the paediatric nephrology clinic and selected sequentially until the required number was reached. They were classified into 3 groups (20 children in each): first presentation, diagnosed as nephrotic for the first time (these were selected first owing to their small number); remission, selected as being in remission for ≥ 3 months; and relapse, selected as having had their first relapse recently but before reinstitution of therapy (after the first group was complete, we selected a child in remission and a child with relapse sequentially until the required number was reached). Informed consent was obtained from all parents and the protocol of the study was approved by the Alexandria University ethics committee. All patients with a history of recent (within the previous 6 months) infective and/or inflammatory conditions and all patients with abnormal urinary sediments (abnormal casts or crystalluria) were excluded from the study.

A detailed history of the present condition of all the participants was obtained and a thorough clinical examination was performed.

A morning blood sample of 8 mL was collected; 2 mL of the sample were added to EDTA tubes for a complete blood picture. The remaining 6 mL were collected in test tubes for clinical tests. Sera were separated and collected in Eppendorf tubes. These were kept frozen (−70 °C) till the time of the specific tests. All investigations were carried out in the laboratories of the university hospital.

The specific tests performed were: complete blood picture, blood urea, serum creatinine, serum protein and serum cholesterol. Specific immunologic tests included: serum IL-1β by enzyme immunoassay using Medgenix kits (Medgenix Diagnostics, Fleurus, Belgium) [intra-assay coefficient of variation (CV) 2.8%, interassay CV 4.5%]; serum IL-6 by enzyme immunoassay using Medgenix kits (intra-assay CV 5.1%, interassay CV 4.6%); TNF-α by enzyme immunoassay using Medgenix kits (intra-assay CV 4.8%, interassay CV 8.7%). All tests were carried out according to the manufacturer’s instructions.

An early morning sample of urine was collected, examined and centrifuged. The clear supernatant was preserved for the definitive test. Urine output was estimated by collecting all urine voided from 08.00 till 08.00 the next day. For the control group, mothers were asked to collect the urine and deliver it to the clinic for analysis. β-2-m was estimated in urine quantitatively using an enzyme-linked immunosorbent assay technique using Eurogenetics kits coated microtitre strips (Eurogenetics, Tesselenderlo, Belgium) (intra-assay CV 6.4%, inter-assay CV 8.0%).

Data were collected and tabulated using SPSS, version 6, for statistical analysis. Descriptive measures included: count, percentage, minimum, maximum, arithmetic mean and standard deviation. Statistical tests included chi-squared for testing association, 1-way analysis of variance (F-test) for comparing means of more than 2 groups, Tukey β difference test for pair-wise comparison and Kruskal–Wallis analysis of variance (χ2) for non-parametric or non-normally distributed variables. Pearson correlation was utilized to study association among quantitative variables. The selected level of significance was P ≤ 0.05.

Results

There were no statistically significant differences between the 4 groups for mean age,
sex distribution and height percentile from 50th centile for age and sex. The weight percentiles were significantly higher in the first presentation and relapse groups than in the control and remission groups from 50th centile for age and sex. Systolic and diastolic blood pressures were significantly higher in the 3 nephrotic groups compared to the control group (Table 1).

Mean serum protein concentration was significantly lower in the 3 study groups, and in the relapse group it was significantly lower than in the other INS groups (Table 2). The serum albumin concentration was significantly lower in the 3 study groups compared to the control group, and also in the first presentation and relapse groups compared to the remission group. Mean serum cholesterol was significantly higher in the 3 INS groups than in the control group. Mean serum creatinine was significantly higher in the first presentation and remission groups compared to the control group, but mean blood urea did not show any statistically significant difference across the 4 groups. The mean leukocyte count was

Table 1 Personal and clinical characteristics of 3 groups of children with nephrosis and a control group

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>First presentation</th>
<th>Remission</th>
<th>Relapse</th>
<th>Control</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>2.1–11.5</td>
<td>2.3–14.3</td>
<td>2.4–12.6</td>
<td>2.3–10.2</td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>5.7 (3.0)</td>
<td>6.7 (3.4)</td>
<td>5.7 (3.8)</td>
<td>4.0 (2.2)</td>
<td>2.4543</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males [No. (%)]</td>
<td>11 (55)</td>
<td>11 (55)</td>
<td>14 (70)</td>
<td>8 (40)</td>
<td>χ² = 3.636*</td>
</tr>
<tr>
<td>Females [No. (%)]</td>
<td>9 (45)</td>
<td>9 (45)</td>
<td>6 (30)</td>
<td>12 (60)</td>
<td></td>
</tr>
<tr>
<td>Weight percentile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>116.4–135.1</td>
<td>76.5–101.7</td>
<td>81.2–194.5</td>
<td>79.3–101.8</td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>126.5 (18.1)c,d</td>
<td>94.0 (6.3)</td>
<td>125.7 (31.8)c,d</td>
<td>92.6 (6.1)</td>
<td>20.255*</td>
</tr>
<tr>
<td>Height percentile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>84–144.8</td>
<td>86.8–160.0</td>
<td>84–149.7</td>
<td>84–138.3</td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>111.8 (19.0)</td>
<td>118.3 (20.6)</td>
<td>111.1 (23.9)</td>
<td>101.2 (14.7)</td>
<td>2.5238</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>100–150</td>
<td>100–140</td>
<td>80–140</td>
<td>90–110</td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>105.5 (11.8)d</td>
<td>103.1 (12.2)d</td>
<td>121 (16.8)d</td>
<td>92.5 (5.5)</td>
<td>18.425*</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>60–80</td>
<td>60–85</td>
<td>50–100</td>
<td>60–70</td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>65.5 (7.2)d</td>
<td>64.2 (6.8)d</td>
<td>73.75 (12.9)d</td>
<td>60.5 (2.2)</td>
<td>9.323*</td>
</tr>
</tbody>
</table>

*Kruskal–Wallis test.

*Presented as % from 50th centile for age and sex.

Significantly different from remission group.

Significantly different from control group.

Significant at P < 0.05.

SD = standard deviation.
<table>
<thead>
<tr>
<th>Test</th>
<th>First presentation</th>
<th>Remission</th>
<th>Relapse</th>
<th>Control</th>
<th>( F )</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Serum protein (g/dL)</strong></td>
<td>Range</td>
<td>3.3–7.4</td>
<td>5.4–8.2</td>
<td>2.8–7.2</td>
<td>7.0–8.2</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>6.0 (0.9)</td>
<td>6.1 (1.2)</td>
<td>4.5 (1.3)</td>
<td>7.8 (0.4)</td>
</tr>
<tr>
<td><strong>Serum albumin (g/dL)</strong></td>
<td>Range</td>
<td>1.2–2.0</td>
<td>3.1–4.2</td>
<td>1.4–2.0</td>
<td>3.0–4.5</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>1.7 (0.2)</td>
<td>3.7 (0.4)</td>
<td>1.8 (0.2)</td>
<td>3.9 (0.3)</td>
</tr>
<tr>
<td><strong>Serum cholesterol (mg/dL)</strong></td>
<td>Range</td>
<td>120–640</td>
<td>140–540</td>
<td>216–561</td>
<td>145–200</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>401.9 (137.8)</td>
<td>350.0 (129.0)</td>
<td>402.9 (105.6)</td>
<td>168.0 (15.3)</td>
</tr>
<tr>
<td><strong>Blood urea (mg/dL)</strong></td>
<td>Range</td>
<td>17–51</td>
<td>18–51</td>
<td>10–56</td>
<td>20–35</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>34.2 (10.3)</td>
<td>29.9 (8.6)</td>
<td>32.5 (14.1)</td>
<td>25.9 (4.3)</td>
</tr>
<tr>
<td><strong>Serum creatinine (mg/dL)</strong></td>
<td>Range</td>
<td>0.2–1.2</td>
<td>0.5–1.1</td>
<td>0.5–1.2</td>
<td>0.3–0.9</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>0.9 (0.2)</td>
<td>0.8 (0.2)</td>
<td>0.8 (0.3)</td>
<td>0.6 (0.2)</td>
</tr>
<tr>
<td><strong>Leukocytes (x 1000/mm(^3))</strong></td>
<td>Range</td>
<td>5.7–12.3</td>
<td>6.9–16.2</td>
<td>5.4–20.7</td>
<td>6.2–9.4</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>8.9 (1.6)</td>
<td>10.0 (2.6)</td>
<td>11.4 (3.9)</td>
<td>7.8 (1.2)</td>
</tr>
<tr>
<td><strong>Haemoglobin (g/dL)</strong></td>
<td>Range</td>
<td>8.0–13.7</td>
<td>9.6–14.0</td>
<td>7.9–15.6</td>
<td>8.3–13.8</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>10.4 (1.6)</td>
<td>11.8 (1.3)</td>
<td>12.2 (2.2)</td>
<td>11.0 (1.6)</td>
</tr>
<tr>
<td><strong>Platelets (x 1000/mm(^3))</strong></td>
<td>Range</td>
<td>180–693</td>
<td>211–630</td>
<td>280–544</td>
<td>238–430</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>349.8 (103.2)</td>
<td>369.7 (105.1)</td>
<td>420.7 (71.4)</td>
<td>314.8 (66.3)</td>
</tr>
<tr>
<td><strong>Leukocytes in urine/HPF</strong></td>
<td>Range</td>
<td>1–100</td>
<td>1–9</td>
<td>2–55</td>
<td>1–2</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>17.4 (22.1)</td>
<td>3.45 (2.0)</td>
<td>12.3 (13.1)</td>
<td>1.36 (0.5)</td>
</tr>
<tr>
<td><strong>Urinary volume (mL/kg per day)</strong></td>
<td>Range</td>
<td>9.1–125.0</td>
<td>24.0–150.0</td>
<td>25.0–38.5</td>
<td>50.0–68.2</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>35.8 (27.1)</td>
<td>60.5 (35.8)</td>
<td>31.0 (3.3)</td>
<td>60.4 (4.4)</td>
</tr>
</tbody>
</table>

\( a \) Significantly different from control group.
\( b \) Significantly different from remission group.
\( c \) Significantly different from first presentation group.
\( d \) Significant at \( P < 0.05 \).

\( SD \) = standard deviation.

\( HPF \) = high power field.
significantly higher in the remission and relapse groups compared to the controls, and in the relapse group it was significantly higher than in the first presentation group. Mean platelet count was significantly higher in the relapse group compared to controls and mean haemoglobin concentration was significantly higher in the relapse group compared to the first presentation group.

Mean urinary leukocyte count was significantly higher in the first presentation and relapse groups compared to the control group, while in the first presentation group the count was significantly higher than in the remission group. Mean 24-hour urinary output was significantly lower in the first presentation and relapse groups compared to the other 2 groups.

Mean serum IL-1β concentration was significantly higher in the first presentation and relapse groups compared to the remission and control groups, while in the remission group the level was significantly higher than in the controls (Table 3). Mean serum IL-6 concentration was significantly higher in the 3 groups with nephrosis compared to the controls, and in the first presentation and relapse groups the level was significantly higher than the remission group. Mean serum TNF concentration in the first presentation and relapse groups was significantly higher than that of the remission and control groups, and in the first presentation group it was significantly higher than in the relapse group. Mean urinary β-2-m concentration in the first presentation and relapse groups was

### Table 3: Serum concentrations of interleukin (IL)-1β, IL-6, tumour necrosis factor (TNF) and urinary β-2-microglobulin (β-2-m) in children with nephrosis and a control group

<table>
<thead>
<tr>
<th>Variable</th>
<th>First presentation</th>
<th>Remission</th>
<th>Relapse</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IL-1β (pg/mL)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>1208.2 (1977.5)</td>
<td>73.4 (91.6)</td>
<td>657.3 (790.5)</td>
<td>6.0 (2.7)</td>
</tr>
<tr>
<td>Negative [No. (%)]</td>
<td>0 (–)</td>
<td>8 (40)</td>
<td>0 (–)</td>
<td>20 (100)</td>
</tr>
<tr>
<td>Positive [No. (%)]</td>
<td>20 (100)</td>
<td>12 (60)</td>
<td>20 (100)</td>
<td>0 (–)</td>
</tr>
<tr>
<td><strong>IL-6 (pg/mL)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>448.5 (268.3)</td>
<td>32.0 (40.6)</td>
<td>171.3 (182.1)</td>
<td>4.1 (2.2)</td>
</tr>
<tr>
<td>Negative [No. (%)]</td>
<td>0 (–)</td>
<td>7 (35)</td>
<td>0 (–)</td>
<td>20 (100)</td>
</tr>
<tr>
<td>Positive [No. (%)]</td>
<td>20 (100)</td>
<td>13 (65)</td>
<td>20 (100)</td>
<td>0 (–)</td>
</tr>
<tr>
<td><strong>TNF (pg/mL)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>56.6 (9.3)</td>
<td>29.3 (58.8)</td>
<td>43.9 (24.6)</td>
<td>5.6 (2.8)</td>
</tr>
<tr>
<td>Negative [No. (%)]</td>
<td>0 (–)</td>
<td>12 (60)</td>
<td>0 (–)</td>
<td>20 (100)</td>
</tr>
<tr>
<td>Positive [No. (%)]</td>
<td>20 (100)</td>
<td>8 (40)</td>
<td>20 (100)</td>
<td>0 (–)</td>
</tr>
<tr>
<td><strong>Urinary β-2-m (μg/mL)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>6.0 (5.2)</td>
<td>2.5 (4.9)</td>
<td>4.9 (7.6)</td>
<td>1.4 (0.9)</td>
</tr>
<tr>
<td>Negative [No. (%)]</td>
<td>13 (65)</td>
<td>17 (85)</td>
<td>9 (45)</td>
<td>20 (100)</td>
</tr>
<tr>
<td>Positive [No. (%)]</td>
<td>7 (35)</td>
<td>3 (15)</td>
<td>11 (55)</td>
<td>0 (–)</td>
</tr>
</tbody>
</table>

*aSignificant at P < 0.05.
Negative = ≤ normal.
Positive = > normal.
SD = standard deviation.
significantly higher than in the remission and control groups.

Serum concentrations of IL-1β, IL-6 and TNF were able to select positively the first presentation and relapse groups (100%), while these 3 cytokines along with urinary β-2-m excretion could select negatively the controls (100%).

Discussion

Increased level of IL-1β encountered in a study is indicative of its significant role in the immunopathogenesis of proteinuria [7]. The effect of increased IL-1β has been explained on the basis of its local and systemic effects. The main vascular effects of IL-1β are increased platelet adherence, increased capillary permeability, increased prostaglandin synthesis and hypertension [12]. Moreover, IL-1β with TNF may stimulate increased synthesis of eicosanoids [2]. These could pass through the endothelial cells, affecting the negatively charged podocytes, which usually prevent the passage of albumin, leading to their neutralization and hence excessive albuminuria.

Although the mean blood pressure measurements among the INS groups in our study were significantly higher than that of the control group, they were within the normal range for age and sex in the majority of children [2]. It has been postulated that increased mesangial cellularity [13] could compromise renal afferent and/or efferent circulation in the glomeruli. Abrass reported that 19% of children remain hypertensive after induction of remission in nephrotic syndrome [14].

An important effect of increased IL-1β combined with IL-6 and TNF is the increased leukocyte count from 2 sources: bone marrow and leucocytes attached loosely to endothelial cells [15]. This high leukocyte count could possibly indicate that the infiltrating monocytes-macrophages are the major source of inflammatory cytokines, especially IL-1β, IL-6 and TNF, rather than the resident glomerular cells. IL-1β stimulates hepatic protein synthesis due to hypoalbuminaemia and inhibits lipoprotein lipase [12], which will lead to hypercholesterolaemia. In this study, the main cause of hypercholesterolaemia in the remission group was inhibition of lipoprotein lipase since the serum protein was within the normal range for age and sex [2]. Although IL-1β increased hepatic protein synthesis, its vascular leak effects surpass it, with a net hypoproteinaemia.

The expression of TNF is amplified by IL-1β and is suppressed by immunosuppressive drugs such as corticosteroids [16]. In renal disease, TNF expression has been found in both resident cells and infiltrating monocytes-macrophages [17]. It acts in a paracrine way to recruit monocytes and macrophages to the glomerular region, besides acting with other mediators to increase vascular permeability [18]. This would cause alteration of the barrier function of the capillary wall [17] leading to proteinuria. In our study, TNF did not behave similar to IL-1β in the remission group, where TNF levels decreased to statistically non-significant levels compared to controls while IL-1β levels remained significantly high. This is because TNF is downregulated by corticosteroids [17] and also by the shift of CD4-T cell differentiation to TH2 instead of TH1 cells with a consequent reduction of TH1 cytokine production, especially TNF [19]. Moreover, the combined effect of IL-1β and TNF will lead to a more effective local capillary leakage and cell death than with either cytokine alone [20]. Therefore, to obtain remission there should be a disengagement of IL-1β and TNF. This emulates...
IL-1β and IL-6 in its systemic effects, especially bone marrow stimulation and release of neutrophils [15].

While IL-1β and TNF are stimulating mesangial cells to release IL-6 [17,20], other sources are activated: TH₂ cells, antigen presenting cells and other somatic cells, especially endothelial cells [12]. Concentration of IL-6 was highest in the first presentation group and lowest in the remission group in the INS patients in this study. IL-6 is activated by the high IL-1β and TNF concentrations in the first presentation group, thus IL-6 seems to be able to downregulate TNF, possibly by helping in differentiating CD₄-T cells into TH₂ cells. Consequently, remission will occur and IL-6 will no longer be needed in the remission group and concentration will ultimately decline. This view is supported by the findings that long-term remission of INS is related to the increased TH₂ cytokine production (especially IL-6) and the downregulation of TH₁ cells [19]. Proteinuria disappears in remission since it has been shown that TNF alone is the single most important cytokine in pathogenesis in INS [21]. Moreover, the use of corticosteroids in the remission group suppressed IL-6 [22]. In the relapse group in this study, the proteinuria caused by increased TNF will need a re-increase of IL-6 expression to suppress TNF expression and its proteinuric effect.

In this study, IL-6 combined with other cytokines acted on the bone marrow to increase leukocyte count and haematopoiesis [12] as well as megakaryocytes [23]. The effect is latent and therefore the platelets increased in the relapse group while the leukocyte count depended more on the effects of other cytokines such as IL-1β and TNF, which can be seen from the results.

The lowest haemoglobin concentration we found was in the first presentation group, possibly as a result of low level of erythropoietin in plasma which can result from increased urinary loss in nephrotic syndrome [14]. This may have outweighed the stimulatory effects of erythropoietin production in bone marrow by the high concentrations of IL-1β and IL-6 in the first presentation group, but the reverse occurred in the relapse group.

In this study, the highest increase of urinary excretion of β-2-m was in the first presentation group because of the combined effect of glomerular and tubular dysfunction. It was shown that increased urinary β-2-m excretion is present in massive glomerular proteinuria and in tubular dysfunction, especially the proximal [24], with a positive correlation between them independent of the primary renal disease [25].

To sum up, significantly high concentrations of IL-1β, IL-6 and TNF were uniformly found in the first presentation and relapse INS groups. They were able to positively predict them (100%) and, along with β-2-m, to negatively predict the controls (100%) with fair accuracy. The lower serum values for TNF and urinary β-2m excretion are important factors in defining and predicting remission. IL-1β and TNF usually work in harmony while IL-6 tries to suppress TNF and its harmful effects. It seems that the 3 months remission period used in this study is not a sufficient duration for the return of cytokines and urinary β-2-m to the basal control values. However, the clinical studies on INS in children are quite limited because of its low global incidence (2/100 000 population) [3].

Acknowledgement

We would like to thank Professor Dr Elham Abdel Karim, Professor of Clinical Pathology, for her help with laboratory investigations.
References


20. Dinarello CA. Reduction of inflammation by decreasing production of interleukin-1 or by specific receptor antagonism. Inter-


*Note from the Editor*

We would like to inform our readers that the next special issue of the EMHJ will be on Medical Bioethics. It is scheduled to be Vol. 12 No. 5, 2006.
Acetylator phenotype in Iraqi patients with systemic lupus erythematosus

R.A. Najim, Y.Y.Z. Farid, T. Abed Samad and S.A.R. Shihab

ABSTRACT The study was designed to determine the acetylator status in patients with systemic lupus erythematosus (SLE) and compare it to a matched group of healthy volunteers. Disease severity was determined using the revised American College of Rheumatology criteria for classification and the SLE disease activity index. After an overnight fast, each participant received a single oral dose of 100 mg dapsone. After 3 hours, plasma dapsone/monoacetyldapsone ratio was determined. In the control group, frequency of slow acetylators was 73.3%; frequency of rapid acetylators was 26.7%. In SLE patients, frequency of slow acetylators was 78.0%; frequency of rapid acetylators was 12.0%. However, 8.0% were non-acetylators (monoacetyldapsone not detected in plasma). There was no association between acetylator status and severity of SLE.

Phénotype d’acétylation chez des patients iraquiens atteints de lupus érythémateux systémique

RÉSUMÉ Cette étude visait à déterminer le statut acétyleur chez des patients atteints de lupus érythémateux systémique et à le comparer avec un groupe apparié de volontaires sains. La gravité de la maladie a été établie au moyen des critères révisés de l’American College of Rheumatology pour la classification et le signe d’évolutivité du lupus érythémateux systémique. Après un jeûne d’une nuit, chaque participant s’est vu administrer une dose unique de 100 mg de dapsone par voie orale. Après 3 heures, on a déterminé le rapport plasmatique dapsone/monoacétyldapsone. Dans le groupe témoin, la fréquence des acétyleurs lents était de 73.3 % ; celle des acétyleurs rapides était de 26.7 %. Chez les patients atteints de lupus érythémateux systémique, la fréquence des acétyleurs lents était de 78.0 % ; celle des acétyleurs rapides était de 12.0 %. Toutefois, 8.0 % n’étaient pas acetylators (monoacétyldapsone non détectée dans le plasma). Il n’y avait pas d’association entre le statut acétyleur et la gravité du lupus érythémateux systémique.
Introduction

Acetylation is considered a major metabolic pathway in the biotransformation of a number of drugs such as procainamide, hydralazine, sulphonamides, isoniazide and dapsone and a caffeine metabolite [1]. Acetylation exhibits a genetically controlled, bimodal distribution within any given population. Individuals can be phenotyped as either slow or rapid acetylators using a test drug. Slow acetylation is inherited in an autosomal recessive fashion [1].

Polymorphic N-acetylation has been linked to variation in drug response, susceptibility to adverse reactions and increased incidence of certain spontaneous disorders, including cancer [1].

In this study, we examined the acetylator status in Iraqi SLE patients. The Iraqi population, as well as other Middle Eastern populations, is characterized by a predominance of slow acetylators [2]. It is, therefore, interesting to examine this problem in a predominantly slow acetylator population. The possible association of the acetylator state on the severity of the disease was also examined

Methods

Fifty SLE patients and 30 healthy volunteers participated in the study. Approval to conduct this study was granted by the ethical committee of the College of Medicine in the University of Baghdad. The nature of the trial was explained to each participant and the consent of each was obtained. Excluded from this study were individuals with glucose-6-phosphate dehydrogenase deficiency or allergy to sulfonamides. These were not encountered in our sample so there were no individuals excluded from the study. No attempt was made to exclude subjects with abnormal hepatic or renal function. None of the participants had a history of drug-induced lupus prior to phenotype determination. None were taking drugs that would interfere with acetylation nor were any on any drugs known to be polymorphically N-acetylated.

We studied all 50 consecutive, unrelated, spontaneous SLE patients attending the Department of Rheumatology in Baghdad Teaching Hospital during the study period, October 2001 to July 2002. The hospital is a tertiary care referral centre drawing patients from all over the country. The nature of the research was explained to each patient and informed consent was obtained. There were no refusals to participate in the study.

The patients were diagnosed and evaluated by a consultant rheumatologist. All SLE patients fulfilled at least 4 of the 11 revised (1982) criteria for classification of SLE of the American College of Rheumatology [3]. A thorough detailed clinical history was taken from all patients, including clinical and laboratory data.

Patients were maintained on the following treatment: 31 patients received corticosteroid therapy (prednisolone), 3 patients were on hydroxychloroquine and 4 were on cytotoxic drugs (methotrexate and cyclophosphamide); 18 patients were on no treatment. Six patients were taking more than 1 drug: 4 were on corticosteroids plus cytotoxic drugs and 2 were on hydroxychloroquine plus corticosteroids.

Assessment of disease activity was done using 2 methods. The first was by classifying patients according to the American College of Rheumatology criteria. In this classification patients are divided into 2 groups, those who met 4 criteria out of 11 were considered to have mild disease. Patients who had ≥ 4 criteria were considered to have severe disease.

The second method involved using a standard SLE Disease Activity Index (SLE-
DAI) chart [4]. Assessment was done at the time of the initial examination. A full score for a particular attribute was given when the patient’s clinical presentation met the terms for that attribute.

Healthy volunteers were recruited from the relatives of patients. None had a history of major illness and there were no abnormal physical findings during examination or investigations. They were matched for age and sex. Owing to restraints of time and funding, only 30 people were recruited. The same exclusion criteria as for the study group applied and informed consent was obtained.

After an overnight fast, each participant received a single oral dose of 100 mg dapsone (Nile Company for Pharmaceuticals and Chemical Industries, Cairo, Egypt). Drinking of caffeine-containing beverages was not allowed during the study period. A 5 mL blood sample was obtained by venepuncture 3 hours after drug intake and transferred to a 10 mL polyethylene tube containing 50 μL of heparin (Heparin Leo 5000 IU/mL, Leo Pharmaceutical Products, Ballerup, Denmark). Plasma was separated within 1 hour of collection by centrifugation at 3000 rpm for 10 minutes. The samples were stored at –20 °C pending analysis.

A rapid, simple, 1-stage protein precipitation method was used for the estimation of plasma dapsone (DDS) and monoacetyldapsone (MADDS) concentrations by high performance liquid chromatography (Shimadzu Corporation, Kyoto, Japan) [2,5].

Statistical analyses were done using SPSS, version 10. Differences between groups were assessed by the chi-squared test. An estimate was considered to be statistically significant if χ²-value was < 0.05. Linear correlation was tested by simple regression analysis [6].

### Results

The SLE patient ages ranged from 17 years to 54 years, mean 33.1 years [standard deviation (SD) 10.3]. The group included 42 females (84.0%), age range 17–54 years, with a mean age of 34.4 years (SD 12.5) and 8 males, age range 19–34 years, with a mean age of 28.3 years (SD 8.2).

The ages of the control group ranged from 16 years to 52 years, mean 26.3 years (SD 9.8). The group included 9 males and 21 females (70.0%).

In the SLE patient group, 39 (78.0%) were slow acetylators (MADDS/DDS ratios < 0.30) (Table 1). The slow acetylators included 31 females (79.5%) and 8 males (20.5%) with ages ranging from 17 to 54 years (Table 2). The plasma MADDS/DDS ratios of slow acetylators ranged from 0.01 to 0.28 (mean 0.10; SD 0.082).

Of the 50 SLE patients, all females, were rapid acetylators (MADDS/DDS ratios > 0.35). Their ages ranged from 18 to 49 years (mean 35.8 years; SD 11.6) (Tables 1 and 2). The plasma MADDS/DDS ratios were estimated using SPSS, version 10.

<table>
<thead>
<tr>
<th>Acetylator phenotype</th>
<th>Control</th>
<th>SLE</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>group</td>
<td>patients</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Rapida</td>
<td>8</td>
<td>26.7</td>
<td>6</td>
</tr>
<tr>
<td>Slowb</td>
<td>22c</td>
<td>73.3</td>
<td>39d</td>
</tr>
<tr>
<td>Non</td>
<td>0</td>
<td>–</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100</td>
<td>49a</td>
</tr>
</tbody>
</table>

χ² 4.73; P = 0.094.

<table>
<thead>
<tr>
<th>Notes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Plasma dapsone/monoacetyldapsone ratio &gt; 0.35.</td>
</tr>
<tr>
<td>b</td>
<td>Plasma dapsone/monoacetyldapsone ratio &lt; 0.30.</td>
</tr>
<tr>
<td>c</td>
<td>95% confidence interval: 59.9–86.7.</td>
</tr>
<tr>
<td>d</td>
<td>95% confidence interval: 63.6–92.4.</td>
</tr>
<tr>
<td>a</td>
<td>One patient was classed as indeterminate.</td>
</tr>
</tbody>
</table>

Table 1 Frequency distribution of acetylator phenotype in healthy controls and patients with systemic lupus erythematosus (SLE)
ranged from 0.36 to 1.61 (mean 0.81; SD 0.57). One patient with an acetylation ratio of 0.30–0.35 was considered an indeterminate acetylator.

Four of the SLE patients were non-acetylators (MADDS/DDS ratio 0.0). They were all females, aged 23–47 years (mean 31.8 years; SD 11.4) (Tables 1 and 2).

In the control group, there were 22 (73.3%) slow acetylators (Table 1). They included 17 females (77.3%) and 5 males (22.7%) with age range 16–52 years, (mean 27.9 years; SD 10.7) (Table 2). Their plasma MADDS/DDS ratios were 0.01–0.28 (mean 0.11; SD 0.09). There were 8 rapid acetylators in the control group (Table 1). They included 4 females and 4 males (Table 2). The age range was 16–29 years (mean 22.0 years; SD 4.9). Plasma MADDS/DDS ratios were 0.36–1.63 (mean 0.86; SD 0.6). There were no non-acetylators in this group (Table 1).

Analysis of the results showed that SLE patients as a group were not significantly different from the control group regarding the incidence of slow and rapid acetylator phenotypes ($P > 0.05$).

Using the Pearson correlation, no statistically significant correlation was found between plasma acetylation (MADDS/DDS) ratios and American college of rheumatology criteria ($r = 0.058$; $P = 0.700$) in the 50 patients. In addition, the correlation between plasma acetylation (MADDS/DDS) ratio and the SLE disease activity index in SLE patients was not significant.

**Discussion**

In this study, the frequency of the slow acetylators in patients with spontaneous SLE did not differ significantly from that in the control group. Godeau et al. were the first to observe an increase in slow acetylators in patients with SLE in 1973 [7]. The association of spontaneous systemic lupus erythematosus (SLE) with slow acetylator status is, however, controversial. While some reports have confirmed the association [8, 9], others failed to find any relationship [10, 11].

Our findings agreed with results published from other institutions worldwide which showed that slow acetylators are not at greater risk of developing SLE than are those who are rapid acetylators [8, 10, 11]. Nor do our findings support the notion of a significant association between acetylator phenotype and SLE [9]. Thus in a population with a high percentage of slow acetylators, the phenotype distribution alone seems not to be the contributing factor to the development of spontaneous SLE. This is in agreement with a previous report which failed to
find an association in a predominantly rapid acetylator Chinese population [11].

More recent studies have determined the arylamine N-acetyltransferase genotype of SLE patients. These studies also failed to find an association between the slow acetylation genotype and SLE [12,13].

An interesting finding in our study was that some SLE patients were non-acetylators. In a previous report, about half the patients with Behçet disease were found to be non-acetylators [2]. This finding cannot be explained by a technical error in the method used since non-acetylators in this study as well as the previous one were found in patients and not in the control group. On both occasions patient and control samples were run together. The significance of this finding needs further investigation to determine the genotype of non-acetylators in order to understand this phenomenon.

In previous studies no attempt was made to correlate acetylator status with the severity of the disease. The severity of the disease as measured by both the American College of Rheumatology criteria and the SLE disease activity index did not show any correlation with the acetylator phenotype. This finding is in contrast to a previous report on Behçet disease, another systemic autoimmune disease, which showed a correlation between the severity of the disease and the acetylator phenotype [2].

In conclusion, in a population of slow acetylators, it appears that the slow acetylator phenotype cannot be considered a genetic trait predisposing to the development of spontaneous SLE. In addition, acetylator phenotype does not appear to influence disease activity. The occurrence of non-acetylators does, however, need further investigation.

References


**Note from the Editor**

We would like to draw our readers’ attention to the evaluation form at the end of this issue. We welcome comments from our readers, which can help us improve the EMHJ. We would appreciate it therefore if readers could kindly take the time to complete this form and return it to us. Alternatively, the form can be completed online at: http://www.emro.who.int/publications/emhj/evaluationform.asp
Role of mast cells and T-lymphocytes in pemphigus vulgaris: significance of CD44 and the c-kit gene product (CD117)

N.R. Ghaly,1 O.A. Roshdy,1 S.A. Nassar,1 S.M. Hamad2 and A.M. El-Shafei3

1Department of Dermatology; 2Department of Clinical Pathology; Department of Pathology, University of Tanta, Tanta, Egypt (Correspondence to A.M. El-Shafei: blackandwhite47@yahoo.com).

Received: 18/03/04; accepted: 05/10/04

ABSTRACT Molecular mechanisms underlying the pathophysiology of pemphigus vulgaris are still not clear. We aimed to determine the significance of detecting expression of some antigens that might be pivotal to the process, namely CD44 and CD117, in patients with active pemphigus vulgaris. Seventeen patients with active pemphigus vulgaris and 19 normal healthy controls were included in the study. The immunohistochemical results showed prominent expression of CD44 in 13 of the patients and CD117 in 9 of the patients with new blister formation. CD44 percentage values in peripheral T-lymphocytes were significantly higher in patients than controls, as detected by flow cytometry. In addition, there was a significant increase in a soluble form of c-kit in sera of patients with active pemphigus vulgaris compared to controls.

Rôle des mastocytes et des lymphocytes T dans le pemphigus vulgaire : importance du CD44 et du produit du gène c-kit (CD117)

RÉSUMÉ Les mécanismes moléculaires impliqués dans la pathophysiologie du pemphigus vulgaire ne sont toujours pas clairs. Notre objectif était de déterminer l’importance de la détection de l’expression de certains antigènes pouvant jouer un rôle essentiel dans le processus, à savoir le CD44 et le CD117, chez des patients atteints de pemphigus vulgaire actif. Dix-sept patients atteints de pemphigus vulgaire actif et 19 témoins sains ont été inclus dans l’étude. Les résultats immunohistochimiques ont montré un haut niveau d’expression de CD44 chez 13 des patients et de CD117 chez 9 des patients ayant une formation de bulles récente. Le pourcentage de CD44 dans les lymphocytes T périphériques était significativement plus élevé chez les patients que chez les témoins, comme détecté par la cytométrie en flux. En outre, il y avait une augmentation significative de la forme soluble du c-kit dans le sérum des patients atteints de pemphigus vulgaire actif par rapport aux témoins.

1Department of Dermatology; 2Department of Clinical Pathology; Department of Pathology, University of Tanta, Tanta, Egypt (Correspondence to A.M. El-Shafei: blackandwhite47@yahoo.com).

Received: 18/03/04; accepted: 05/10/04

المجلة الصحية الشرق المتوسط، منظمة الصحة العالمية، البحرين، الأχامير عشر، العددان 5–6، 2005
Introduction

Pemphigus vulgaris (PV) is a life-threatening blistering skin disease in which patients’ autoantibodies are directed against desmosomal glycoproteins, resulting in the loss of keratinocyte cell–cell adhesion [1].

The CD44 family of cell surface glycoproteins is widely expressed in epithelial, mesothelial and haemopoietic tissues and is thought to function primarily as adhesion molecules, involved in cell–cell and cell matrix interactions and thought to take part in cell motility [2,3]. First identified in lymphocytes in 1982, they act as co-stimulatory molecules for T cells, leading to the induction of effector functions in these cells [4]. A relationship between activated or memory-effector lymphocyte populations and increased expression of family members of CD44 has been described and the importance of such CD44 expressing cells in the effector arm of the immune response in vivo has been reported [5]. This molecule is encoded by a single gene located on the short arm of chromosome 11 [6].

It is well known that the c-kit proto-oncogene codes for a type III tyrosine kinase receptor protein (CD117) that is structurally related to other transmembrane receptors. It is expressed in many tissues and cells and binds to stem cell factor [7]—c-kit/stem cell factor is involved in the development of several lineages of stem cells, such as germ cells, neural crest-derived melanocytes and haematopoietic precursor cells [8].

Moreover, c-kit/stem cell factor interaction induces mast cell adhesion to extracellular proteins differentiation, proliferation, migration and survival. It also activates mast cells to secrete its mediators – tumour necrosis factor α, protease, esterase, glycosaminoglycans and phosphogluconate dehydrogenase [9]. Thus, strong membrane reactivity for CD117 identified in mast cells may be useful in the diagnosis of mast cell disorders and to shed a light on the role of mast cells in autoimmune diseases [7].

Little is known about molecular mechanisms affecting mast cell and T lymphocytes function in PV. Therefore, we aimed to explore possible factors controlling mast cells and T-lymphocytes during blister development through assessment of CD44 and CD117 by immunohistochemical methods in order to clarify the role of the infiltrating inflammatory cells in the pathomechanisms of acantholysis in PV. We also evaluated the circulating activity of these cells in the sera of patients with PV, using flow cytometry for CD44-positive peripheral blood lymphocytes and enzyme-linked immunosorbent assay (ELISA) for CD117.

Methods

Patients

We selected 17 patients clinically and histologically proven to be suffering from PV who were attending the outpatient clinic of the Department of Dermatology at Tanta University Hospital; 19 normal healthy individuals were recruited as a control group. All the patients had received no treatment in the previous 5 weeks and they were experiencing an eruption for the first time or an exacerbation due to interrupted regimen of therapy. From each patient, 10 mL of venous blood were withdrawn; 3 mL were centrifuged to separate the serum which was kept frozen for CD117 analysis by ELISA. The remaining 7 mL were put in heparinized tubes to separate peripheral blood lymphocytes, which were then analysed for CD44 monoclonal antibodies by flow cytometry.

A skin biopsy from new blisters and perilesional skin was taken for all patients; 6 of the controls also had a skin biopsy taken.
Immunohistochemistry
Paraffin sections of 4 mm thickness were deparaffinized in xylene and dehydrated in ethanol. The slides were incubated in methanol containing 0.03% hydrogen peroxidase at room temperature for 30 minutes to inactivate endogenous peroxidase and then rinsed in distilled water. The tissue sections were microwaved for antigen retrieval in a plastic Coplin jar filled with 0.01 M citrate buffer in distilled water (pH 6.0). The specimens were then rinsed with tris-buffered saline (TBS) and incubated for 60 minutes at room temperature with monoclonal mouse anti-human phagocyte glycoprotein-1 CD44 (Code No. M 7082). The antibody gives optimal staining when used at a dilution of 1:40-1:80. DAKO Envision System avidin peroxidase (DakoCytomation, Carpinteria, California) was used as the detection system. PAP (BioGenex, San Roman, California) was used as chromogen as well as substrate.

The intensities of the staining obtained with the CD44 were assessed semiquantitatively by comparing the staining intensity of a given blister area with that in the same section or with that at stratum basal and stratum spinosum of the perilesional epidermis, which served as an internal standard. The scale applied ranged from zero (no staining detectable) to 3 (a staining intensity greater than that of the epidermis).

Flow cytometry for CD44 on T cells
Peripheral blood was collected in preservative-free heparin tubes and diluted 1:1 with phosphate buffered saline (PBS). Peripheral blood mononuclear cells (PBMCs) were isolated by Ficoll–Hypaque gradient centrifugation [16]. Then 106 PBMCs were incubated with 10 μL anti-CD3-PE (Becton Dickinson, USA) and 10μL and anti-CD44-FITC (Becton Dickinson) for 30 minutes at 4 °C in the dark. Cells were washed twice with PBS followed by fixation of cells in 0.5 mL 2% paraformaldehyde in PBS. Cells were acquired and analysed using flow cytometry (Becton Dickinson). For a negative control, irrelevant isotype-matched dye conjugated antibodies were used to stain cells. The mononuclear cells were graded according to their typical forward and right-angle light scatter followed by their expression on a dot plot of anti-CD3 versus anti-CD44 fluorescence. The percentage of T cells expressing CD44 antigen was then calculated [11].

ELISA for CD 117
A human CD117 ELISA kit (Diaclone Research, France) was used for the in vitro quantitative determination of soluble stem cell factor receptor molecule (ssCD117) in human serum.

Results
Immunohistochemistry
Skin from the controls exhibited mild intensity especially in basal and intermediate epithelial cell layers (Figure 1). There was positive expression of CD44 in 13 out of 17 (76.5%) patients with PV. Some of the stromal cells and T-lymphocytes were distinctly positive for CD44. PV lesions had a higher positivity of CD44 expression, compared to perilesional and normal skin. The epidermis exhibited variability in CD44 staining as the strongest staining was observed in the lower layers of the blister (Figure 2). The distribution of CD44 staining in the perilesional skin was only slightly increased or resembled that of the normal epidermis (Figure 3).

Of 6 normal control specimens, 3 showed mild positive melanocytes in the basal epidermal layer and it was difficult to
detect mast cells in these normal specimens (Figure 4). There was positive expression of CD117 in 9 of the 17 (52.9 %) patients with PV. Some of the stromal cells and mast cells were positive for CD117. PV lesions had a higher positivity of CD117 expression (Figure 5), compared to perilesional skin. CD117 staining in the perilesional skin is illustrated in (Figure 6).
Flow cytometry (CD44)
There was a significant increase in the percentages of total lymphocytes (CD3) expressing CD44 in the patient group with active PV compared to the control group. The mean in the control group was 8%–15% while in patients with PV it was 12%–23% (Table 1, Figures 7 and 8).

<table>
<thead>
<tr>
<th>Table 1 Percentage of CD44 in peripheral blood CD3 in patients with pemphigus vulgaris and the control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control group</td>
</tr>
<tr>
<td>(n = 19)</td>
</tr>
<tr>
<td>Range</td>
</tr>
<tr>
<td>Mean (SD)</td>
</tr>
<tr>
<td>t = 5.65, P &lt; 0.05</td>
</tr>
</tbody>
</table>

ELISA (CD117)
There was a significant difference between patients and controls (P < 0.5) for expression of CD117 (Table 2).

Discussion
Although there has been wide interest in the role of humoral immunity and autoantibodies in the pathogenesis of PV, the role of the cellular immune system is still unclear.

In the present study, CD44 expression was detected as an intense stain on the cell membrane of epidermal keratinocytes and some lymphocytes in the papillary dermis in active PV lesions. At the same time, nearby skin sections showed moderate positive staining. Normal skin, on the other hand, showed weak to negative staining for CD44. This concurs with Hashimoto et al. who detected positive CD44 acantholycic cells in PV [12]. This overexpression of the cell adhesion molecule CD44 in the epidermis of active PV could be explained by increased proinflammatory cytokines IL-1 alpha and TNF-alpha in an attempt to restore adhesive function between keratinocytes [13,14]. Therefore this finding might be considered a result of acantholysis and not an initiating event in this process [12,14].
Moreover, many authors have demonstrated a predominant expression of CD44 on skin-infiltrating lymphocytes that indicate adhesion to inflamed dermal microvascular endothelial cells as well as keratinocytes, an important prerequisite for the development of cutaneous inflammatory and immunological diseases \[2,15–17\]. This finding was recently supported by the use of CD44 as a marker to evaluate activated T lymphocytes \[15,18\]. The presence and role of activated T lymphocytes in this study is supported by Mashkilleyson et al. who demonstrated the release of IL2 R at the site of blister formation as an indicator for activated T lymphocytes \[19\]. This increased CD44 on lymphocytes infiltrating the skin in active PV could explain the mechanism of lymphocyte activation, with these activated T cells serving as the trigger for a cascade of events that lead to the amplification of the inflammatory process with the resultant tissue damage at target sites \[11,16\].

In our study, there was significant increased percentages of CD44 expressed on total T-lymphocytes by flow cytometry in the peripheral blood of patients with active PV. This is in agreement with other studies demonstrating that CD44 expressing...
cells correlate with autoimmune conditions [11,15]. In addition, Yang et al. reported that assessment of the expression patterns of surface antigen CD44 on peripheral blood T lymphocytes (using monoclonal antibodies directed against surface antigen by flow cytometry) is sensitive, safe, easily repeatable and controllable, and therefore can be considered a promising tool for the diagnosis of autoimmune diseases such as PV [15]. Therefore, it can be regarded more useful as a screening test or follow-up indicator rather than as an early diagnostic tool. Furthermore, indirect clinical evidence also supports the idea that T-cells may be involved in helping autoantibody production in PV [20].

It is a well known fact that mast cells are the key cells in allergic reactions and have a pivotal role in inflammation. However, the role of mast cells in blister formation of PV is still unclear.

The c-kit gene product (CD117), which is known to be expressed on tissue-anchored stromal cells, plays an important role in the development of c-kit bearing cells such as mast cells and melanocytes. In the present study, prominent membranous expression of CD117 in dermal mast cells was detected in active lesions, in contrast to the slight expression in perilesional skin. This finding supports the role of mast cells in blister formation and agrees with Caproni et al. who consistently detected granulocytes and mast cells that showed clear signs of activation in lesional skin of PV [20]. In addition, Kaminke et al. detected significant alterations in mast cell chymase and protease inhibitors in PV, suggesting mast–mast cell involvement in this bullous diseases [21].

Our study demonstrates that c-KIT is significantly elevated in the serum of patients with active PV compared with healthy controls. A similar significant relation between CD117 and disease activity has been detected in other autoimmune diseases such as psoriasis and systemic lupus erythematosus [20,22]. Therefore, assessment of the level of this marker provides valuable information of the probable severity of the condition. Its mechanism of action could be explained on the basis that mast cells contain large amounts of different proteolytic enzymes that can participate in cutaneous inflammation [23]. Moreover, mast cells could be involved in blister formation since elevated tryptic activity is formed in blister fluid of patients with PV [24]. Tryptase can activate single-chain urinary type plasminogen activator (pro-urokinase) which in turn could activate plasminogen to plasmin resulting in acantholysis [14,21]. Tryptases induce and maintain blister formation by continuous activation of collagenolytic metalloproteinases and degradation of fibronectin [14,25].

We conclude that therapeutic regimens targeting CD44 or CD117 might help ameliorate the inflammatory process in active PV. However, all these alterations could reflect general inflammation rather than a specific reaction in PV. Further studies are necessary to define the precise nature of acantholysis and molecular factors controlling mast cells and autoreactive lymphocytes at the genetic level to elucidate the primary event in the pathogenesis of PV with the aim of devising new strategies for better therapeutic intervention.
References


18. Termeer C et al. Targeting dendritic cells with CD44 monoclonal antibodies selectively inhibits the proliferation of naive


إصابات العمل في قطاعات البناء وتشكيل المعادن والصناعات الغذائية في محافظة أريحا/فلسطين

عثمان أحمد الخطيبي، ريم مقادير، رامي حبش، غادة عليان، فداء خفش، سالم جرادية


Work Injuries in building construction, metal shaping, and food production sectors in Jericho District in the Palestinian Territory

ABSTRACT Work injuries and accidents have a considerable impact on public and community health. This study targeted three work sectors: metal shaping, food production and building construction. Work injuries that occurred in these sectors were compared for the years 1999 and 2000 in Jericho District in the West Bank of Palestine. One hundred three injuries were examined and information recorded about the nature of the injury, site of injury in the body, direct cause of injury and some personal information about the injured worker. The most vulnerable group were young people in their twenties, and mostly those working in the metal shaping and building construction sectors. The kinds and sites of injuries varied. The data were compared with data from 1997, 1998 and 2001–2003, although only loosely as the available data about work injuries for these years were limited and inaccurate.

Accidents du travail dans les secteurs du bâtiment, du profilage des métaux et de la production alimentaire à Jéricho (Palestine)


A. Al-Khatib, R. Maqadari, R. Habash, G. Aliyan, F. Khofash and S. Grayesh.
Institute of Community and Public Health, Birzeit University, Palestine. (correspondence to A. Al-Khatib: ikhatib@birzeit.edu).
Received: 29/04/04; accepted: 30/03/05
المقدمة

بعد موافقة إصابات العمل من الموضوعات الهامة التي يجب التركيز عليها ودراسةها، ومحاولة التقليص من حدوثها، لاسيما وأن تعاليم الإسلام هي المرشد الأول في الدعوة إلى تزامن أسباب الأمن والسلامة في كل شيء، ولا بد أن وعلى ذلك من قوة تعالن بمحفظة كفاءة ويليق بأي điềuيات إلى المهن [7].

وإصابات العمل هي كل ما يقع نتيجة لشيء غير متوقع، أو غير مخطط له مسبقًا، يؤدي إلى الإضرار بالإنسان بالنسبة للدراسة الأولى، والموضوع والأجهزة الناتجة، سواءً كان ذلك بسبب العامل، أو فيه الحشرة، أو عدم مراجعة القوانين والأنظمة والتعليمات المتعلقة بالوقاية والسلامة المهنية في أماكن العمل [2-4]. وقد وجد أن نسبة إصابات العمل ترتيب طففاً من قبل الجزء، وتراجعت عند العمال الموظفيون توقفًا مؤقتًا، وعند العمال غير المهرة، بالإضافة إلى أن الممارسات المرتبطة بالعمر، وخاصة عند المراهقين، كانوا بعد أداء العمل [5].

أما أسباب إصابات العمل، فتختلف من حيث تبطيبها، وأسبابها تبدأ لظروف حدنها، والواعي المختلفة التي أدت إليها، ويمكن القول بأنه لا يوجد قاعدة ثابتة لتعريف كيفية وقوع الحوادث، إلا أن أغلب الحوادث التي تقع تعود من الالتباس [6].

وتحت إصابات العمل بشكل متكرر. في معظم بلدان العالم، وبعد قضاء أبناء من الظروف التي تكثر فيها حوادث العمل، وخاصة السقوط، حيث تعتبر السلامة، والسقوط، وضيق الوضوح أكثر الأسباب خطورة على العمال [7, 8]. فعلى سبيل المثال تكون في سنودة الذين يتعرضون لإصابات العمال الإجمالي خلال العام 1999 هو 288 مقارنة بالعام 1998 كان عدد الإصابات 298 [9].

ووجد في بعض الدول جهود إيجابية عن حوادث العمل، بعض هذه النماذج يتمثل في مكان وقود الحادث، واسم المنشأة، وتاريخ وقود الحادث، وعسايحة حدوثه، ونوع الحادث (إجهاض، اصطدام، إلخ)، وعدد العمال المصليين وأعمالهم، ونوع الإصابة (حرق، جروح، إصابة، إلخ)، ووجود المباني وظروفها [10].

وهناك أمور رئيسية يمكن تطبيقاتها في القطاعات كافة، وفي جميع مواقع العمل، للوقاية من وقود الحوادث، وتقليدها، والخدم منها. وتمثل في وجود مؤسسات في الصحة والسلامة المهنية في الموقع. كما أن نمو الخلل في بيئة العمل يعد من الأمور الأساسية التي تقلل من إصابات العمل. ويدعو إجراء الفحص البدني الصحي، والفحص الصحي، والفحص البدني، والفحص البدني، والفحص البدني، والفحص البدني، والفحص البدني [11-12]. كما يعد التدريب على أداء العمل، واستعمال المعدات، والأدوات المكلفة، والتشخيص والتخطيط على الزمر بشكل طريقة للوقاية، وبدون اهتمام أصحاب العمل، تتوفر أسس الصحة والسلامة المهنية ومتطلباتها في مكان العمل [13].

أما بالنسبة للوقاية الفلسطيني، فمن المستحيل القضاء على إصابات العمل في الفلسطيني، يتم إنشاء وزارة العمل، التي قامت بتشكيل الإدارة العامة للصحة والسلامة المهنية. كذلك تم الاتحاد العام لفيدات عمال فلسطين بتشكيل دائرة مركزية، وعدد دائرة فرعية للصحة والسلامة المهنية في جميع المحافظات، وفق ذلك لا يزال وضع دون المستوى المطلوب، نتيجة لقلة أو عدم اهتمام أصحاب العمل، لتتوفر أسس الصحة والسلامة المهنية ومتطلباتها في مكان العمل [10].

وتشمل المصادر التي يمكن أن تتعارض هذه التصور الأساسي في عملية الإنتاج وإنسان، مما يؤدي إلى خلل في الطاقة الإنتاجية، ونظراً لأن سلامة الطاقة الإنتاجية هي متزامن اقتصاد الوطن، فإن أهمية دراسة هذا الموضوع وحصة الدراسة ضمن ثلاثة قطاعات هي: قطاع البنية، وقطاع تشغل الموارد، وقطاع الصنايعات الغذائية، وذلك لتوافر المعلومات حول هذه القطاعات، ويفيد التعرف على أسباب الحوادث وإصابات العمل التي تحدث في هذه القطاعات، ويعزز من نتائج وتحفيزت يمكن أن تدعم في التقلص من حدوث إصابات العمل، فضلًا عن أنه يمكن الاستفادة من النتائج في الاعداد للخطط والبرامج الوقائية والاجتماعية المختلفة [18].
المهجة

تم اختيار العامين 1999 و2000 لإجراء الدراسة. وشملت العينة جميع إصابات العمل التي حصلت في هذه العامين.

وقد تم تجميع المعلومات حول هذه الإصابات من مكتب وزارة العمل وتقاريرها في رام الله للعامين 1999 و2000.

وهي تمثل جميع إصابات العمل التي حصلت في محافظة أريحا، التي أبلغت وزارة العمل بها. علماً بأن هذه المعلومات موجودة على نماذج خاصة بتشكيل إصابات العمل. تم الوصول إلى هذه البنية بعد التسديق بإدارة العامة للسلامة والصحة المهنية في وزارة العمل. جمعت المعلومات على نماذج خاص، ثم إعدادها لهذا الهدف، وشملت المعلومات التي جمعت الملاحظات التالية: الرقم السلبي، والسنة التي حصلت فيها الإصابات، والشهر الذي تم فيه التحقق في الإصابة، وعمر العامل المصاب، وجنسيته، وقطاع العمال، ووظيفة المصاب، وأي نوع الإصابة، وموقع الإصابة في الجسم، وطبيعة الإصابة، والسبب المباشر للإصابة.


أدخلت جميع التغييرات والملاحظات الخاصة بالعامين 1999 و2000 إلى برنامج SPSS الإحصائي، وتم عمل عدة تقاطعات جدولية (cross tabulations) لمعرفة توزيع الإصابات حسب الجنس، وقطاع العمل، ووضعية الإصابة، في الجسم، وطبيعة الإصابة، والسبب المباشر لها.

ثم إجراء تحليلات إحصائية أخرى (Fisher's exact test) لإجراء اختبارات صحة الفرضية، ومقابلة ما إذا كانت هناك علاقات ذات دلالة إحصائية بين بعض المتغيرات.

سمات المدراسة:

- وجد العديد من محددات الدراسة أثناء جمع المعلومات أهمها:
  - عدم الانتماء بنمذج واحد لجميع المعلومات حول إصابات العمل في وزارة العمل ومكانها.
  - عدم كتابة المعلومات الواردة في التقرير، لإعطاء صورة واضحة حول الحالة.
  - كون التقارير والإحصائيات الموجودة في وزارة العمل ومكانتها في المناطق لا تعكس العدد الحقيقي للإصابات.
  - وجود تباين في تغطية الإصابات خلال السنة الواحدة وخلال السنين المختلفة.
  - عدم وجود تحسين بين وزارة العمل والصحة والمؤسسات الأخرى التي تبحث في المجال نفسه.
  - عدم متابعة العمال الذين صمموا أو الظروف الصحية المهمة التي تم تقييمها، بعد زيارة موظف وزارة العمل لموقع العمل، وعدم وجود نماذج متابعة.
  - المراجعه التي يتم اعتمادها جمع المعلومات حول الإصابة غير موحد، وغير موثقة (صاحب العمل، العامل نفسه، العمال الآخرون، الخ).
المستلزمات المرتبطة في بعض التقارير غير واضحة، وأحياناً غير كافية، وترويج عملية البحث واستخلاص النتائج.

- تباعد الفئة بين وقوع الحادثة أو الإصابة والتحقيق فيها.
- عدم وجود تفتيش أو تواصل بين أصحاب العمل ومكاتب العمل في المناطق$path:123
- تلميح عن الحادثة إلا إذا قام موظف وزارة العمل بإبراء الوقف، أو قام العامل نفسه بالتلميح عن الحادث.

نتيجة علاج بعينه وصاحب العمل.

النتائج:


أظهرت النتائج الخاصة بالعامين 2000 و2001 هناك تقارباً كبيراً بين تراقي تشكيل المعدات، وقطاعات البناء في عدد الإصابات، مقترنة بقطاع الصناعات الغذائية في الدراسة، كما هو واضح في الجدول رقم 1. وهذا يتفق مع العديد من الدراسات، فقد وجد أن نسبة حوادث الوفاة في قطاع البناء في تركيا 2.6 ضعف حوادث الوفاة في قطاعات الانتاج [26].

كما بيتبت الدراسة أن كانت حساباً على الطرق العملية (البيضاء والدوسين)، 30 حساباً كانت إضافتهم في الأطراف السفلية (القدمين والساقين)، و24 حساباً أصيبوا في منطقة الرأس والرقبة، و11 حساباً أصيبوا في منطقة الجسم (البطن والظهر والصدر). وكان هناك حالة وفاة واحدة (الشكل رقم 1).

وحص دراسة توزع الإصابات حسب طبيعة الإصابة نرى أن 47 حساباً أصيبوا برضوض، و23 حساباً أصيبوا بمحروج، و21 حساباً أصيبوا بكسور، و13 حساباً أصيبوا بجروح، و5 حساباً أصيبوا بالهول، و5 حساباً أصيبوا بالسمن، وكان هناك حالة وفاة واحدة، كما هو واضح في الجدول رقم 1.

كَما بين البحث أن من بين 38 إصابة كان هناك 21 حساباً (21.4%) أصيبوا نتيجة سوء استخدام الآلة، و23 حساباً (23.5%) أصيبوا نتيجة السقوط، و22 حساباً (22.5%) أصيبوا نتيجة إعمال المعدات، 19 حساباً (19.4%) أصيبوا نتيجة عطل في الآلة، و8 حساباً (8.2%) أصيبوا بثأر أمور أخرى يتحكم فيها خليط الخارجي، وكان هناك حساب أخر (الشكل رقم 4).

من خلال الجدول رقم 4، باستخدام اختبار الدقة التنبؤي لـ>Fisher’s exact test< (p-value)، يوجد عدد علاقة إحصائية ذات أهمية بين السبب المباشر للإصابة والغلاف العصبي لفؤال العام، إذا ما معطى الحالات تقع في المنظمة الصناعية الكافية، 40% 20 عامًا، ونسبة العنف السربية تشكل نسبة أخر بين الصناع.

أما الجدول رقم 2، فهو يوضح أن عدد الإصابات، وهو 10 إصابات، كان نتيجةً على سوء استخدام الآلة، وذلك ضمن قطاع تشكيك الحادث، وهذا العدد من الإصابات ينقر أيضاً في الإصابات الناشئة عن السقوط في قطاع البناء، كما تلاحظ وجود 9 إصابات نتيجةً عن إعمال العمليات في قطاع تشكيك الحادث. أما لعنة توزوّع نسبة القوى العامة في قطاع التعدين والمخازن والصناعات التحويلية هو 18.1% في عام 1999، و14.3% في عام 1999، و32% في عام 2000، بينما كانت نسبة القوى العامة في قطاع البناء والمنشآت 20.4% في عام 1999، و20.4% في عام 2000، كما هو واضح في الجدول رقم 5.
الجدول رقم (1): عدد إصابات العمل الإنجازية والنسبة المئوية لها (%)
ونوع إصابة العمل في الأعوام 1996-2003

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>طفيفة</td>
<td>2</td>
<td>4</td>
<td>8</td>
<td>33</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>(7.8)</td>
<td>(30.8)</td>
<td>(16.6)</td>
<td>(50.8)</td>
<td>-</td>
<td>(81.3)</td>
</tr>
<tr>
<td>متواصلة</td>
<td>11</td>
<td>7</td>
<td>14</td>
<td>26</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(42.2)</td>
<td>(53.8)</td>
<td>(29.2)</td>
<td>(40.0)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>بلزمة</td>
<td>13</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>(50.0)</td>
<td>(16.6)</td>
<td>(4.2)</td>
<td>(9.2)</td>
<td>(50.0)</td>
<td>(18.7)</td>
</tr>
<tr>
<td>وقعة</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(15.4)</td>
<td>(2.1)</td>
<td>(2.1)</td>
<td>-</td>
<td>(50.0)</td>
<td>-</td>
</tr>
<tr>
<td>غير محدد</td>
<td>-</td>
<td>-</td>
<td>23</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(47.9)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>المجموع</td>
<td>26</td>
<td>13</td>
<td>48</td>
<td>65</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>(100.0)</td>
<td>(100.0)</td>
<td>(100.0)</td>
<td>(100.0)</td>
<td>(100.0)</td>
<td>(100.0)</td>
</tr>
</tbody>
</table>


الجدول رقم (2): العلاقة بين السبب المباشر للإصابة وقطاع العمل للعامين 1999 و2000

<table>
<thead>
<tr>
<th></th>
<th>المجموع</th>
<th>السبب المباشر للإصابة (التكرار والنسبة المئوية، %)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>عدم اتباع التعليمات</td>
</tr>
<tr>
<td></td>
<td></td>
<td>شرب مياه ملوثة</td>
</tr>
<tr>
<td></td>
<td></td>
<td>السقوط</td>
</tr>
<tr>
<td></td>
<td></td>
<td>استخدام الة</td>
</tr>
<tr>
<td></td>
<td></td>
<td>تشلكل</td>
</tr>
<tr>
<td></td>
<td></td>
<td>العداة</td>
</tr>
<tr>
<td></td>
<td></td>
<td>البناء</td>
</tr>
<tr>
<td></td>
<td></td>
<td>الصناعات الغذائية</td>
</tr>
<tr>
<td></td>
<td></td>
<td>أخرى</td>
</tr>
<tr>
<td></td>
<td></td>
<td>المجموع</td>
</tr>
<tr>
<td></td>
<td></td>
<td>34 (31.2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30 (27.5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11 (10.1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>109 (100.0)</td>
</tr>
</tbody>
</table>
الجدول رقم (3): العلاقة بين السبب المباشر للإصابة وطبيعة الإصابة للعامين 1999 و 2000

<table>
<thead>
<tr>
<th>المجموعة</th>
<th>السبب المباشر للإصابة (نسبة المئوية)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>غير معروف</td>
</tr>
<tr>
<td></td>
<td>الرأس والرقبة</td>
</tr>
<tr>
<td></td>
<td>الجلد</td>
</tr>
<tr>
<td></td>
<td>الأطراف</td>
</tr>
<tr>
<td></td>
<td>الاحتكار والتعرض النفيسي (%)</td>
</tr>
<tr>
<td></td>
<td>الرقة</td>
</tr>
<tr>
<td></td>
<td>الموت</td>
</tr>
<tr>
<td>كسر</td>
<td>21 (19.1)</td>
</tr>
<tr>
<td>حرق</td>
<td>13 (11.8)</td>
</tr>
<tr>
<td>رضوض الإصابة</td>
<td>47 (42.7)</td>
</tr>
<tr>
<td>جروح</td>
<td>23 (20.9)</td>
</tr>
<tr>
<td>نسمم</td>
<td>6 (4.5)</td>
</tr>
<tr>
<td>وفاة</td>
<td>1 (0.9)</td>
</tr>
<tr>
<td>المجموع</td>
<td>110 (100.0)</td>
</tr>
</tbody>
</table>

المجلة الصحية لشرق المتوسط; منظمة الصحة العالمية; المجلد الحادي عشر; العدد 5-6، 2005.
### الجدول رقم (4): العلاقة بين السبب المباشر للإصابة والفتنة العمرية لعامين 1999 و 2000

<table>
<thead>
<tr>
<th>الجموع</th>
<th>السبب المباشر للإصابة (التكرار والنسب المتوقعة (٪))</th>
<th>شرب مياه ملوثة</th>
<th>السقوط</th>
<th>استخدام الآلات</th>
<th>عدم اتباع التعليمات</th>
<th>خلل في الآلة</th>
<th>أخرى</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 (7.1)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1 (4.3)</td>
<td>1 (4.8)</td>
<td>-</td>
<td>5 (22.7)</td>
</tr>
<tr>
<td>61 (62.2)</td>
<td>12 (54.5)</td>
<td>11 (57.9)</td>
<td>5 (100.0)</td>
<td>13 (56.5)</td>
<td>-</td>
<td>-</td>
<td>5 (40.5)</td>
</tr>
<tr>
<td>24 (24.5)</td>
<td>7 (18.2)</td>
<td>7 (36.8)</td>
<td>-</td>
<td>7 (30.4)</td>
<td>5 (23.8)</td>
<td>-</td>
<td>4 (12.5)</td>
</tr>
<tr>
<td>6 (6.1)</td>
<td>1 (25.0)</td>
<td>1 (5.3)</td>
<td>1</td>
<td>2 (8.7)</td>
<td>-</td>
<td>-</td>
<td>2 (41.6)</td>
</tr>
<tr>
<td>98 (100.0)</td>
<td>8 (100.0)</td>
<td>22 (100.0)</td>
<td>19 (100.0)</td>
<td>5 (100.0)</td>
<td>23 (100.0)</td>
<td>21 (100.0)</td>
<td></td>
</tr>
</tbody>
</table>

### الجدول رقم (5): التوزيع السني للقرى العاملة من محافظات أرخبيل وبيت لحم حسب النشاط الاقتصادي

<table>
<thead>
<tr>
<th>العام</th>
<th>الزراعة والصيد والحراجة وصيد الأسماك</th>
<th>التغذية والمناجز والصناعة التحويلية</th>
<th>البناء والتشييد</th>
<th>التجارة والقطاع والتنافس</th>
<th>النقل والاتصالات</th>
<th>الخدمات والنشاط الأخرى</th>
<th>المجموع</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>13.8</td>
<td>16.7</td>
<td>16.3</td>
<td>14.3</td>
<td>18.8</td>
<td>18.8</td>
<td>100</td>
</tr>
<tr>
<td>2002</td>
<td>14.8</td>
<td>14.0</td>
<td>14.0</td>
<td>16.7</td>
<td>18.3</td>
<td>18.8</td>
<td>100</td>
</tr>
<tr>
<td>2001</td>
<td>12.4</td>
<td>20.5</td>
<td>19.7</td>
<td>14.3</td>
<td>18.8</td>
<td>18.8</td>
<td>100</td>
</tr>
<tr>
<td>2000</td>
<td>13.6</td>
<td>12.3</td>
<td>14.2</td>
<td>12.9</td>
<td>18.3</td>
<td>18.8</td>
<td>100</td>
</tr>
<tr>
<td>1999</td>
<td>16.0</td>
<td>14.6</td>
<td>14.2</td>
<td>12.9</td>
<td>18.3</td>
<td>18.8</td>
<td>100</td>
</tr>
<tr>
<td>1998</td>
<td>14.0</td>
<td>16.4</td>
<td>14.1</td>
<td>12.9</td>
<td>18.3</td>
<td>18.8</td>
<td>100</td>
</tr>
<tr>
<td>1997</td>
<td>16.7</td>
<td>14.3</td>
<td>14.3</td>
<td>12.9</td>
<td>18.3</td>
<td>18.8</td>
<td>100</td>
</tr>
<tr>
<td>1996</td>
<td>14.3</td>
<td>18.3</td>
<td>14.2</td>
<td>12.9</td>
<td>18.8</td>
<td>18.8</td>
<td>100</td>
</tr>
</tbody>
</table>

المعلومات الخاصة بهذا الجدول تشمل المزاعم الفردية ونشاطات عامة، ومن المحافظة أرخبيل وبيت لحم فقط.

المجلة الصحية الشرق المتوسط، منظمة الصحة العالمية، مجلد الحادي عشر، العدد 5-6: 1000
ظهرت الدراسة أن أكبر حوادث السقوط قد تسببت في الإصابة بالر zus لدى العمل، وهي 14 حادثة، تليها الحوادث الناتجة عن سوء استخدام الآلة، وهي 12 حادثة، وتبست في الحوادث بالجروح، أما الحوادث التي تجنبت عن إعمال التماسات، وهي 10 حوادث، فتسببت في الإصابة بالر zus أيضًا، كما هو واضح في الجدول رقم 3.

المقدمة وتحليل النتائج

قدمت خلال عقود من اثرت علاقات كبيرة ومتروفة منذ قدمت السلطة الفلسطينية إلى الضفة الغربية، إذ كان الشعب الفلسطيني ضحيةًا من أبسط الحقوق، وكان التبقي إنشاءًا مصنعًا أو أي بناء آخر صعبًا، ويستغرق عدة سنوات لכניסتها على أخذ، وفي الأغلب يتم رفعه من قبل سلطات الاحتلال. ومع بداية الاندماج الاقتصادي والصحي في الضفة الغربية وقطاع غزة مع بداية العام 1996، انسحع نطاق العمل، ورد عدد العمال في القطاعات المختلفة. ومع توقيع وزارة العمل الفلسطينية مهارها، وتأسس الإدارة العامة للصحة والصحة المهنية، ودنج نوع من الاعتدامات والعمال إما أن لا يكون دون المستوى المطلوب، فسما بلغ عدد إصابات العمل في محافظة أريحا 16 إصابة في العام 1996، وم تي رصد أية إصابة عمل في العام 1997، بينما انخفض عدد إصابات العمل إلى 4 إصابات في العام 1998، وهذا العدد لا يمكن أن يكون دقيقًا، كما أنه مؤسس قوي على وجود خلل في عدد إصابات العمل.

أما في العامين 1999 و 2000، فقد وصل عدد إصابات العمل التي تم ترسخًا إلى 6148، وراح وحدة في عدد إصابات العمل بعد هذين العامين، وذلك لقدم عددًا طاقم وزارة العمل على مدار عدد من جهة، وتوفر العديد من المشروعات العمرانية والصناعية عن العمل من جهة أخرى. وقد أدى ذلك لعدم وجود استقرار سياسي واقتصاد في محافظة أريحا وقيمة إجماليات الضفة الغربية وقطاع غزة.

ومن خلال تحليل نتائج الدراسة الخاصة بالعامين 1999 و 2000، يمكن ملاحظة وجود علاقة بين كل من العمر، وقطاع العمل، ووظيفة الإصابة من جهة، وبين السبب المباصر للإصابة من جهة أخرى، ويمكن أن نستنتج أن أكثر اللفات المعرضة لإصابات العمل هي:

1. فئة الشباب:

بالرجوع إلى الجدول رقم 4، نجد أن فئة الشباب من 19-29 سنة هي أكثر اللفات العمرية تعرضًا للإصابات، وقد يشرح ذلك إلى:

- أن معظم العمال هم أصوات من هذه الفئة العمرية.
- أن العمال في هذه الفئة يبدأون العمل ويتكون خبرتهم أقل من هم أكثر من سنًا، فهم أكثر عرضة للإصابات. من هنا تطور الحاجة للنظام لتدريب العمل، وإعدادهم لتعليم هذه الأعمال على نحو وازع، خاصة وأن التدريب والتحقيق بينهم من أهم العوامل التي تهم إلى حد كبير في ضبط نسبة إصابات العمل بين فئة الشباب.
- أن هذه الفئة من العمال تزول إليها المهام الأكثر، وبالتالي فهم أكثر عرضة للإصابة.

2. العاملون في قطاعي تشكيل المعادن والبناء:

بين الدراسة (الجداول رقم 2) أن أكثر الإصابات تقع في قطاعي تشكيل المعادن والبناء، حيث بلغت نسبة إصابات العمل في هذه القطاعين 58.7% من إجمالي الإصابات، بينما بلغت نسبة الفرق الواحدة في هذه القطاعين 36.5% في عام 1999 و46.3% في عام 2000 (الجدول رقم 5)، وقد يعود ذلك إلى بعض خصائص العمل في هذين القطاعين وأهم ما يلي:

المجلة الصحية لشرق المتوسط، منظمة الصحة العالمية، المجلد الحادي عشر، العددان 5–6، 2005.
لا يوجد نص يمكن قراءته بشكل طبيعي من الصورة المقدمة.
كما هو الحال في دول أخرى، حيث تكون هذه الممارسات متوفرة في كل التقارير السنوية التي يجب أن تكون وسيلة للتعليم ولاستمتاع، والخروج بصورة واضحة لما يمكن عمله في المستقبل وليس فقط لمعرفة الأرقام.

كما نستند نسبيًا هذه الدراسة على أن هناك أهمية كبيرة لوجود نظام لتنبؤ على الحوادث، وتنظيم الآليات، إذ إن النتائج في الإحصاء كان يتم بعد فترة قد تكون طويلة بعد وقوع الحادث، مما يؤدي إلى حدوث مضاعفات تضر بصحة العام.

كذلك فإنه من الضروري وجود تعاون بين جميع الفئات ذات العلاقة بالصحة والسلامة المهنية، مثل المنشفي للسلامة المهنية في وزارة العمل، ومعهد البيئة الرئيسي والفرعيين، ومع ضرورة أن تكون الاحتياجات الخاصة بالسلامة من ضرورة عقد، مع أهمية توزيع جميع الأعمال بتعاون المطلوبين، وتدريبهم عليها، وتعين خبير للسلامة المهنية في المؤسسات الصناعية الكبرى، وخاصة مصانع التعليم وورش البناء.

ومن الضروري أيضاً الارتقاء بإعداد إصابات العمل، عن طريق سجل موافقات المواقف المذكورة أن المواقف الإدارية في المستقبل، وصرفاتهم نحو المخاطر، وحوادث العمل التي تحدث في مؤسساتهم، خاصة وأن إصابات العمل تعلق تعطلا

للإمبراطورية والخاضطة للمؤسسات. إن دور المريض في عمل إصابات العمل يمكن وصفه بأنه حاسم، إذ إن المريض التقييمي غالباً ما يستبين وقوع إصابات العمل في القطاع الذي يشرفون عليه. وهذا التفكير يجعلهم يحملون وضع خطط استراتيجية، وتعين مرشحات للإصابات العمل، ولذلك فإن إعادة مدير المريض مادحة تعليمية

تعزز السلامة المهنية في جميع العمل أثناء دراستهم الجامعي، بعكس من الأمور الهمية التي تؤدي إلى صدفة تفكيرهم، إذ إن الاهتمام الكبير، والمعرفة بهذه المواضيع أثناء الدراسة الجامعية، يمكن أن يمنع إصابات عمل مأساوية عندما يصبح الطلاب مديرين، وهذا يتفق مع ما توصل إليه عدد من الباحثين [20-22].

المراجع

1. القروي، سورة القدر، الإثنا عشرة.
2. الشكرجي، محمود (1965)، الهندسة الإدارية.
3. منشورات وزارة، الطبعة الأولى، سوق.
4. الله، طارق علي (1994)، العلاج مع الحرائق، الدورة التدريبية لتكوين عمل في المملكة الأردنية المحايدة، عدد، 5-10 حرف.
5. جملي، حكيم (1983)، السلامة في العمل، منشورات وزارة الثقافة والأعلام، الجمهورية العراقية، دار الوصف للنشر.


13. النجار، طارق علي (1994) السلامة في قطاع الإنشاءات. الدورة التدريبية المفتشي العمل في المملكة الأردنية الأهلية، عمان 5-10 مارس.


23. الجهاز الرئيسي للإحصاء الفلسطيني، التقارير السنوية لمسح القوى العاملة، من العام 1996 إلى العام 2003.
Specificity and sensitivity of clinical diagnosis for chronic pneumonia

M. Avijgan¹,²

¹Department of Infectious Diseases, Isfahan University of Medical Sciences, Isfahan, Islamic Republic of Iran (Correspondence to M. Avijgan: avijgan@yahoo.com).
²Shahr-e-Kord University of Medical Sciences, Shahr-e-Kord, Islamic Republic of Iran.

ABSTRACT To compare clinical (non-invasive) diagnosis with bronchoscopic (invasive) diagnosis, a total of 50 patients with chronic pneumonia (sputum smear-negative for tuberculosis) were examined. Age range was 12–82 years. Sensitivity of clinical diagnosis was 100% for tuberculosis and 81.8% for lung cancer; specificity was 67.5% for tuberculosis and 89.7% for lung cancer. Clinical diagnosis was correct in 43.4% of cases suspected of tuberculosis and 69.2% of cases suspected of lung cancer. It may be reliable only for elderly women smokers. Because tuberculosis is over-diagnosed in endemic areas, bronchoscopy is strongly recommended for all cases of chronic pneumonia.

Spécificité et sensibilité du diagnostic clinique pour la pneumonie chronique

RÉSUMÉ Afin de comparer le diagnostic clinique (non invasif) avec le diagnostic bronchoscopique (invasif), un effectif total de 50 patients souffrant de pneumonie chronique (frottis d’expectoration négatif pour la tuberculose) a été examiné. L’âge des patients était compris entre 12 et 82 ans. La sensibilité du diagnostic clinique était de 100% pour la tuberculose et 81.8% pour le cancer du poumon; la spécificité était de 67.5% pour la tuberculose et de 89.7% pour le cancer du poumon. Le diagnostic clinique était correct dans 43.4% des cas suspects de tuberculose et dans 69.2% des cas suspects de cancer du poumon. Il peut être fiable uniquement pour les femmes âgées qui fument. Étant donné que la tuberculose est surdiagnostiquée dans les zones d’endémie, la bronchoscopie est fortement recommandée pour tous les cas de pneumonie chronique.
Introduction

Diagnosis of pneumonia is predominantly a clinical diagnosis. Signs and symptoms of lower respiratory tract infection are, however, not unique to pneumonia [7]. Pneumonia that fails to resolve at the expected rate, e.g. when the radiograph has failed to resolve by 50% in 2 weeks, or completely in 4 weeks [2,3], or does not show significant radiographic resolution after at least 10 days of antibiotic therapy [4,5], is considered to be chronic pneumonia [3–5], a diagnosis which to many clinicians conjures up an association with underlying neoplasm or less common pathogens [6].

The cause of non-resolving pneumonias may be non-infectious or infectious and usually invasive diagnostic techniques are required for confirmation [7,8]. It remains controversial to decide when to initiate an invasive diagnostic work-up for chronic infiltrates [9]. When clinical improvement has not occurred and chest radiographs remain unchanged or worsen, or in a situation with patients who are clinically stable or improving when the rate of radiographic resolution is delayed, then a more aggressive approach is warranted [9].

Fibreoptic bronchoscopy (FOB), which has minimal morbidity, is the preferred initial invasive method [7] and as the first step in the evaluation of non-resolving pneumonias after an appropriate period of observation [4,10–12].

In some conditions there is a long time between the initial and final diagnosis of chronic pneumonia, which usually occurs after failure of treatment for tuberculosis or lung cancer. Because many chronic pneumonia patients are treated by general practitioners in the absence of a diagnosis, it is important that they have knowledge of the sensitivity and specificity of clinical diagnosis for chronic pneumonia as they are the ones who generally make the primary diagnosis.

In reality, very little is known regarding the sensitivity and specificity of clinical diagnosis. In other words, how sensitive and specific is this method of diagnosis? Is it reliable? When should an invasive method of diagnosis be requested? These questions need to be answered. It is important that the reliability of the non-invasive method is assessed, particularly for tuberculosis. Additionally, it has been recommended that FOB be performed early in heavy smokers and patients > 50 years of age with slow or non-resolving pneumonia [5]. The aim of this study was, therefore, to compare the primary or clinical diagnosis with final diagnosis done by FOB and to find out how well matched they were.

Methods

This study was conducted in the infectious and tropical diseases clinic and ward of Al-Zahra Hospital, which is affiliated to Isfahan University of Medical Sciences, with the cooperation of the pulmonology, radiology and pathology departments. Al-Zahra Hospital is a specialty and sub-specialty hospital which is equipped with the latest modern facilities. An evaluation study was carried out from January 2004 to June 2004 on 50 patients who were examined using FOB because of non-resolving pneumonia.

Many patients treated in private clinics of our infectious diseases clinic with acute presentation of pneumonia failed to respond to treatment. They were then referred by their physicians to the pulmonology unit for bronchoscopy.

Inclusion criteria for this study were: non-resolved signs and symptoms (cough or sputum) despite at least 10 days antibiotic therapy against community acquired
pneumonia [3–5]; lung infiltration in chest X-ray for at least 2 weeks (indicated in 2 chest X-rays); and negative sputum smear for tuberculosis.

There were many patients with acute presentation of pneumonia such as fever, cough, sputum and lobar or segmental infiltration of the chest X-ray who had been diagnosed and treated as acute community acquired pneumonia. The usual treatment regimen was ceftriaxon 1 g every 12 hours for 10 days plus erythromycin 400 mg every 6 hours for 10 days. Patients who showed no clinical response (continuous fever, sputum and cough) were re-evaluated. At this stage any patients having the first criteria were sent for a second chest X-ray (second criteria) and they were also referred to the reference laboratory for tuberculosis in Isfahan to exclude tuberculosis by sputum smear (× 3) (third criteria).

The exclusion criteria were: patients with definitive diagnosis; testing positive for human immunodeficiency virus (HIV); patients without previous chest X-rays (at least 2 X-rays are needed to confirm chronic pneumonia); patients with previous bronchoscopy; and patients who did not have a complete history taken and had not had a physical examination.

We selected 50 patients consecutively during the period January 2004–June 2004 who had been diagnosed with chronic pneumonia and who met the inclusion and exclusion criteria. There were about 70 patients who did not meet the criteria, mainly not showing lung infiltration in 2 chest X-rays. All of the patients who were selected for the study were informed and completed a consent form. There were no refusals to participate.

The data collected included information obtained from the patient, demographic characteristics, chief complaints, course and duration of symptoms, history of smoking (packs per year), previous underlying disease, previous therapy and management recorded on the base of declarations of patients. Data regarding clinical diagnosis (non-invasive method) was based on the first diagnosis of the infectious diseases specialist (history taking, physical examination). The findings of chest X-ray (postero-anterior and lateral) were recorded from the radiologist’s report.

All patients had 3 negative sputum smears for acid-fast bacilli. The clinical diagnosis (non-invasive method) was based on the first diagnosis of an infectious diseases specialist (history taking, physical examination), report and suggestion of a radiologist for 2 chest X-rays. In this step, according to this diagnosis, all patients were classified as: tuberculosis, lung cancer or others (bronchectasia, chronic bronchitis, aspiration pneumonia and non-specific diagnosis).

All patients were then examined by FOB for a definitive diagnosis. In this study, FOB diagnosis (invasive method), which was conducted by a pulmonologist in the pulmonology unit of the hospital, was the gold standard. It included all procedures done by FOB: bronchial washing, bronchial biopsy, bronchial brushing, bronchoalveolar lavage and transbronchial biopsy. The samples obtained by FOB were sent to the hospital laboratory for cytological analysis and to the reference laboratory for tuberculosis in Isfahan for direct smear and culture for acid-fast bacilli.

All acid-fast bacilli sputum smears or cultures positive in the bronchoalveolar lavage procedure were classified as having tuberculosis. Patients with positive findings indicating cancer (cytology) in bronchoalveolar lavage were classified as having lung cancer.

Patients were divided into 2 groups by history of smoking: non-smokers or light
smokers (≤ 40 packs per year) and heavy smokers (> 40 packs per year) [5].

Statistical analysis was performed using the binominal test to compare data for each method of diagnosis. The chi-squared test was used to compare the results of sex difference and type of smoking and also Fisher’s exact test to compare the results for age group (≤ 50 years and > 50 years) using SPSS, version 11. The level of significance was \( P < 0.05 \).

**Results**

The study sample included 23 males and 27 females (male to female ratio 0.85:1) (Table 1). In terms of age, 78% were > 50 years and 8% were ≤ 30 years. Mean (standard deviation) age was 57 (20.1) years for men and 66 (15.4) years for women.

The main clinical diagnoses for these patients with chronic pneumonia were tuberculosis (23 patients) and lung cancer (13 patients) (Table 2).

Of the 23 patients who had a clinical diagnosis of tuberculosis, only 10 were confirmed by FOB (Table 3). Clinical diagnosis of not having tuberculosis was the same. Only 9 of the 13 patients clinically diagnosed with lung cancer were confirmed by FOB (Table 4). Two of those diagnosed as not having lung cancer were eventually diagnosed with the disease and were added to lung cancer category but they are not in the group diagnosed by clinical diagnosis.

So in 23 out of 50 patients, positive diagnosis of using the non-invasive method was as the same as for the invasive method of diagnosis. The binominal test indicated a highly significant difference between the invasive and the non-invasive methods of diagnosis, indicating that the non-invasive method was not a reliable method for cases of chronic pneumonia (\( P < 0.001 \) (Table 2).

The sensitivity of clinical diagnosis for tuberculosis was 100% but specificity was 67.5% (Table 3). The sensitivity of clinical diagnosis for lung cancer was 81.8% but specificity was 89.7% (Table 4).

Overall, the correct diagnosis was found in 34.7% (8 out of 23) of males by the non-invasive method of diagnosis, (confirmed by FOB) and 55.5% (15 out of 27) of females (Table 5). The difference was not significant using the chi-squared test (\( P = 0.142 \)).

Ten of the males (43.4%) and 1 of the females (3.7%) (27) were classed as heavy smokers (≥ 40 packs/year). The non-invasive method produced a correct diagnosis in 63.6% of heavy smokers and 41.0% of non-smokers or light smokers (Table 6). However, the chi-squared test showed the difference was not significant (\( P = 0.184 \)).

The non-invasive method gave the correct diagnosis in 27.2% of patients ≤ 50 years and 48.5% of patients > 50 years. Fisher’s exact test showed there was no significant difference (\( P = 0.189 \)).

---

**Table 1 Distribution of patients by age and sex**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>23</td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>3</td>
<td>27</td>
</tr>
</tbody>
</table>
Discussion

The presentation of chronic pneumonia syndrome is varied and may mimic neoplasm, interstitial lung disease, or chronic fungal or mycobacterial infection [6].

In this study, sensitivity of clinical diagnosis for tuberculosis and lung cancer, the 2 main diagnoses for patients with chronic pneumonia, was high, 100% and 81.8% respectively. Specificity of clinical diagnosis was lower, especially for tuberculosis (67.5%); it was higher for lung cancer (89.7%). It must be remembered that many of the patients in this study had first been managed by general practitioners, who use clinical diagnosis as the baseline of management. This indicates that in endemic

Table 2 Comparison of non-invasive (clinical) diagnosis and invasive diagnosis (fibreoptic bronchoscopy)

<table>
<thead>
<tr>
<th>Disease</th>
<th>Non-invasive diagnosis* No.</th>
<th>Invasive diagnosis Confirmed No.</th>
<th>Ruled out No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB</td>
<td>23</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>13</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic bronchitis or bronchectasia</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Aspiration pneumonia</td>
<td>4</td>
<td>0</td>
<td>4*</td>
</tr>
<tr>
<td>Non-specific diagnosis</td>
<td>2</td>
<td>0</td>
<td>2*</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>23</td>
<td>27</td>
</tr>
</tbody>
</table>

TB = tuberculosis.
P < 0.001.
*2 Cancer, 11 healthy.
*a3 healthy.
*b3 healthy.
*cBoth healthy.

diagnosis for tuberculosis among chronic pneumonia patients, measured by bronchoscopy

Table 3 Specificity and sensitivity of clinical diagnosis for tuberculosis among chronic pneumonia patients, measured by bronchoscopy

<table>
<thead>
<tr>
<th>Disease</th>
<th>Non-invasive diagnosis No.</th>
<th>Invasive diagnosis (bronchoscopy) TB confirmed No.</th>
<th>TB ruled out No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TB</td>
<td>23</td>
<td>10</td>
<td>13*</td>
</tr>
<tr>
<td>Non-TB</td>
<td>27</td>
<td>0</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>10</td>
<td>40</td>
</tr>
</tbody>
</table>

TB = tuberculosis.
*2 of these 13 patients were eventually diagnosed as having lung cancer.
Sensitivity of clinical diagnosis = 10/(10 + 0) = 100%.
Specificity of clinical diagnosis = 27/(27 + 13) = 67.5%.
areas, clinical diagnosis may give an over-
diagnosis of tuberculosis of up to 32.5%, an
alarming rate given that in some endemic
areas FOB is not available and these patients
are at risk of being wrongly treated.

It is important to differentiate slowly
resolving from non-resolving pneumonias
because the cause of each is different. In
general, slowly resolving pneumonias are
caused by antimicrobial or host defence
factors [7] but the cause of non-resolving or
progressive pneumonia may be infectious or
non-infectious [8]. Several risk factors have
been established for delayed radiographic
resolution of pneumonia and should be con-
sidered in patient evaluation. They include
coeexisting medical conditions, history of
smoking, advanced age, diabetes mellitus,
chronic obstructive pulmonary disease and
conditions that mimic pneumonia (e.g. neo-
plasms) [13]. Some of the patients in this
study of chronic pneumonia syndrome also

<table>
<thead>
<tr>
<th>Disease</th>
<th>Non-invasive diagnosis No.</th>
<th>Invasive diagnosis (bronchoscopy) Lung cancer confirmed No.</th>
<th>Lung cancer ruled out No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung cancer</td>
<td>13</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Non-lung cancer</td>
<td>37</td>
<td>2*</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>11</td>
<td>39</td>
</tr>
</tbody>
</table>

*These 2 patients were originally diagnosed as having tuberculosis.
Sensitivity of clinical diagnosis = 9/(9 + 2) = 81.8%.
Specificity of clinical diagnosis = 35/(35 + 4) = 89.7%.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuberculosis</td>
<td>23</td>
<td>10</td>
<td>13*</td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>16</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>13</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Female</td>
<td>7</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Bronchitis</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Male</td>
<td>5</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Female</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Male</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Female</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
<td>23</td>
<td>27</td>
</tr>
</tbody>
</table>

*2 of these 13 patients were eventually diagnosed as having lung cancer.
had underlying predisposing conditions, advanced age (78% > 50 years) and history of heavy smoking: more than 20% of patients were heavy smokers.

Concerning reliability of clinical diagnosis, FOB confirmed the diagnosis made by non-invasive methods in no more than 23 (46.0%) patients. In other words, in 54.0% of patients in this study the clinician had failed to reach a correct diagnosis. Could it be a reliable method? There was a statistically significant difference between the non-invasive and the invasive method of diagnosis \((P < 0.001)\). So the non-invasive method of diagnosis was not a reliable method for chronic pneumonia syndrome. This may result in over-diagnosis of tuberculosis and lung cancer.

Non-invasive methods of diagnosis may, however, be correct in some circumstances. For example, it was correct in 34.7% of men and 55.5% of women. It was correct in 63.6% of heavy smokers and 41.0% of light smokers/non-smokers. It was also diagnostic in 48.5% of patients ≥ 50 years old. But after statistical analysis, there was no significant difference.

Non-resolving or slowly resolving pulmonary infiltrates constitute a clinical diagnostic challenge for physicians [7]. Invasive techniques such as FOB with bronchoalveolar lavage and appropriate culture for bacteria, *Legionella* spp., fungi, and mycobacterium can also be deferred when unequivocal, albeit incomplete, radiographic resolution can be demonstrated [9]. The technique is extremely useful in finding a specific diagnosis for a non-resolving pneumonia (in those cases where a specific diagnosis can be made) [4]. In other words, FOB, in the absence of any indications, is rarely diagnostic and should not be routinely employed [14]; it may be required in selected cases for the diagnosis of tuberculosis [15]. It should, however, be accompanied by bronchoalveolar lavage, bronchial washings and post-bronchoscopy sputum smears.

Fibreoptic bronchoscopy procedures have provided overall diagnostic yields in 5.8% [16], 32.5% [17], 87.1% [18] and 90% [19] of patients suspected of having tuberculosis. In the present study, overall

### Table 6: Comparison of clinical diagnosis (non-invasive) and final diagnosis (invasive) by smoking habit

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heavy smoker</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TB</td>
<td>11</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39</td>
<td>16</td>
<td>23</td>
</tr>
<tr>
<td><strong>Non-smoker/light smoker</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TB</td>
<td>19</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Bronchitis</td>
<td>12</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>50</td>
<td>23</td>
<td>27</td>
</tr>
</tbody>
</table>

TB = tuberculosis.

*Heavy smoker*: ≥ 40 packs/year; light smoker: < 40 packs per year.
diagnostic yield was 43.5%. Moreover, lung cancer was diagnosed in 2 of the patients who were ruled out for tuberculosis. As in a previous study, these results suggest that in an area with high prevalence of tuberculosis, FOB procedures should be performed in patients with chronic pneumonia syndrome where other conditions (such as tuberculosis or malignancy) must be ruled out [17].

Fibreoptic bronchoscopy may be the best means of evaluating the bronchial tree and adjacent lung parenchyma [20] and bronchoalveolar lavage can provide diagnostic information in cases of primary and metastatic disease of the lung [21]. Bronchoscopic material can be obtained in about 50% of primary lung cancers, with more accuracy in bronchoalveolar cell carcinoma and adenocarcinoma than in squamous cell carcinoma [21]. It is most useful (73%) in the diagnosis of bronchogenic carcinoma [12]. Of the 11 lung cancer patients in our study, 91% were diagnosed as bronchogenic carcinoma and 1 patient as adenocarcinoma, a finding which is similar to those of some previous studies [12,21].

Bronchoscopic procedures in the suspected cancer cases in this study provided overall diagnostic yields in 69.2% (9/13) of patients. In 2 patients with suspected tuberculosis, this was ruled out and they were finally confirmed as having lung cancer. Overall diagnostic yield was 66.7% (10/15). These results show the importance of FOB in the diagnosis of tuberculosis and lung cancer in patients with chronic pneumonia.

To sum up, the sensitivity of the non-invasive method of diagnosis was 100% for pulmonary tuberculosis and 81.8% for lung cancer. Specificity was 67.5% for pulmonary tuberculosis and 89.7% for lung cancer. Therefore, this method may not be reliable, at least for tuberculosis. Also, it suggests that FOB is a necessary option in every chronic pneumonia patient. In fact, as indicated in a previous study, FOB must be performed early in heavy smokers and patients > 50 years of age with slow or non-resolving pneumonia [5]. In contrast, in light smokers/non-smokers or younger patients, it should only be performed after 4–8 weeks unless clinical symptoms justify an earlier intervention [6].

Acknowledgements

My sincere thanks to Dr Soleiman Kheiri of the Biostatistics Department for his critical statistical review of the manuscript. Special thanks to Dr Farid Karimi who helped in this work and Maria Gillies who helped in the final edit. Thanks also to the Research Deputy of Isfahan University of Medical Sciences and the pulmonology, radiology and pathology departments of Al-Zahra Hospital for their help in conducting this study.

References


Changing trends in drug resistance among typhoid salmonellae in Rawalpindi, Pakistan

T. Butt, 1 R.N. Ahmad, 1 M. Salman 1,2 and S.Y. Kazmi 1

1Microbiology Department, Armed Forces Institute of Pathology, Rawalpindi, Pakistan.
2National Institute of Health, Islamabad, Pakistan (Correspondence to T. Butt: tariqbutt24@yahoo.com).

ABSTRACT We analysed the record of blood cultures carried out at the Armed Forces Institute of Pathology, Rawalpindi between 1996 and 2003. We isolated 477 Salmonella typhi and 410 S. paratyphi A from blood of patients suffering from typhoid fever. We observed a significant shift in the distribution and antimicrobial susceptibility of typhoid salmonellae. The isolation rate of S. typhi fell significantly while S. paratyphi A is emerging as a major pathogen. Resistance to conventional antityphoid drugs in S. typhi decreased dramatically from 80% to 14%, while in S. paratyphi A resistance increased from 14% to 44%. Susceptibility to the fluoroquinolones decreased in both. No resistance to third generation cephalosporins was detected.

Évolution de la résistance aux médicaments chez les salmonelles typhiques à Rawalpindi (Pakistan)

RÉSUMÉ Nous avons analysé le dossier des hémocultures réalisées à l’Institut de Pathologie des Forces armées de Rawalpindi entre 1996 et 2003 : 477 Salmonella typhi et 410 S. paratyphi A ont été isolées dans le sang de patients atteints de fièvre typhoïde. Nous avons observé un changement significatif dans la distribution et la sensibilité aux antimicrobiens des salmonelles typhiques. Le taux d’isolement de S. typhi a significativement diminué tandis que S. paratyphi A est un agent pathogène majeur. La résistance de S. typhi aux médicaments classiques contre la fièvre typhoïde a diminué considérablement, passant de 80 % à 14 %, tandis que la résistance de S. paratyphi A a augmenté, passant de 14 % à 44 %. La sensibilité aux fluoroquinolones a diminué pour les deux. Aucune résistance aux céphalosporines de troisième génération n’a été décelée.
Introduction

Typhoid salmonellae are important human pathogens. They thrive in overcrowded and unsanitary conditions. While improving sanitation and introduction of antibiotics has led to control of typhoid fever in the developed countries, it continues to plague the developing world, especially South Asia. The problem has been compounded by the development of plasmid-mediated antibiotic resistance against conventional antityphoid drugs, which first emerged in the 1970s. Multidrug resistance, defined as simultaneous resistance to the 3 conventional antityphoid drugs (chloramphenicol, cotrimoxazole and ampicillin), rapidly spread all over the world, and by the mid 1990s it was widespread in *Salmonella typhi*. The situation was saved by the introduction of the fluoroquinolones, which are now the treatment of choice for typhoid fever [1].

Widespread and uncontrolled use of these drugs has, however, led to the emergence of resistance against them also [1–3]. Several recent studies from various parts of Pakistan have reported increasing susceptibility of *S. typhi* to the conventional antityphoid drugs [4,5]. Similar observations in our institute prompted us to review the distribution and antimicrobial drug susceptibility pattern of typhoid salmonellae isolated between 1996 and 2003 (T. Butt et al., unpublished data, 2003).

Methods

The study was conducted at the Armed Forces Institute of Pathology, Rawalpindi, which provides laboratory services to a 1500-bed tertiary care hospital in Rawalpindi and is the main reference laboratory in Northern Pakistan. Data from 1996 to 2003 were retrieved from our database and analysed for changing trends using the chi-squared test.

Blood samples were collected from patients clinically suspected of having typhoid fever. The patients were of all ages and both sexes and had been referred from various civil and military hospitals in Rawalpindi and Islamabad. Five mL blood was inoculated into 45 mL brain heart infusion broth (Oxoid, Basingstoke, UK) and incubated aerobically at 37 °C for 7 days. Subculture on Columbia agar (Oxoid) containing 5% horse blood (blood agar) and MacConkey agar (Oxoid) was done on days 1, 2, 3 and 7. The isolates were identified by morphology and standard biochemical tests using API 20E galleries (bioMerieux SA, Lyon, France) and confirmed as *S. typhi* and *S. paratyphi* A by serological tests using standard antisera (Wellcome Reagents Ltd., Beckenham, UK).

Antimicrobial susceptibility testing was done on Mueller–Hinton agar (Oxoid) by the modified Kirby–Bauer disk diffusion technique according to the National Committee for Clinical Laboratory Standards criteria [6]. The antimicrobial disks used (all from Oxoid) were ampicillin (10 μg), chloramphenicol (30 μg), cotrimoxazole (1.25/23.75 μg), ciprofloxacin (5 μg) and ceftriaxone (30 μg). The sensitivity plates were incubated aerobically for 18–24 hours at 37 °C. *Escherichia coli* ATCC 25922 was used as the control strain. Minimum inhibitory concentration (MIC) of ciprofloxacin was determined by the Kirby–Bauer broth dilution technique in cases of therapeutic failure (failure of fever to settle despite 7 days of treatment with oral ciprofloxacin).

Results

A total of 477 *S. typhi* and 410 *S. paratyphi* A isolates were detected between 1996 and
2003. Even though the number of blood cultures carried out for typhoid fever did not change significantly from during this period (3906 in 1996, 3737 in 1997, 3670 in 1998, 3048 in 1999, 3583 in 2000, 3866 in 2001, 3872 in 2002, and 3422 in 2003), the isolation rate of typhoid salmonellae decreased significantly from 147 in 1996 to 49 in 2003 \((P < 0.0001)\). However, the proportion of \(S.\) \textit{paratyphi} \(A\) isolates increased compared to \(S.\) \textit{typhi} \((P = 0.033)\) (Figure 1).

A significant decrease in multidrug resistance was noted among the isolates of \(S.\) \textit{typhi} which decreased from 80% in 1996 to 13% in 2003 \((P < 0.0001)\), while at the same time multidrug resistance among \(S.\) \textit{paratyphi} \(A\) increased from 14% in 1996 to 44% in 2003 \((P = 0.004)\) (Figure 2). The resistance pattern of the isolates is presented in Tables 1 and 2.

Ciprofloxacin MICs were determined in isolates from 25 cases of therapeutic failure with oral ciprofloxacin between 2001 and 2003. Reduced susceptibility to ciprofloxacin (MIC 0.125 μg/mL–1.0 μg/mL) \([3]\) was noted in 22 typhoid salmonellae, while 3 cases responded to parenteral ciprofloxacin. No resistance was detected against ceftriaxone (Tables 1 and 2).

**Discussion**

Several interesting trends were observed in our study. We noticed a decrease in the isolation rates of both \(S.\) \textit{typhi} as well as \(S.\) \textit{paratyphi} \(A\) over the past 8 years. There is, however, no evidence to suggest that the incidence of typhoid fever has gone down, as the various factors responsible for the endemicity of typhoid in Pakistan like poverty, overcrowding and absence of clean drinking water have not changed.

In Pakistan, antibiotics are easily available over the counter. This has led to widespread and uncontrolled use of quinolones as empiric treatment and self-medication for typhoid fever on the basis of clinical suspicion. The unrestricted use of quinolones is probably responsible for the falling isolation rate of typhoid salmonellae in the laboratory.

Another trend has been the increase in the relative proportion of \(S.\) \textit{paratyphi} \(A\) isolates compared to \(S.\) \textit{typhi}. Hannan et
al. were among the first to test in vitro and in vivo efficacy of fluoroquinolones against typhoid salmonellae in 1986–87 and reported higher MICs of fluoroquinolones against *S. paratyphi* A even though they were within the susceptible range [7,8]. It is possible that the indiscriminate use of quinolones, which has led to the suppression of *S. typhi*, has allowed the relatively resistant *S. paratyphi* A to occupy the niche vacated by *S. typhi*. It is also possible that increasing awareness and higher index of

---

**Table 1** Antimicrobial drug resistance among *Salmonella typhi* (1996–2003)

<table>
<thead>
<tr>
<th>Year</th>
<th>No of isolates resistant (%) to various antimicrobials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amp</td>
</tr>
<tr>
<td>1996 (n = 97)</td>
<td>81 (83)</td>
</tr>
<tr>
<td>1997 (n = 60)</td>
<td>32 (53)</td>
</tr>
<tr>
<td>1998 (n = 77)</td>
<td>28 (36)</td>
</tr>
<tr>
<td>1999 (n = 65)</td>
<td>31 (48)</td>
</tr>
<tr>
<td>2000 (n = 52)</td>
<td>14 (27)</td>
</tr>
<tr>
<td>2001 (n = 68)</td>
<td>10 (15)</td>
</tr>
<tr>
<td>2002 (n = 34)</td>
<td>6 (18)</td>
</tr>
<tr>
<td>2003 (n = 24)</td>
<td>5 (21)</td>
</tr>
</tbody>
</table>

MDR = multidrug resistance.

<sup>a</sup>Simultaneous resistance to ampicillin (Amp), co-trimoxazole (Cot) and chloramphenicol (Cap).

<sup>b</sup>Reduced susceptibility to ciprofloxacin (minimum inhibitory concentration 0.125–1.0 μg/mL).

<sup>c</sup>Ceftriaxone.
on the salmonellae and gradual reversal of the susceptibility pattern.

However, the same was not observed in *S. paratyphi* A—44% of our *S. paratyphi* A isolates were multidrug resistant in 2003.

Resistance to the conventional antityphoid drugs has seen a steady rise since 1995 when the first case of multidrug-resistant *S. paratyphi* A in Pakistan was isolated at our institute [16].

The increasing resistance to conventional antityphoid drugs in the absence of selective drug pressure appears paradoxical. It is possible that as the pathogen has emerged, it is the already resistant clones that have spread. Conversely, the increasing resistance might be due to acquisition of resistance plasmids from other Gram-negative rods [14].

It seems that *S. paratyphi* A is now emerging as a major pathogen in Pakistan. Although considered to be a pathogen of low virulence, its diagnosis is also easily missed due to milder and more varied clinical presentation (compared to *S. typhi*).

As mentioned earlier, MICs of fluoroquinolones against *S. paratyphi* A have been on the higher side ever since the introduction.
of these drugs into clinical practice. This, when combined with selective drug pressure of unrestricted quinolone use, might lead to the rapid spread of quinolone-resistant S. paratyphi A.

Development of quinolone resistance in typhoid salmonellae is most worrisome [3,17–19]. We reported the first case of fluoroquinolone treatment failure in typhoid salmonellae in Pakistan in 1993 [20]. Since then the incidence of such cases has been increasing: 22 of our isolates between 2001 and 2003 exhibited reduced susceptibility to ciprofloxacin. The problem is compounded by the inability to identify this reduced susceptibility by the standard disk diffusion techniques. The inadequacy of the current guidelines for detection of this resistance has prompted a reappraisal and revision of these guidelines. We have recommended revised break-point ciprofloxacin MICs of 0.125 μg/mL–1.0 μg/mL as reduced susceptibility [3]. It is interesting to note that the first case of multidrug resistance S. paratyphi A in Pakistan, isolated in 1995, had ciprofloxacin MIC of 0.125 μg/mL [16] which would make the isolate resistant to ciprofloxacin according to the revised guidelines.

To summarize, there is a definite shift in the distribution as well as antimicrobial susceptibility of typhoid salmonellae in Pakistan. S. paratyphi A resistant to both the conventional antityphoid drugs as well as the fluoroquinolones is emerging as a major pathogen. While resistance to the conventional antityphoid drugs in S. typhi has decreased dramatically, it is increasing against the fluoroquinolones. The common denominator in all these findings appears to be widespread and uncontrolled use of fluoroquinolones. Fluoroquinolones are the most effective antityphoid drugs available. It is imperative that these drugs are used judiciously to prevent the spread of this resistance. At the same time, the role of conventional antityphoid drugs in the treatment of S. typhi infection should be re-evaluated.

References


Prevalence of asymptomatic bacteriuria in pregnant women in Sharjah, United Arab Emirates

A.A. Abdullah1 and M.I. Al-Moslih1

ABSTRACT To determine the prevalence of asymptomatic bacteriuria in pregnancy, midstream urine samples from 505 pregnant women in Sharjah, United Arab Emirates, were screened using urine culture and urinalysis. Urine cultures showed heavy growth (≥10^5 colony forming units/mL) in 4.8% (24/505) of the samples; 16/24 (66.7%) of these isolates were Escherichia coli. Microscopic examination had the highest sensitivity (67%), while nitrite dipstick testing showed the highest specificity and positive predictive value (99% and 57% respectively). Antibiotic sensitivity tests carried out on the positive culture samples showed high sensitivity to gentamicin, amoxicillin-clavulanic acid and fosfomycin.

1College of Health Sciences, University of Sharjah, United Arab Emirates (Correspondence to A.A. Abdullah: ridhaabdullah@sharjah.ac.ae).
Received: 27/10/04; accepted: 27/04/05

Prévalence de la bactériurie asymptomatique chez les femmes enceintes à Sharjah (Émirats arabes unis)

RÉSUMÉ Afin de déterminer la prévalence de la bactériurie asymptomatique pendant la grossesse, on a analysé des prélèvements d’urine recueillis par la méthode du jet de milieu de miction chez 505 femmes enceintes à Sharjah (Émirats arabes unis) par mise en culture et examen des urines. Les cultures d’urine ont montré une forte croissance (≥10^5 unités formant colonies/mL) dans 4,8 % des échantillons (24/505) ; Escherichia coli a été isolée dans 16/24 (66,7 %) de ces derniers. L’examen microscopique avait la sensibilité la plus élevée (67 %), tandis que le test « nitrite » (bandelettes réactives) présentait la spécificité la plus élevée et la meilleure valeur prédictive positive (99 % et 57 % respectivement). L’étude de la sensibilité aux antibiotiques réalisée sur les échantillons de culture positifs a montré une forte sensibilité à la gentamicine, à l’amoxicilline-acide clavulanique et à la fosfomycine.

1Collège de Sciences de la Santé, Université de Sharjah, Émirats Arabes Unis (Correspondance à A.A. Abdullah: ridhaabdullah@sharjah.ac.ae). 
Recu le 27/10/04 ; accepté le 27/04/05
**Introduction**

Asymptomatic bacteriuria is a major risk factor for the development of urinary tract infection (UTI) [1–3]. During pregnancy, many changes occur in the structure and function of the urinary tract that predispose pregnant women to upper UTI. Although there is a small risk of development of acute episodes of UTI in early pregnancy, there will be a substantial increase risk (to 30% to 60%) during the last trimester.

MacLean found that 6% of pregnant women had asymptomatic bacteriuria and this was associated with increased prematurity and perinatal mortality compared with healthy pregnant women [4]. In general, the prevalence of asymptomatic bacteriuria in pregnancy was found to be 2% to 7% [3,5]. Failure to treat bacteriuria during pregnancy increases the risk of development of acute pyelonephritis by 25% and may result in complications, such as preterm labour, transient renal failure, acute respiratory distress syndrome, sepsis, shock and haematological abnormalities [5–7]. Woman with untreated UTI during their third trimester of pregnancy are at-risk of delivering a child with mental retardation or developmental delay [8].

Diagnosis of UTI usually depends on different screening tests: urine microscopic examination, nitrite reductase, leukocyte esterase dipstick and urine culture. Urine dipstick tests have been evaluated by many researchers but their low sensitivity, high false negative (specificity) and poor positive predictive value makes them unreliable [9–15]. For such reasons urine culture remains the most reliable tool for the diagnosis of UTI. Urine culture has shown *Escherichia coli* to be the most common bacterial isolate of UTI during pregnancy [6,16]. *E. coli* serotyping is important in distinguishing the small number of strains that cause disease since over 700 antigenic types of *E. coli* have been recognized based on O, H and k antigens [17]. *E. coli* serotype O5 was the most prevalent (29.3%) followed by O17 and O25 in patients with symptomatic UTI [18–21].

In Sharjah, United Arab Emirates (UAE), no data are yet available on the prevalence of asymptomatic bacteriuria during pregnancy. This study sought to investigate the prevalence of asymptomatic bacteriuria among pregnant women and to determine the most reliable diagnostic procedures, the most common types of bacteria and the most suitable antibiotics to use.

**Methods**

This study was approved by the University Research Centre, University of Sharjah, UAE and Sharjah Medical District. All participants signed a consent form.

**Sample**

The sample comprised 505 asymptomatic pregnant women visiting the primary health care centre (Maternal Child Health, Main Centre, Sharjah Medical District, Sharjah, UAE) between February 2001 and April 2002. The women’s ages ranged from 15 to 41 years, with a mean age of 27.0 (standard deviation 4.9) years. None of the women had received antibiotics before screening.

**Tests**

Midstream urine (MSU) samples were collected from the women and each sample was divided into two parts. One part was used for general urine examinations. Direct microscopy for white blood cell (WBC) counts was considered positive if there were > 5 WBC per high-power field. Dipstick tests were made using Comber 10 reagent test strips (Analyticon, Germany) that have
panels to detect protein, blood and nitrite and leukocyte esterase in urine.

Urine cultures
The other urine sample was cultured on the following media: McConkey agar, eosin methylene blue agar, nutrient agars, blood agars and CLED (cystine-lactose- electrolyte-deficient) agar. The standard loop technique was used for colony counting (LP Italiana SpA, Milan, Italy). The urine culture was defined as positive if ≥ 10⁵ colony forming units (CFU) per mL of urine was found, regardless of the presence or absence of leukocytes [2]. Urine cultures with 10³–10⁴ CFU/mL were regarded as suspected infections, cultures with less than 10³ CFU/mL were considered contaminated, while cultures with no growth of bacteria were said to be negative. From these criteria, the sensitivity, specificity and positive predictive values were calculated for each test.

Antibiotic sensitivity tests were carried out using the antibiotic sensitivity disc method with the following antibiotics: ampicillin, amoxicillin-clavulanic acid, nitrofurantoin, ciprofloxacin, nalidixic acid, trimethoprim, cephalexin, gentamicin, as well as fosfomycin, an antibiotic which has not been used or tested in the UAE.

Serotyping of Escherichia coli
Several kits (Mast Diagnostic, Amiens, France) were used to type the 16 E. coli strains isolated from cases of asymptomatic bacteriuria: O26, O86a, O111, O127a, O44, O119, O124, O112a, O28ac, O128, O20, O157, O55, O125, O126, O142, O114 and O18.

For comparison of serotypes from the community, the same kits were used to serotype another 16 E. coli isolates obtained from non-pregnant women with symptomatic community-acquired UTI.

Identification of bacteria was performed using a kit for API-20 (bioMérieux, Marcy-Etoile, France).

Results
Table 1 shows the prevalence of the asymptomatic bacteriuria of pregnant women (CFU ≥ 10⁵/mL); 4.8% (24/505) of the screened urine samples were positive (CFU ≥ 10⁵/mL), while 34.1% (172/505) were suspected infections.

Table 2 shows that urinalysis by microscopic examination was positive (> 5 WBC per high-power field) in 35.6% (180/505) of samples. However, the nitrite dipstick and esterase dipstick tests were positive in 1.4% (7/505) and 11.7% (59/505) of samples respectively.

Table 3 shows the sensitivity, specificity and positive predictive value for the leukocyte esterase dipstick, nitrite dipstick and microscopic urinalysis tests. Microscopic examination had the highest sensitivity (67%), while the nitrite dipstick showed the highest specificity and positive predictive value (99% and 57% respectively).

The most common bacteria isolated from the culture of the urine samples of pregnant women were:

Table 1 Prevalence of asymptomatic bacteriuria in the urine of 505 pregnant women

<table>
<thead>
<tr>
<th>Bacteriuria</th>
<th>Colony forming units (No./mL)</th>
<th>No. of isolates</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>10⁵</td>
<td>24</td>
<td>4.8</td>
</tr>
<tr>
<td>Suspected</td>
<td>10³–10⁴</td>
<td>172</td>
<td>34.1</td>
</tr>
<tr>
<td>Contaminated</td>
<td>10³</td>
<td>19</td>
<td>3.8</td>
</tr>
<tr>
<td>Negative</td>
<td>&lt; 10³</td>
<td>290</td>
<td>57.4</td>
</tr>
<tr>
<td>Total</td>
<td>505</td>
<td></td>
<td>100.0</td>
</tr>
</tbody>
</table>

Eastern Mediterranean Health Journal, Vol. 11, Nos 5/6, 2005
the pregnant women with asymptomatic bacteriuria were *E. coli* in 66.7% of samples (16/24) (Table 4).

The different serotypes of *E. coli* isolated from the urine of asymptomatic bacteriuria of pregnant women and symptomatic bacteriuria isolated from the sample from women with community-acquired infection are shown in Table 5. The main *E. coli* serotype among the samples with asymptomatic bacteriuria was O112ac (25.0% of samples), while in symptomatic community-acquired bacteriuria the main serotype was O86a (31.3% of samples).

The pattern of antibiotic sensitivity of the 16 *E. coli* isolates is shown in Table 6. The results show that *E. coli* of asymptomatic bacteriuria of pregnancy were 100% (16/16) sensitive to gentamicin, ciprofloxacin and fosfomycin. The *E. coli* isolated from symptomatic bacteriuria showed 100% sensitivity to amoxicillin-clavulanic acid and fosfomycin. *E. coli* from both types of isolates were the least sensitivity to trimethoprim. The 8 non-*E. coli* isolates were also 100% sensitive to fosfomycin and amoxicillin-clavulanic acid.

<table>
<thead>
<tr>
<th>Table 2 Comparison of different tests used for diagnosis of urinary tract infection in the urine of 505 pregnant women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colony forming units (No./mL)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>10⁴</td>
</tr>
<tr>
<td>10³</td>
</tr>
<tr>
<td>10²</td>
</tr>
<tr>
<td>&lt; 10²</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 3 Accuracy of urine screening tests for asymptomatic bacteriuria in the urine of pregnant women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Leukocyte esterase dipstick</td>
</tr>
<tr>
<td>Nitrite dipstick</td>
</tr>
<tr>
<td>Microscopic examination</td>
</tr>
</tbody>
</table>

---

aPercentage of patients with a positive culture who will have a positive test.

bPercentage of patients with a negative culture who will have a negative test.

cPercentage of patients with a positive test who have positive urine culture.
Discussion

The prevalence of asymptomatic bacteriuria of pregnant women in our study (4.8%) is similar to other reports (4% to 10%) [8,22]. This indicates that about 5% of pregnant women are at risk of development of acute episode of UTI during pregnancy if they are not properly treated. Suspected urine cultures with 103–104 CFU/mL (34.1% of our sample) need to be repeated at regular intervals during the course of pregnancy and the cases should be followed up or treated.

Comparing the urinalysis screening tests with the results of urine culture, which is the gold standard for the diagnosis and management of UTI, these tests were shown to be unreliable. The tests had low sensitivity, high false negative (specificity) and poor positive predictive value. Similar findings were reported by other authors [9,13–15].
Therefore, a urine culture should be routinely obtained from all pregnant women for screening during the first antenatal visit and repeated during the third trimester, because the urine of the treated patients may not remain sterile for the entire pregnancy.

The most common bacterial isolates from MSU samples of asymptomatic pregnant women were *E. coli* in 66.7%, followed by coagulase-negative staphylococci in 12.5%. Similar findings have been reported by other researchers [5,15]. *E. coli* is the most common microorganism in the vaginal and rectal area, and because of the anatomical and the functional changes that occur during pregnancy, the risk of acquiring UTI from *E. coli* is high [5].

The commonest *E. coli* serotypes were O112ac in the urine of pregnant women with asymptomatic bacteriuria and O86a in symptomatic bacteriuria. In India, Misra found that the commonest *E. coli* serotype in symptomatic UTI was O5 [18]. Other studies have found different *E. coli* serotypes in UTI (O1, O2, O4, O6, O18ac and O75) [18–21]. Geographical distribution and epidemiological factors may play a role in this variation [19]. Further studies are required to explore the relationship between different serotypes and virulence factors of *E. coli* causing UTI in different geographical regions by using tissue cultures and polymerase chain reaction analysis [18,23].

The antibiotic sensitivity patterns showed that most of the bacterial isolates were sensitive to gentamicin, ciprofloxacin, amoxicillin-clavulanic acid and fosfomycin. However, the data were insufficient to confirm the preference of a single dose or longer duration doses in treating asymptomatic bacteriuria in pregnant women. Fosfomycin (Monurol) is a new antibiotic that can be taken as a single dose and has a good margin of safety during pregnancy [24]. Single-dose treatments have lower costs and better compliance than multiple doses, but need to be evaluated further [25]. Amoxicillin-clavulanic acid (Augmentin) is also considered safe for the treatment of pregnant women with urinary tract infection and is regarded as a good choice [26]. Trimethoprim-sulfamethoxazole was the least sensitive antibiotic in our study.

The choice of antibiotic should be based on urine culture, stage of gestation, maternal clinical data and the characteristics of the antibiotic [27]. However, aggressive antibiotic treatment may be necessary to reduce the risk of pyelonephritis in pregnancy [22,28]. All pregnant women with persistent bacteriuria or recurrent infection need follow-up cultures and a urological evaluation after delivery [17].

In conclusion, this study showed that 4.8% of the pregnant women examined had a positive urine culture without any symptoms of UTI. Hence, it is important that pregnant women are screened for asymptomatic bacteriuria at the first antenatal visit.

### Acknowledgements

We are grateful to Dr Aisha Al-Roomi, Director of Maternal Child Health, Main Centre, and her staff at the Sharjah Medical District, Ministry of Health, UAE, for their support during the different phases of the study. We wish to thank also Mrs Muna Jawad for her microbiology technical assistance. This work was sponsored by the Research Center, University of Sharjah, UAE, grant number MB 271/200.
References


Prévalence du virus de l’hépatite G chez les donneurs de sang en Tunisie

M. Mastouri,1 L. Safer,2 B. Pozzetto,3 T. Bourlet4 et M. Khedher1

1 Faculté de pharmacie, Université de Monastir (Tunisie).
2 Faculté de médecine, Université de Monastir (Tunisie).
3 Faculté de médecine Jacques Lisfranc, Saint-Étienne (France).
4 Laboratoire de virologie, Hôpital Nord, Saint-Étienne (France).

Reçu : 10/03/04 ; accepté : 27/09/04

RÉSUMÉ Le GBV-C/HGV est un virus de découverte récente, répandu dans le monde. Aucune donnée n’est disponible sur la prévalence du GBV-C/HGV en Tunisie. Le but de notre étude était de déterminer la prévalence du GBV-C/HGV chez les donneurs de sang en Tunisie. La recherche de l’anticorps anti-E2 a été réalisée pour 912 donneurs de sang et la recherche de l’ARN par RT-PCR pour 600 donneurs. La prévalence des marqueurs de l’infection par le GBV-C/HGV était de 5,3 % pour l’ARNémie et de 4,9 % pour l’anti-E2. Une corrélation a été notée entre l’infection par le GBV-C/HGV et le VHC (p = 0,006). La prévalence de l’infection par le GBV-C/HGV chez les donneurs de sang en Tunisie est comparable à celle rapportée dans le monde.

Prevalence of hepatitis G virus among Tunisian blood donors

Hepatitis G virus (GBV-C/HGV) is a recently identified virus which occurs worldwide. The prevalence of GBV-C/HGV in Tunisia has not been previously studied. We aimed to assess the prevalence of GBV-C/HGV infection in Tunisian blood donors. A total of 912 blood donors were tested for anti-E2 antibodies of GBV-C/HGV by enzyme-linked immunosorbent assay and 600 were tested by reverse transcriptase polymerase chain reaction. GBV-C/HGV RNA was found in 5.3% of the sample and HGV antibodies occurred in 4.9%. A correlation was noticed between GBV-C/HGV infection and hepatitis C virus (P = 0.006). The prevalence of GBV-C/HGV is similar to that reported worldwide.
Introduction

Le GBV-C est un virus à ARN positif simple brin appartenant à la famille des Flaviviridae, décrit en 1995 par Simons et al. [1]. En 1996, l'équipe de Linnen et al. ont décrit un second virus appelé HGV qui s'est avéré être un variant du précédent [2]. C'est pourquoi cet agent est désormais désigné sous le nom de GBV-C/HGV. Souvent qualifié de virus d’hépatite, le GBV-C/HGV est un agent dont le pouvoir pathogène n'est pas clairement démontré. Les mécanismes de réplication sont encore mal connus car il n'existe pas de système de culture efficace [3]. Cependant, des travaux récents ont pu mettre en évidence des brins négatifs d'ARN du GBV-C/HGV dans les cellules mononucléées [3], mais aussi au niveau de la rate, de la moelle osseuse [4] et de l'appendice, suggérant que le GBV-C/HGV prolifère au niveau de l'appendice, puis il est transporté par voie portale jusqu'au foie [5]. Le GBV-C/HGV est loin de constituer un agent hépatotrope classique. Le mode de transmission du GBV-C/HGV est également l'objet de discussions : la transmission parentérale est bien avérée [6], la transmission materno-foetale est fréquente [7], la transmission sexuelle est bien avérée et joue un rôle important dans la dissémination du virus dans la population générale [8]. Le GBV-C/HGV est largement répandu dans le monde, notamment chez les donneurs de sang. Pour connaître sa prévalence dans une population, il faut tenir compte à la fois des porteurs du virus (ARN GBV-C/HGV positif) et de ceux qui ont développé une immunité protectrice (anticorps anti-E2 positifs). Aucune donnée n'est disponible sur la prévalence de l'infection par le virus GBV-C/HGV dans notre pays. Le but de notre travail était de déterminer la prévalence de l'infection par le GBV-C/HGV chez les donneurs de sang en Tunisie (région de Monastir), de préciser les modes de transmission de l'infection dans cette population et d'établir la prévalence des co-infections par les virus VIH, VHB et/ou VHC chez les donneurs infectés par le GBV-C/HGV.

Méthodes

Donneurs
L’étude a porté sur 912 donneurs de sang (756 hommes et 156 femmes) de la banque de sang du C.H.U. Fattouma Bourguiba de Monastir, et ceci sur une période allant de janvier à décembre 2000. L’âge moyen des donneurs était de 27,2 ans avec des extrêmes allant de 18 à 58 ans. Aucun critère d’exclusion n’a été appliqué. Chaque donneur a reçu un questionnaire portant sur les antécédents d'affections hépatiques, d'interventions chirurgicales, de transfusion de sang, de scarification et/ou de tatouage. Pour chaque donneur de sang, nous avons prélevé sur tube sec 10 mL de sang total par ponction veineuse au pli du coude. Les tubes de sang ont été centrifugés 15 minutes à basse vitesse et le sérum a été réparti en 5 aliquotes de 0,5 mL à 1 mL et congelé dans les meilleurs délais à -80 °C.

Détection des anticorps anti-E2
La détection des anticorps anti-E2 a été réalisée par une technique ELISA à l’aide d’un test commercial (µPLATE anti-HGenv, Boehringer/Roche).

Détection de l’ARN du GBV-C/HGV par RT-PCR
La détection de l’ARN du GBV-C/HGV n’a concerné que 600 donneurs sans aucun biais de sélection et ceci par manque de réactif. La technique utilisée a été celle commercialisée par Boehringer/Roche ; l’ARN a été extrait à partir de 200 µL de sérum à
l’aide de la trousse High Pure viral RNA Kit selon les recommandations du fabricant. La RT-PCR en une seule étape a été réalisée à l’aide de la trousse Titan one tube RT-PCR system. Ce système permet la synthèse de l’ADNc en même temps que la PCR sans avoir recours à l’addition de réactifs entre la synthèse de l’ADNc et la PCR. On utilise, pour la transcription inverse, l’enzyme de l’Avian Myelobaltosis Virus (AMV) et pour la PCR, l’expand high fidelity enzyme qui consiste en une Taq ADN polymérase et une Pwo ADN polymérase (polymérase thermostable isolée de archaeabacterium Pyrococcus woesei). Ces enzymes sont contenues dans un seul mélange réactionnel (Enzyme Mix de la trousse Titan one tube RT-PCR). La PCR a été réalisée à l’aide d’amorces situées dans la région 5’ non codante du génome viral : amorce 1 : 5’-CGGCCAAAAGGTGGATG-3’ et amorce 2 : 5’-CGACGAGCCTGACGTCGGG-3’ (Hepatitis G virus-primer and capture Probe set, 2nd generation) et des dNTP de la trousse (PCR ELISA Dig labling Mix) permettant un marquage à la digoxigénine du matériel amplifié. L’amplification a été réalisée à l’aide d’un thermocylqueur Perkin Elmer 9600 selon le protocole suivant : une transcription inverse pendant 30 min à 50 °C suivie d’une dénaturation des hybrides pendant 2 mn à 94 °C, puis 10 cycles comportant chacun 30 s à 94 °C, 30 s à 55 °C et 30 s à 68 °C, ensuite 30 cycles comportant chacun 30 s à 94 °C, 30 s à 55 °C et 30 s à 68 °C plus 5 s par cycle. Enfin une étape d’élongation finale de 8 mn à 68 °C. Les amplifiats ont été révélés par une technique ELISA (PCR ELISA DIG detection) utilisant une sonde biotinylée spécifique de la région amplifiée 5’-BIO-TIN-GGTAGCCACTATAGGG-3’ (Hepatitis G virus-primer and capture Probe set, 2nd generation). La sonde immunisée a été immobilisée au fond des puits d’une microplaque recouverte de streptavidine ; le produit d’amplification marqué à la digoxigénine a été révélé grâce à un anticorps anti-digoxigénine marqué à la peroxydase.

**Autres techniques**

Les anticorps anti-VIH, anti-VHC et l’antigène HBs ont été recherchés par des techniques ELISA (Genscreen plus HIV Ag-Ab, Biorad, France, Innotest HCV Ab IV, Innogenics, Belgique et BIOELISA HBS Ag colour, biokit, Espagne, respectivement). La sérologie de la syphilis a été réalisée par technique d’hémagglutination TPHA (Syphagen, biokit, Espagne) avec les réactifs commerciaux utilisés en routine dans le cadre de la qualification des dons de sang.

De même ont été effectuées en routine des dosages systématiques des transaminases (ASAT et ALAT).

**Analyse statistique**

L’étude statistique a été effectuée au moyen du logiciel Epi Info 6 version 6.02. La comparaison des fréquences a été réalisée en se basant sur le test khi², ou le test Fischer exact au seuil de 5 %.

**Résultats**

Parmi les 912 donneurs de sang, 45 étaient séropositifs, soit une prévalence de 4,9 %. La différence de distribution des anticorps anti-E2 en fonction de l’âge était statistiquement significative (p = 0,0003). La prévalence du portage sérique de l’ARN du GBV-C/HGV chez les donneurs de sang était de 5,3 %. Les tableaux 1 et 2 donnent la répartition par tranche d’âge des marqueurs de l’infection par le GBV-C/HGV.

Si on tient compte uniquement des 600 donneurs de sang qui sont analysés à la fois pour la recherche des anticorps anti-E2 et de l’ARN du GBV-C/HGV, la prévalence des
ant-E2 est de 5,5 % (33/600), et on aboutit ainsi à une positivité des marqueurs de l’infection par le GBV-C/HGV de 10,8 %. Aucun donneur n'est trouvé virémique pour le GBV-C/HGV (ARN positif) et en même temps porteur des anticorps anti-E2 (témoin de guérison).

L'étude des co-infections GBV-C/HGV avec les virus VHC, VIH, VHB, ou avec la syphilis a montré un lien statistiquement significatif entre l’infection par le GBV-C/HGV et le virus de l’hépatite C : p = 0,006 (Tableau 4).

**Discussion**

La séroprévalence du virus GBV-C/HGV chez les donneurs de sang en Tunisie (région du centre) atteint 4,9 %. La prévalence sérique de l’infection par le GBV-C/HGV varie beaucoup d’un pays à l’autre. En effet, elle est de 9,5 % [9] à 12 % [10] en France, 12,6 % en Italie [11], 15,9 % en Allemagne [12], 10,5 % en Norvège [13], 7,3 % au Canada [14] et 9 % aux États-Unis [15]. L’approche moléculaire, c’est-à-dire la recherche de l’ARN du virus du GBV-C/HGV par RT-PCR, a montré une prévalence de 5,3 %. Si nous prenons en compte les 600 donneurs de sang testés à la fois par RT-PCR et par sérologie, nous aboutissons à une prévalence globale de 10,8 %. Cette prévalence se rapproche de celle trouvée en France [9].

De même les résultats trouvés par biologie moléculaire sont variables d’un pays à l’autre. La prévalence est de 2,6 à 3,4 % en France [9,10], de 12,2 % en Égypte [16], de 1,9 % en Allemagne [12], de 1,1 % au Canada [14], de 2 % aux États-Unis [15], de 1,8 % en Corée [17], de 9,7 % au Brésil [18], de 2,5 % en Norvège [13], de 2,1 % à

<table>
<thead>
<tr>
<th>Tranche d’âge (ans)</th>
<th>Effectif</th>
<th>Anti-E2 + Nbre</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25</td>
<td>509</td>
<td>14</td>
<td>2,7</td>
</tr>
<tr>
<td>26-30</td>
<td>138</td>
<td>4</td>
<td>2,9</td>
</tr>
<tr>
<td>31-35</td>
<td>91</td>
<td>9</td>
<td>9,9</td>
</tr>
<tr>
<td>36-40</td>
<td>91</td>
<td>6</td>
<td>6,6</td>
</tr>
<tr>
<td>41-45</td>
<td>48</td>
<td>6</td>
<td>12,5</td>
</tr>
<tr>
<td>46-50</td>
<td>29</td>
<td>4</td>
<td>13,8</td>
</tr>
<tr>
<td>51-55</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>&gt; 55</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>912</td>
<td>45</td>
<td>4,9</td>
</tr>
</tbody>
</table>

*p = 0,0003.*

<table>
<thead>
<tr>
<th>Tranche d’âge (ans)</th>
<th>Effectif</th>
<th>ARN + Nbre</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25</td>
<td>333</td>
<td>17</td>
<td>5,1</td>
</tr>
<tr>
<td>26-30</td>
<td>98</td>
<td>7</td>
<td>7,1</td>
</tr>
<tr>
<td>31-35</td>
<td>61</td>
<td>5</td>
<td>8,2</td>
</tr>
<tr>
<td>36-40</td>
<td>58</td>
<td>2</td>
<td>3,4</td>
</tr>
<tr>
<td>41-45</td>
<td>30</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>46-50</td>
<td>19</td>
<td>1</td>
<td>5,2</td>
</tr>
<tr>
<td>51-55</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>&gt; 55</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>912</td>
<td>32</td>
<td>5,3</td>
</tr>
</tbody>
</table>

*p : NS (différence non significative).*
Tableau 3 Étude des facteurs de risque de l'infection par le GBV-C/HGV chez les donneurs de sang dans la région de Monastir (Tunisie)

<table>
<thead>
<tr>
<th>Facteur</th>
<th>ARN +</th>
<th>ARN -</th>
<th>p</th>
<th>Anti-E2 +</th>
<th>Anti-E2 -</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ictère</td>
<td>+</td>
<td>1</td>
<td>7</td>
<td>0,35</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>31</td>
<td>560</td>
<td>45</td>
<td>859</td>
<td></td>
</tr>
<tr>
<td>Soins dentaires</td>
<td>+</td>
<td>9</td>
<td>182</td>
<td>0,63</td>
<td>20</td>
<td>369</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>23</td>
<td>385</td>
<td>25</td>
<td>498</td>
<td></td>
</tr>
<tr>
<td>Interventions chirurgicales</td>
<td>+</td>
<td>1</td>
<td>40</td>
<td>0,71</td>
<td>0</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>31</td>
<td>527</td>
<td>45</td>
<td>823</td>
<td></td>
</tr>
<tr>
<td>Scarification/ tatouage</td>
<td>+</td>
<td>4</td>
<td>48</td>
<td>0,51</td>
<td>6</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>28</td>
<td>519</td>
<td>39</td>
<td>770</td>
<td></td>
</tr>
<tr>
<td>Transfusion</td>
<td>+</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>32</td>
<td>563</td>
<td>45</td>
<td>862</td>
<td></td>
</tr>
<tr>
<td>ALAT ≥ 35 UI/L</td>
<td>0</td>
<td>14</td>
<td>1</td>
<td>4</td>
<td>51</td>
<td>0,32</td>
</tr>
<tr>
<td></td>
<td>&lt; 35 UI/L</td>
<td>29</td>
<td>453</td>
<td>33</td>
<td>694</td>
<td></td>
</tr>
<tr>
<td>ASAT ≥ 35 UI/L</td>
<td>5</td>
<td>41</td>
<td>0,16</td>
<td>0</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>&lt; 35 UI/L</td>
<td>24</td>
<td>442</td>
<td>38</td>
<td>713</td>
<td></td>
</tr>
</tbody>
</table>

ALAT : alanine-aminotransférase.
ASAT : aspartate-aminotransférase.

Tableau 4 Prévalence des co-infections GBV-C/HGV avec les virus VHB, VHC, VIH et la syphilis chez les donneurs de sang (n = 600) dans la région de Monastir (Tunisie)

<table>
<thead>
<tr>
<th>Co-infection</th>
<th>ARN +</th>
<th>ARN -</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nbre</td>
<td>%</td>
<td>Nbre</td>
</tr>
<tr>
<td>VHB</td>
<td>+</td>
<td>0</td>
<td>0,006</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>32</td>
<td>91,5</td>
</tr>
<tr>
<td>VHC</td>
<td>+</td>
<td>3</td>
<td>0,8</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>29</td>
<td>93,8</td>
</tr>
<tr>
<td>VIH</td>
<td>+</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>32</td>
<td>94,5</td>
</tr>
<tr>
<td>Treponema pallidum</td>
<td>+</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>32</td>
<td>94,3</td>
</tr>
</tbody>
</table>

VHB : virus de l’hépatite B.
VHC : virus de l’hépatite C.
VIH : virus de l’immunodéficience humaine.
Taiwan [19], et de 0,5 % au Japon [20]. La technique de recherche de l’ARN du GBV-C/HGV utilisée a été la même, c’est-à-dire une transcriptase inverse, suivie d’une PCR, utilisant des amorces dans la région 5’ non codante qui est une technique plus sensible et plus spécifique que l’amplification dans d’autres régions du génome du GBV-C/HGV : NS3, E2 [21].

Nous notons que la présence d’anticorps anti-E2 augmente avec l’âge pour atteindre 13,8 % à 55 ans. La différence de distribution en fonction de l’âge de ces anticorps est statistiquement significative (p = 0,0003).

L’étude des co-infections avec d’autres virus a montré une liaison statistiquement significative entre l’infection par le virus de l’hépatite C et l’infection par le GBV-C/HGV (p = 0,006). Ceci peut s’expliquer par un mode de transmission concomitant du virus de l’hépatite G avec le virus de l’hépatite C. En effet, de nombreux auteurs font état d’une forte prévalence de l’infection au GBV-C/HGV chez les sujets HCV positifs : 16,3 % en Italie [22] et 20 % aux États-Unis [2]. Par ailleurs, le GBV-C/HGV ne constitue pas un facteur aggravant de l’infection par le VHC [23], alors que l'examen des conséquences de la co-infection VIH et GBV-C/HGV a montré que la présence du GBV-C/HGV pourrait avoir un effet bénéfique sur l’évolution de l’infection par le VIH. En effet, l’infection par le GBV-C/HGV est associée à une inhibition de la réplication du VIH, ou pourrait être également un marqueur de la présence d’autres facteurs conduisant à une réponse favorable au VIH [24,25].

L’étude des différents facteurs de risque n’a pas montré de lien statistique entre les antécédents d’affections hépatiques, d’interventions chirurgicales, de transfusion de sang, de scarification et/ou tatouage et les marqueurs de l’infection par le GBV-C/HGV. L’infection par le virus de l’hépatite G ne semble pas induire une augmentation des taux de transaminases. En effet, il n’y a pas de liaison statistiquement significative entre l’augmentation des transaminases et l’infection par le GBV-C/HGV. Il a été rapporté dans la littérature que si l’infection par le GBV-C/HGV pouvait être associée à des élévations des taux de transaminases sériques, cette augmentation serait modérée, souvent transitoire et non toujours corrélée avec les pics de virémie [26]. En effet, le GBV-C/HGV ne constitue pas un agent hépatotrope classique, et la multiplication du virus se fait essentiellement dans les cellules mononucléées et non dans les hépatocytes [3] de sorte que sa classification comme « virus d’hépatite » pourrait bien avoir été quelque peu prématurée [27].

Enfin, la forte prévalence de l’infection par le GBV-C/HGV chez les donneurs de sang en Tunisie (10,8 %) révèle, outre le partage des mêmes voies de transmission que le VHC, une transmission par voie sexuelle. En effet, en dehors de la transmission parentérale du virus, la transmission verticale et la transmission sexuelle constituent les principales voies de transmission du virus dans la population générale [8,28].

Références


Review

Medical ethics in the Islamic Republic of Iran

B. Larijani,1 F. Zahedi1 and H. Malek-Afzali2

1Endocrinology and Metabolism Research Centre, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran (Correspondence to B. Larijani: emrc@sina.tums.ac.ir).
2Department of Research and Technology, Ministry of Health and Medical Education, Tehran, Islamic Republic of Iran.

Received: 17/02/04; accepted: 01/06/04

ABSTRACT Recent trends in biomedical technologies have been associated with increasing discussion about ethical aspects of the new knowledge in many societies, including the Islamic Republic of Iran. Medical ethics has a long history in our country, and great Iranian physicians laid special emphasis on teaching and practising traditional ethics. In recent decades, great strides have been made in biomedical ethics, especially in the fields of education, research and legislation. We present a brief history of medical ethics in our country. Current activities and topics of future plans are also discussed.

L’éthique médicale en Iran

Introduction

Biomedical advances, new medical technologies and public concern about ethics in recent decades have stimulated a renewed interest in medical ethics. Advances in genetics, stem cell research, and organ transplantation are some of the medical issues that have raised concern. An emphasis on ethics has also been expressed by members of the medical and religious professions in the Islamic Republic of Iran.

Recent major biomedical activities in the Islamic Republic of Iran, with the emphasis on medical ethics, are reviewed in this document.

The Islamic Republic of Iran and the history of medical ethics

The Islamic Republic of Iran is a Middle Eastern country with a land area of 1 648 000 km² and a population of 67 million. The per capita gross domestic product (GDP) was about 7219 Intl $ in 2002, with health expenditure at 6% of GDP [1,2].

The Islamic Republic of Iran (the ancient Persia), a country with one of the oldest civilizations of the world, promotes today the “dialogue among civilizations”. In a response to the proposal made by the president of the Islamic Republic of Iran in September 1998, the United Nations General Assembly declared 2001 as the year of Dialogue among Civilizations [3]. The Iranian government subsequently founded the International Centre for Dialogue among Civilizations (ICDAC) in February 1999 [4].

The name Iran is associated with great scholars such as Avicenna, from whom not only the Islamic Republic of Iran but also Europe and several other countries of Asia have benefited. The combination of Iranian culture and Islam, which emphasizes the acquisition and propagation of knowledge, led in the past to the golden period of scientific achievement, particularly in the field of medicine. Great Iranian Muslim scholars laid huge emphasis on teaching and practising ethics. Razi (865–925 AD) was one of the foremost Iranian physicians who described the basic principles of medical ethics. Ali ibn Abbas Ahvazi (930–994 AD), known as Haly Abbas to the Europeans, authored a book on medicine entitled *Kamil al-rana’at al-tebbiyah* (The complete medical art). Matters related to medical ethics are discussed in detail in the first chapter of this book [5]. Ibn Sina (Avicenna) (981–1037) also wrote valuable guidelines on teaching and practising ethics for physicians.

Medical ethics was a part of the curriculum for medical students in traditional Iranian medicine in medieval times, and great Iranian physicians have paid special attention to ethics in their practice, teaching and manuscripts. Persian medical ethics was “modern” in speaking not only of the cognitive but also of the characterological attributes of a good physician [6,7]. After the introduction of modern medical education in the Islamic Republic of Iran, the first college of medicine, Dar ul-Funoon, was established in the nineteenth century. With the foundation of the faculty of Medicine in Tehran University in 1934, education in medical ethics comprised a part of medical student education courses [8].

The first Farsi book of medical ethics, *Medical ethics and customs*, written by Dr M.N. Etemadian was published in 1963 [9]. Topics such as doctor–patient relationship, confidentiality, abortion and euthanasia were thoroughly discussed. Currently, medical ethics is taught in 19 lectures (2 credits) to medical students in Iranian medical universities at national level. Books

---

المجلة الصحية لشرق المتوسط،منظمة الصحة العالمية،الجلد الحادي عشر،العددان 5،6،2005
and guidelines have been printed and are a part of the curriculum. Problem-based case studies for teaching medical ethics were introduced 2 years ago. A book on this topic, *Pezeshk va molaezat-e akhlghi* (Health care professional and ethical issues), using a detailed case study approach has recently been published in Farsi [10].

In the Islamic Republic of Iran, ethical issues are discussed among physicians, legal experts and religious scholars. The principles of bioethics and solutions to ethical problems are therefore derived from the Islamic legal rulings. They are updated in the light of the Holy Quran, the traditions of the Prophet of Islam ﷺ, the consensus of scholars, and human wisdom or intellect.

Iranian Islamic culture essentially emphasizes altruism, benevolence to fellow human beings, seeking perfection, life after death and association of a human being with God and the universe.

**Principles of Islamic ethics**

Special attention has been paid toward moral ethics in Islam [11]. The essential core of Islamic teachings is the perfection of ethical conduct of a human being. The prophet of Islam, Muhammad ﷺ, has said, “I have been appointed as prophet of God for the completion and perfection of moral ethics,” (Ali al-Hakim al-Nisaburi (d. 405 AD), *Al-Mustadrak ala al-sahihayn* (The supplement), Vol. 2:282). The road to moral and spiritual perfection is described as the “quest for God” in Islam. The seekers after God must satisfy 2 conditions: their actions must be governed by the prescriptions or ordinances of the “divine law” (al-sha’r), and they must ensure that God is constantly present in their hearts [12]. Man is a being with dual aspects, soul and body. Man’s reality is not merely his physical nature. Human reality depends on the eternal soul. Man has certain perfections by virtue of his spiritual self. Any act that is consistent with man’s spiritual perfection is valuable, and any act that is irrelevant to the higher aspect of the soul is an ordinary and mediocre act [13]. In accordance with this approach, virtues like honesty, truthfulness, beneficence and the like are notions which have affinity to the higher self. A most significant Islamic principle is: “Man has an innate nobility and sublimity which is the same as his spiritual being and the divine breath” [13]. Although physically and naturally all men live in different conditions and situations and with varying physical needs, they are equally situated in respect to their spiritual perfection. Inevitably, in that domain likes and dislikes and notions of what is good and evil assume a uniform, universal and permanent aspect. All perceptions of good and evil signify a thing’s relation with its perfection. Nevertheless such perfections of good and evil can be universal and permanent [13].

On the other hand, God gave man life and with that also gave man the freedom and the authority to do good or to indulge in evil. God also gave man the basic knowledge of good and bad at the time of his inception [14]. The Holy Quran (91:7–10) says: “The human soul—the way He moulded it and inspired it with knowledge of its evil and its good—bears witness to the fact that indeed he who cleanses it (of all impiety) shall be successful while he who corrupts it shall face doom.”

It is for this reason that ethical values like justice, honesty, trustworthiness and truthfulness have never been questioned philosophically, even if there is considerable practical deviation from these values or a huge difference in their practical application [14].

Freedom is among the highest of human values and is above man’s animal nature and material values [15]. A human act is valuable if it is done by informed freedom.
From the Islamic viewpoint, people are autonomous in the decision-making process if they are able to understand and make intelligent decisions for themselves which are intentional and voluntary \[16\].

In conclusion, in Islamic ethics, the 4 principles of medical ethics (beneficence, non-malfeasance, autonomy and justice) and other similar values such as freedom, helping fellow human beings, etc. are completely acceptable. But their interpretation and practical application may be different from those of other religions and cultures. For example, since Islam places more emphasis on respect to all human beings, the interpretation of the principle of “respect to autonomy” may be limited in some situations.

**Bioethics activities in the country**

In the current decade, great efforts are being exerted in medical ethics education, research and legislation in the Islamic Republic of Iran.

**Research and education**

Recent developments in medical ethics in the field of research started with the establishment of a medical ethics research centre, since when other activities at national and local levels have been gradually carried out.

*Establishment of a medical ethics research centre*

The medical ethics research centre was established by the Ministry of Health and Medical Education in 1993. At present, the centre is known as the Office of Study for Humanistic and Islamic Sciences on Medicine and Medical Ethics \[17\]. The goals are:

- organizing discussions on medical ethics at university level;
- training specialists in medical ethics;
- research on various aspects of contemporary medical ethics;
- publication of textbooks for the medical school curriculum;
- establishment of a council to address ethical issues in medicine and research in accordance with Islamic rules and universally recognized codes.

The first international conference on medical ethics was organized in Tehran in 1993 by the centre. Collection, organization and categorization of scientific publications on medical ethics were accomplished in the conference. The proceedings of the conference were published as a series of books (7 volumes) in Farsi \[18\].

From 1993 onward, seminars and courses on medical ethics for physicians, nurses and pharmacists were established in different regions of the country. Weekly workshops on biomedical ethics for physicians and specialists were also organized about various topics related to current important issues.

*The National Committee for Medical Research*

This committee was established in 1998 with the following responsibilities:

- to apply Islamic, legal and moral principles to biomedical research;
- to guard human rights and legally protect the participants, the researchers and the institutes involved in research;
- to promote mandatory inclusion of advisors on ethical issues in all research projects at universities, private research foundations and industries.

Members of the National Committee are the Deputy for Research of the Ministry of
Regional committees for ethics in medical research
The establishment of the national committee paved the way for the organization of regional committees in over 40 medical universities throughout the country. These committees undertake the supervision and observation of national and international laws on medical ethics in research. They approved over 305 graduate level research projects during 1999–2001.

Local ethics committees have also been established in over 70 research centres involved in biotechnology, molecular and cellular biology and related fields [17]. The current trend is towards approving a common guideline for all ethics committees throughout the country.

National codes of ethics in biomedical research
In 2000, a guideline comprising 26 National Codes of Ethics for biomedical researchers was prepared by Ministry of Health and Medical Education. These codes are in accordance with the international declarations such as the Council for International Organizations of Medical Sciences guidelines [19] and the Helsinki Declaration [20] and have been customized according to the code of religious laws in shi’a (the official religion in the Islamic Republic of Iran) and specific cultural issues of the Iranian population. The code for the protection of human participants in medical research (to be used by the local committees of ethics in medical research for making ethical judgments) is as follows.

- Informed consent in all investigations where human beings are involved is mandatory; in the case of interventional research, this should be in the form of a written statement.
- Nothing can justify exposing a human being to unnecessary harm or restricting his/her volition.
- The consent should be both informed and voluntary. It should be verified that there are no predictable risks to participants that are more than minimal. Behaviours such as threats, temptation and coercion will also annul the consent. Whenever these conditions are not observed, the scientist is accountable for any possible damage.
- In all studies where the researcher has a higher rank than the participant(s) in the study, the reason for selecting the participant(s) must be approved by the Committee of Ethics in Research. The situation requires that a trusted third person take the consent.
- In all medical research, therapeutic or non-therapeutic, the scientist is obliged to inform the participants in an appropriate way about the duration of the research, the methods used and the possible harms and benefits. The scientist should also give accurate answers to his/her participants’ questions. These should be reflected in the consent form.
- Before any medical research can be done, preliminary actions should be executed to minimize harm to research participants and to maintain health. Each participant should have his/her own insurance in the case of a research mishap. In addition, all scientists should be covered by some indemnity insurance.
• The way that results of a study are reported should guarantee all rights of every related element (research subject, researcher, the research itself and the related institution)

• The participant should be aware that she/he can withdraw from the research project at any time. She/he should also be informed about and supported for any possible harm caused by abandonment of the research.

• If the subject’s knowledge of certain information affects the validity of research result, at the discretion of the researcher, the subject must be denied such information upon the approval of the ethics committee. Comprehensive arrangements must however be made to inform the subject of such information at an appropriate time.

• It is the duty of the scientist to make sure that the participant is informed; informing by other persons will not obviate this responsibility.

• Including an uninformed participant is prohibited unless the participant waives his/her rights.

• In clinical trials where groups of controls and cases are necessary, participants should be aware that they are participating in an investigation where they will be placed in one of the groups by chance.

• Research on human participants is not justified unless the benefits to be derived outweigh the risks. The arbitrators who will judge the issues are committees of ethics in medical research, who will get advice from related specialists.

• In non-therapeutic research, the level of harm participants are exposed to should not surpass the level that the participant may face in everyday life.

• Exposing an individual to harm is not justified in any circumstances solely by affirming that the procedure is practical, simple, fast, comfortable, or cost-effective.

• Whenever a research project would expose participants to possible risks and the participants are of low socio-economic status or from less-educated groups of the community, the appropriate committee should verify that the patient understands the implications of participating.

• It is the scientist’s responsibility to ensure the confidentiality of the participants and to set up appropriate measures to ensure this will not be breached. If there should be any obstacle to this, the scientist must inform his/her participants.

• In research in which the participant is unaware of the drug used, the scientist must establish measures to provide the required information to the participant and/or his/her physician in the event of an emergency.

• Any possible harm as a result of participation in a study should be indemnified according to enacted laws.

• Research methods should not violate the accepted morals of society.

• When there is no obvious advantage, it is the committee of ethics in medical research that decides which method should be applied and how the selection of participants (from prisoners or certain groups such as minors, mentally retarded individuals or psychotics as opposed to normal individuals) should be made.

• Participation of prisoners is not prohibited as long as the results of the study are exclusively applicable to those in jails. A written statement of consent should be obtained in this case.
• The scientist cannot include prisoners as “preferred subjects” merely because they are available for research projects.
• Participation of people with cognitive impairment or those who are not legally able to enter into contracts, such as children, is the responsibility of their guardians, who will have to give their permission. This principle will also apply if a participant develops any sign of cognitive impairment or psychosis during a research project, in which case previously given consent would be void. On the other hand, when a minor reaches full legal majority, a written statement of consent must be obtained from him/her.
• Performing non-therapeutic investigation on embryos (from the time of fertilization until the end of the eighth week of gestation) is not permitted unless such studies bring beneficial consequences to the embryo and/or its mother [21]. Written informed consent, both from the mother and the guardian of her embryo, must be obtained in this case.
• When it seems necessary, there is no prohibition against study on aborted embryos when it is considered necessary, provided that the legal codes of practice are observed.

Approval and financial support of each project will be confirmed only when the above code has been respected.

Publications
A number of reference books are available for medical students in the Islamic Republic of Iran. Medical ethics with a brief overview of medical history is one such reference book, which was published by the Ministry of Health and Medical Education in collaboration with the faculties of the Tehran University of Medical Sciences in 1991 [22]. Since 1993, great achievements have been made in authoring, translating and publishing medical ethics books and other sources. Over 30 foreign texts and books on biomedical ethics have been translated in that time. The book Ethics in medical research by Trevor Smith has been translated recently (2002) [22]. In the preface, the correlation between ethics and research, history of international laws, philosophy of ethics in Islam, status of ethics and research in the Islamic Republic of Iran are discussed in detail.

A journal entitled Teb va tazkyeh (Medicine and purification) has also been published by the Ministry of Health and Medical Education since 1993. The first book in Farsi about medical, legal, ethical and religious aspects of organ transplantation in the Islamic Republic of Iran published in 1999 [23]. A further book on this issue was published in 2004 [24]. A problem-based approach for teaching medical ethics was introduced recently in a book in Farsi on health care and professional and ethical issues using this approach [10].

National bioethics committee
The Iranian national commission for the United Nations Educational, Scientific and Cultural Organisation is drafting a guideline for the constitution of a national bioethics committee [17]. The committee will include representation from the Ministry of Health and Medical Education; the Ministry of Science, Research and Technology; the Organization for the Protection of the Biological Environment; the Ministry of Agricultural Jihad; the Legal Medicine Organization of the Islamic Republic of Iran; the Hozhelimieh (Seminary of religious jurisprudence) of Qom; the Iranian Academic Centre for Education, Culture and Research; and the Medical Council of the Islamic Re-
public of Iran (a nongovernmental organization). Two specialists in the philosophy of ethics, 2 lawyers, 2 biotechnologists, 2 biologists, and 1 specialist from each of immunology, genetics, pharmacology, biochemistry, psychology and epidemiology will comprise the permanent members [17]. This committee will discuss important issues of bioethics in the country.

Bioethics legislation in the Islamic Republic of Iran
The official religion in the Islamic Republic of Iran is Shi'a, a branch of Islam, and fatwa (religious opinion about whether an action is permissible or not) of religious scholars is essential for the success and acceptability of an act by the general public. There have been positive fatwas about bioethical issues such as organ transplantation, abortion and genetic research in the Islamic Republic of Iran, some of which have been implemented into law by parliament in recent years.

Organ transplantation and brain death
Organ transplantation has a long history in the Islamic Republic of Iran and the country has one of the most successful programmes in the Middle East (Table 1). Data comparing organ transplant rates in Asia, Europe and the United States of America with those in the Islamic Republic of Iran are shown in Table 2 [25].

Ethical problems associated with organ transplantation have been important issues in recent years all over the world. In our country, altruism based on religious ethical teachings and the traditional cultural values of helping fellow human beings have a significant place in the context of organ donation. In the Holy Quran it is mentioned: “... and whosoever gives life to a soul, it shall be as if he has given life to all mankind” (5: 32). In 1998, the consensus of physicians and religious leaders in the Islamic Republic of Iran paved the way for advancement and rapid progress for a nationwide organ transplantation programme. In this regard, parliament approved the Deceased or Brain Dead Patients Organ Transplantation Act (Act. H/24804-T/9929, June 4 2000) (Table 3). According to the Act, cadaver organs and tissues and organs of brain-dead persons can be used for transplantation if the

| Table 1 History and current data for organ transplantation in the Islamic Republic of Iran |
|---------------------------------|---------|---------|---------|---------|
| Organ or tissue                | First transplant | Total no. | 2002 Living don | Cadaver don |
| Cornea                         | 1935     | > 18 000 | 2581    | –     | 2581    |
| Kidney                         | 1967     | > 14 000 | 1681    | 1585  | 96     |
| Bone marrow                    | 1990     | > 800    | 170     | 170   | –      |
| Liver                          | 1993     | 55       | 23      | 1     | 22     |
| Heart                          | 1993     | 45       | 11      | –     | 11     |
| Lung                           | 2001     | 4        | 1       | –     | 1      |
| Heart + Lung                   | 2002     | 1        | 1       | –     | 1      |
| Pancreas + islet cells (preliminary studies) | 1999 | –        | –       | –     | –      |
person expressed in his/her will a desire to donate organs, or with the consent of his/her family and definite establishment of brain death by specialists.

Usually organ transplantation is assisted by charity organizations and there would be a gift to the donor as well. The law relating to organ donation was approved by the government of the Islamic Republic of Iran in 1997.

**Table 2 Comparison of transplant rates in the year 2000 in different geographic regions**

<table>
<thead>
<tr>
<th>Region</th>
<th>Population (millions)</th>
<th>No. transplants/million population</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Kidney</td>
</tr>
<tr>
<td>Islamic Republic of Iran</td>
<td>65</td>
<td>24</td>
</tr>
<tr>
<td>Asia</td>
<td>3600</td>
<td>3</td>
</tr>
<tr>
<td>Europe</td>
<td>520</td>
<td>27</td>
</tr>
<tr>
<td>United States of America</td>
<td>260</td>
<td>52</td>
</tr>
</tbody>
</table>

**Genetic research**

There are few centres for genetic research in the Islamic Republic of Iran but the numbers are increasing. Given the importance of issues such as gene therapy, confidentiality of genetic information, sex selection before birth, eugenics, and cloning, there is a necessity for the adjustment of guidelines. There is no absolute restriction on

<table>
<thead>
<tr>
<th>Table 3 Deceased or Brain Dead Patients Organ Transplantation Act, April 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single article</td>
</tr>
<tr>
<td>Sub article 1</td>
</tr>
<tr>
<td>Sub article 2</td>
</tr>
<tr>
<td>Sub article 3</td>
</tr>
</tbody>
</table>

The executive by-law of the aforementioned Act shall be prepared within 3 months of the notification of the Act by the Ministry of Health and Medical Education and the representative of the judiciary in coordination with the Medical Association of the Islamic Republic of Iran and the Special Diseases Foundation.
genetic research in the Islamic Republic of Iran; moral principles and ethical codes must, however, be completely followed, particularly compulsory informed consent, informed choice, respect for individual autonomy, anonymity (no name and address, use of coding), relative risk assessment, confidentiality and privacy.

The Molecular Medicine Network is a newly founded organization whose goal is coordination and observation of research centres in regard to ethical issues [17].

**Stem cell research and cloning**

Human reproductive cloning is prohibited in the Islamic Republic of Iran. Embryonic stem cell research has, however, recently been approved by the religious authorities and some projects have been started.

**Assisted reproductive health**

At present, there are more than 15 active infertility centres in the country. In vitro fertilization and intracytoplasmic sperm injection are permissible and have been done in The Islamic Republic of Iran. The first infertility centre was established in Yazd (in the central region of the country) in 1986 and the first Iranian baby conceived by in vitro fertilization was born in 1989. Recently, parliament approved the Embryo Donation to Infertile Spouses Act of July 2003 (Ref. No. 33704, August 5, 2003). By virtue of this law, the donation of embryos is permitted under certain conditions.

**Abortion**

The majority of scholars consider life to begin at the time of conception. A mother is free to decide herself if she wants to conceive. After that, God is the owner of the life of that baby and she is only a carrier. Abortion is considered equivalent to murder, and is not ordinarily permitted. Therapeutic abortion is permissible before the end of the 16th week of gestation if there is a danger to the life of the mother. Parliament ratified the Therapeutic Abortion Act recently (Therapeutic Abortion Act. Ref. No. 2/85876, June 21 2005). Based on the act, therapeutic abortion in the above-mentioned circumstances will be permissible with the confirmation of 3 gynaecologists and the approval of the Legal Medicine Organization. This act will pave the way for therapeutic abortion under circumstances with such criteria as definite diagnosis of untreatable disorders, unusual problems for the family and life-threatening conditions for the mother. The Legal Medicine Organization has defined 51 fetal and maternal disorders that could be included in this bill.

**Future of bioethics in the Islamic Republic of Iran**

Considerable plans and activities are being carried out by the Ministry of Health and Medical Education and also the Ministry of Science, Research and Technology. The most important topics are:

- implementation of “nationwide strategic planning for medical ethics”;
- maintaining and strengthening a nationwide bioethics network in collaboration with intellectuals, philosophers, legal experts, sociologists, scholars and physicians;
- the establishment of a National Medical Ethics Information Centre and Library;
- planning special courses at master’s level and a PhD programme in medical ethics, with special attention to Iranian Islamic culture;
- organizing workshops on ethics in biomedical research;
- promoting dialogue among diverse groups on medical ethics;
designing coordinated ethical codes with all stakeholders.

We hope that this document will encourage physicians, lawyers and religious scholars to take a greater interest in the different issues of bioethics in the Islamic Republic of Iran.

References


Comparison of health care financing in Egypt and Cuba: lessons for health reform in Egypt

C.A. Gericke1

1Department of Health Care Management, (WHO Collaborating Centre for Health Systems Research and Management), Berlin University of Technology, Berlin, Germany (Correspondence to C.A. Gericke: christian.gericke@tu-berlin.de).

Received: 31/05/04; accepted: 15/09/04

ABSTRACT Egypt and Cuba are both lower-middle income countries with a history of socialist rule, which have embarked on economic liberalization since the 1990s. Cuba has achieved exemplary health status whereas health status in Egypt is lower than could be expected for its level of income. In this article, health care financing mechanisms in both countries are analysed on their effectiveness, efficiency, and equity, with the objective of identifying the determinants of success in the Cuban health system from which valuable lessons for current health reforms in Egypt may be derived.

Comparaison du financement des soins de santé en Égypte et à Cuba : enseignements pour la réforme de santé en Égypte

RÉSUMÉ L’Égypte et Cuba sont deux pays à revenu moyen inférieur qui ont une histoire de régime socialiste et qui se sont engagés dans un processus de libéralisation économique depuis les années 90. Cuba est parvenu à une situation sanitaire exemplaire tandis que la situation sanitaire en Égypte est en deçà des attentes par rapport à son niveau de revenus. Cet article analyse les mécanismes de financement des soins de santé dans les deux pays pour ce qui est de leur efficacité, efficience et équité, dans le but d’identifier les déterminants du succès du système de santé cubain dont on pourrait tirer des enseignements utiles pour les réformes actuelles du système de santé en Égypte.

1Department of Health Care Management, (WHO Collaborating Centre for Health Systems Research and Management), Berlin University of Technology, Berlin, Germany (Correspondence to C.A. Gericke: christian.gericke@tu-berlin.de).

Received: 31/05/04; accepted: 15/09/04
Introduction

Egypt’s health status is surprisingly poor considering its level of national income \[1,2\]. Cuba on the other hand achieves an extraordinarily good health status with a comparable national income [3], and was able to maintain it through a prolonged period of economic crisis in the 1990s [4]. Although both countries are located on different continents and have very different cultures, a number of similarities exist. Notably, both countries have been under socialist rule since the 1950s/1960s and have embarked on economic reforms in the last decade. Both are lower-middle income countries according to the World Bank classification. In contrast to many other low- and middle-income countries, both countries have a tradition of training large numbers of health professionals, in particular doctors, and both are net exporters of health professionals.

The Egyptian government is currently considering policies to reform health care financing and has started pilot projects with the help of external funding and technical assistance, notably by the World Bank, USAID, private consultancies, mainly USAID-subcontractors, and the European Commission.

In this article the Egyptian and Cuban health care financing arrangements are compared in order to determine which successful aspects of the Cuban approach could possibly be translated into the Egyptian context. Health service delivery issues are beyond the scope of this study.

The paper begins with an overview of the two health care systems and their political and socioeconomic environments. A description of the assessment criteria is followed by a comparative analysis of the health care financing mechanisms in both countries. The paper concludes with a discussion of the implications of this analysis for the current health reforms in Egypt.

Country situations

Political and socioeconomic environment

Egypt and Cuba are both lower-middle income countries [5]. Since 1990, both countries have introduced measures of economic liberalization in socialist systems without major changes to their political systems [6,7]. National income levels and income distribution are very similar, although national income estimates for Cuba are somewhat uncertain, as the country does not collaborate with the World Bank or the International Monetary Fund and thus has not been assessed using the same methodology (Table 1).

The demography of the two countries differs markedly. Whereas Egypt struggles to cope with high population growth and associated problems like unemployment of young people, Cuba is facing problems of an ageing society similar to the situation in many developed countries. For other socioeconomic determinants of health there is a wide discrepancy between the two countries, especially concerning gender inequality (Table 1).

Health systems

Egypt

Egypt has a complex health system, with many different public and private providers and financing agents. There are four main financing agents: i) the government sector which is understood in Egypt to refer to the various ministries and departments of the government; ii) the public sector, consisting of financially autonomous organizations owned by the government, the largest being the Health Insurance Organization (HIO)

1074  La Revue de Santé de la Méditerranée orientale, Vol. 11, No 5/6, 2005

النظام الصحي للشرق المتوسط، منظمة الصحة العالمية، المجلة الحادية عشر، العددان 5- 6، 2005
and Curative Care Organizations (CCO); iii) private organizations, such as private insurance companies, unions, professional organizations, and not-for-profit nongovernmental organizations (NGOs); and iv) households \[12,13\]. Health care providers in the government sector are the Ministry of Health and Population (MOHP), teaching and university hospitals, HIO, and the Ministries of Interior and Defence. Public providers are HIO, CCO and other public firms. The private sector consists of both not-for-profit and for-profit providers, such as private clinics, hospitals and pharmacies \[12\]. NGOs are currently one of the fastest growing sectors \[13\].

In the Egyptian financial year 1995, health spending totalled Egyptian pound (LE) 7.5 billion or 3.7% of GDP, equivalent to LE 127 (US$ 38) per capita \[12\]. Public financing, mainly from general taxation, contributed 1.6%, private financing 2.1% of GDP \[12\]. In 1999, government revenues totalled 23.6% of GDP. Central tax revenues accounted for 15.6%, transferred profits for 3.2% and other, not-tax revenues for 1.8%. Local revenues accounted for 2.9%. Since 1994 total revenues have decreased steadily from 30% of GDP, and tax revenues from 17.9% respectively \[14\].

Social insurance, which accounted for 18% of public funding \[12\], is mandatory for formal government and company employees, who contribute 0.5% and 1% of their base salary, and their employers 1.5% and 3% respectively \[13\]. Firms, private insurance and syndicates raised 5% of funding, and household spending accounted for 51% \[12\].

Almost all public monies passed through financial intermediaries before being transferred to providers, whereas more than 90% of household expenditures consisted of direct out-of-pocket payments to private providers and pharmacies \[12\]. There were three major financing channels: i) from Ministry of Finance (MOF) to MOHP facilities through the MOHP budget (LE

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Egypt</th>
<th>Cuba</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socioeconomic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population (millions)</td>
<td>64</td>
<td>11</td>
</tr>
<tr>
<td>Area (’000 km²)</td>
<td>1001</td>
<td>110</td>
</tr>
<tr>
<td>Gross national income per capita (current US$)</td>
<td>1530</td>
<td>746 to 2975 (estimated)</td>
</tr>
<tr>
<td>Gini coefficient</td>
<td>0.29 (1995)</td>
<td>0.27 (1978)</td>
</tr>
<tr>
<td>Rural population (%)</td>
<td>53</td>
<td>25</td>
</tr>
<tr>
<td>Adult illiteracy in males (%)</td>
<td>29</td>
<td>2.3</td>
</tr>
<tr>
<td>Adult illiteracy in females (%)</td>
<td>51</td>
<td>2.3</td>
</tr>
<tr>
<td>Unemployment (%)</td>
<td>12.5</td>
<td>7.9</td>
</tr>
<tr>
<td><strong>Demographic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total fertility rate (births per woman)</td>
<td>3.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Crude birth rate (per 1000 population)</td>
<td>28.4</td>
<td>12.7</td>
</tr>
<tr>
<td>Crude death rate (per 1000 population)</td>
<td>6.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Dependency ratio (%)</td>
<td>67</td>
<td>45</td>
</tr>
<tr>
<td>Percent population below 15 years</td>
<td>35</td>
<td>22</td>
</tr>
<tr>
<td>Percent population 60 years and over</td>
<td>6.3</td>
<td>13.4</td>
</tr>
</tbody>
</table>

Sources: [4,5,8,9,10,11].

Table 1 Socioeconomic and demographic indicators for Egypt and Cuba, 2000

[12]}

The Mediterranean Journal of Global Health (IJMGH) 2010; 1: 87-95

Table 1 Socioeconomic and demographic indicators for Egypt and Cuba, 2000

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Egypt</th>
<th>Cuba</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socioeconomic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population (millions)</td>
<td>64</td>
<td>11</td>
</tr>
<tr>
<td>Area (’000 km²)</td>
<td>1001</td>
<td>110</td>
</tr>
<tr>
<td>Gross national income per capita (current US$)</td>
<td>1530</td>
<td>746 to 2975 (estimated)</td>
</tr>
<tr>
<td>Gini coefficient</td>
<td>0.29 (1995)</td>
<td>0.27 (1978)</td>
</tr>
<tr>
<td>Rural population (%)</td>
<td>53</td>
<td>25</td>
</tr>
<tr>
<td>Adult illiteracy in males (%)</td>
<td>29</td>
<td>2.3</td>
</tr>
<tr>
<td>Adult illiteracy in females (%)</td>
<td>51</td>
<td>2.3</td>
</tr>
<tr>
<td>Unemployment (%)</td>
<td>12.5</td>
<td>7.9</td>
</tr>
<tr>
<td><strong>Demographic</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total fertility rate (births per woman)</td>
<td>3.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Crude birth rate (per 1000 population)</td>
<td>28.4</td>
<td>12.7</td>
</tr>
<tr>
<td>Crude death rate (per 1000 population)</td>
<td>6.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Dependency ratio (%)</td>
<td>67</td>
<td>45</td>
</tr>
<tr>
<td>Percent population below 15 years</td>
<td>35</td>
<td>22</td>
</tr>
<tr>
<td>Percent population 60 years and over</td>
<td>6.3</td>
<td>13.4</td>
</tr>
</tbody>
</table>

Sources: [4,5,8,9,10,11].
1337 million); ii) from Social Insurance Organization (LE 448 million) and MOF (LE 434 million) to HIO; and iii) from households (LE 3780 million) directly to private providers and pharmacies [12].

The use of funds at provider level is summarized in Figure 1. Less than 60% of MOF funds were actually spent in MOHP facilities [12]. The rest was transferred to teaching and university hospitals, HIO and CCO. MOHP facilities thus only received 19% of all health sector resources, or 0.7% of GDP [12]. Of all resources, 56% were spent in the private sector, most of it for the purchase of drugs (63%) or paying for private ambulatory care (17%). Less than 10% of private funds were used to purchase inpatient care [12].

Despite the radical economic policy shift, there has been little change in the overall financing and structure of the health system since 1991. The only notable changes were the expansion of social insurance coverage to 10 million schoolchildren in 1993 [13] and an increase in total health spending from 3.4% to 3.7% of GDP [12].

Cuba
Cuba’s health system represents the archetype of a public integrated system, with funding through general taxation, public ownership of all health services, and health professionals who are direct state employees [15]. Financing for the National Health System (Sistema Nacional de Salud - SNS) is almost completely covered by public funds [4]. With the Ministry of Public Health (Ministerio de Salud Pública - MIN-SAP) as steering agency, the SNS is organized at three levels (national, provincial and municipal), which mirror the country’s administrative structure [15]. Coverage is universal, as all citizens have the right to all health benefits.

Health care provision is exclusively public with a ban on private practice [7]. This includes all kinds of health and social welfare provision, from primary care to drug-exporting companies [15].

In 1997, health spending totalled pesos 125.3 million or 6.7% of GDP, equivalent to US$ 139 per capita [4,10]. Financing from general taxation contributed 5.5%, and private household financing 1.2% of GDP [10]. Private financing for public health services is a new phenomenon in Cuba, which was introduced in 1990 [10]. It consists of modest out-of-pocket co-payments for drugs prescribed for outpatients, hearing, dental and orthopaedic...
prostheses, and medical devices such as wheelchairs and crutches [4].

Before 1990, the Soviet Union and other socialist economies in Eastern Europe represented Cuba’s main export markets and source of foreign aid needed because of the economic embargo imposed by the United States of America (USA) [7]. After the collapse of socialism in the Soviet Union and Eastern Europe, Cuba faced a grave economic crisis, during which its GDP decreased by as much as 35% in 1993 [4], resulting in severe shortages of various basic commodities including food, pharmaceuticals, soap and insecticides [7]. An epidemic of optic and peripheral neuropathy, probably caused by vitamin deficiency, hit the country in 1992/1993 and affected more than 50 000 people. To counteract the health effects of the economic crisis, the Cuban government increased health expenditure steadily as a percentage of public spending from 6.6% in 1990 to 10.9% in 1997 [16].

Assessment criteria

The analysis follows the three E’s framework for comparative evaluation of health systems: effectiveness, economy and equity. Here, effectiveness is defined as improvement in health status. Economy is defined as efficiency at the macro- and micro-economic level, where aspects of productive and allocative efficiency are assessed. Both vertical and horizontal equity aspects will be considered. Horizontal equity will be assessed according to the ability-to-pay principle, but not the benefit principle, and according to the principle of equality of opportunity. The ability-to-pay principle requires payment to be organized not according to the benefit received, but in such a way that individuals pay according to their means, whereas the benefit principle requires that those who benefit from a service should pay for it, and that the amount paid should in some way be related to the benefit received [17].

Comparative analysis

Effectiveness

Health status improvement

The effectiveness of health care to improve health on a population level is not directly measurable, as observed improvements in population health cannot be attributed to any single determinant. Furthermore, there is good evidence that the contribution of other factors towards good health, such as education, safe water, sanitation and housing, is more important than that made by health care [1,18]. Thus, a general description of the health status in Egypt and Cuba is given here (Table 2), together with a summary of health trends over the past two decades (Table 3). This is not meant to imply that health care is necessarily the driving factor behind those changes.

Cuba and Egypt are on very different levels of the health development curve. Health status in Cuba was already comparable to a country belonging to the Organization for Economic Cooperation and Development (OECD) in 1978 and continued to improve at a rate comparable to OECD countries despite the severe economic crisis. In Egypt, substantial health improvements occurred in the 1980s and 1990s, such as the reduction in infant mortality by more than 60% (Table 3). The country has also been very successful in controlling infectious diseases [21]. However, compared to other countries at its level of income, Egypt’s health indicators were and remain poor [1,2,12], whereas Cuba’s health status still exceeds the health status of countries of comparable income and the health status of
regional comparators, best demonstrated by under-five mortality (Figure 2).

**Efficiency**

*Macro-efficiency*

Macro-efficiency refers to the proportion of national income devoted to health care. According to economic theory, health services should be funded up to the point when the value of the last health intervention equals the marginal value derived from the next best alternative use to which the resources involved could be put. As in reality neither can be measured on a system level, there is considerable uncertainty about what constitutes the appropriate level of funding for a given country. Pragmatic approaches compare national health expenditure with i) regional averages or ii) averages for countries with similar national income, whilst taking effectiveness into account. Table 4 summarises the two approaches for Egypt and Cuba.

With total health care spending at 3.8% of GDP, Egypt spends on the lower side
of what is seen in lower-middle income countries, and less than most countries in the Middle East and North Africa region. Its life expectancy lies below the regional and lower-middle income country average. With a total health expenditure of 6.8% of GDP, Cuba spends just above the regional average and attains one of the highest life expectancies in the developing world (Figure 3).

**Micro-efficiency**

Micro-efficiency refers to the health system’s ability to use whatever resources it has to maximum effect. Assessment of micro-efficiency is organized under two categories: productive and allocative efficiency.
**Productive efficiency**

Productive or internal efficiency is achieved when the maximum possible improvement in outcome is obtained from a given level of resource inputs or when costs are minimized to obtain a given level of output. Prerequisites for productive efficiency are effectiveness and technical efficiency. Technical efficiency, which answers the narrow question of whether the same or a better outcome could be obtained by using less of one type of input, and which is a prerequisite for productive efficiency, will not be analysed separately.

**Health professionals input mix**

In Egypt absolute levels of doctors and nurses are 3 to 4 times lower than in Cuba. Furthermore, there are as many doctors and nurses, whereas in Cuba nurses outnumber doctors (Figure 4).

This indicates economic inefficiency in input mix in Egypt as services that could be provided by nurses at lower cost are provided by doctors. The inefficiency in input mix is even greater for general versus specialist medical care, as primary care services in Egypt are mainly provided by specialists (Figure 5).
hospital management

The average hospital occupancy rate of 49% in Egypt is clearly inefficient [25]. This is even worse in public hospitals where rates average 40% compared to 60%–70% in private hospitals [25]. The severity of inefficiency of such low occupancy rates in public hospitals is made clear if one takes into account that private hospitals in Egypt already struggle to remain profitable at 60%–70% occupancy rates [25]. The average occupancy rate in Cuba of 71% [16] is approaching that of many countries in Western Europe which range between 61% in the Netherlands and 84% in Switzerland [26].

Coordination between providers and across subsectors

In Egypt, financing and management is completely fragmented with 29 different public agencies involved [25]. This precludes efficient and equitable risk pooling as well as a consistent policy focus or consistent incentives for efficiency [25]. Duplication of services and administrative structures is common.

Cuba on the other hand has one integrated system under central control. This brings with it a different set of inefficiencies typically seen in large public institutions, like a mismatch between central planning and local needs resulting in waiting lists; the government tries to counterbalance this through a decentralization process and improvements in information flow between the different levels of the system [16].

Incentives for efficient institutional and provider behaviour

The fragmentation and subsequent lack of coordination of the Egyptian financing system result in strategic behaviour among provider institutions [25]. On the individual provider level, public salaries are so low that multiple job-holding is quasi-universal among Egyptian doctors. The potential for earnings in the private sector is also modest given the relative over-supply of physicians [27]. There is indirect evidence that some doctors limit their commitment to public services to work in private practice [27].

Cuban health professionals are all state employees and private practice is banned. Although some perverse incentives like self-referrals to private practice are thus
not seen, the usual inefficiencies associated with low remuneration levels and public salaries are to be expected, such as inappropriate referrals, low motivation and reduced courtesy towards patients [28].

Availability of medical equipment, supplies and adequacy of buildings
There are reports from both countries that both adequacy of health care facilities and supply with essential drugs or maintenance of medical equipment are problematic [16,25]. These problems have intensified in Cuba during the recent economic crisis, in particular repair of high-tech medical equipment is a considerable problem [16].

Allocative efficiency
Allocative or external efficiency refers to the way resources are divided between alternative uses within the health sector. It implies productive efficiency. The theoretical foundation of allocative efficiency rests on the Pareto criterion: a resource allocation is efficient if it is impossible to move to an alternative allocation which would make some people better off and nobody worse off. Among other conceptual difficulties, strict adherence to this principle would preclude changes that would make many people much better off at the expense of a few made slightly worse off [24]. An operational utilitarian decision rule is often used instead: allocative efficiency is achieved when resource allocation maximises social welfare [24].

Incentives to provide cost-effective procedures
Economic theory would predict that in Egypt, where most primary care services are provided by the private sector, preventive services with positive externalities like immunizations would be undersupplied as price signals do not reflect the social and financial costs of production. Indeed only 79% of children receive the complete Expanded Programme of Immunization (EPI) schedule in Egypt [9] compared to 99% in Cuba [16]. As payments in the private sector are predominantly fee-for-service, supplier-induced demand is likely to occur in Egypt.

Other measures to encourage cost-effective behaviour are taken in Cuba. For many prevalent conditions standardized treatment plans have been developed [16]. An essential drug list with 904 compounds is applied [16], whereas in Egypt irrational and over-prescribing is an important problem which is reflected in pharmaceutical consumption and spending being 50% higher than in comparable countries [25].

Distribution of expenditure on different levels of care
In Egypt, public health is poorly targeted, as the focus is on expensive tertiary care [25] and primary care is largely left to the private sector. The reverse is true in Cuba, where the hallmark of the system is the integration of public health into service delivery, in particular through primary care services [23]. In Cuban primary care, one family doctor, often with a nurse partner, cares for around 150 families, whom they know intimately and put as much effort in keeping them healthy as in providing care when they are sick [23].

Equity
Vertical equity
Vertical equity is concerned with the redistribution of income or consumption from the rich to the poor. Health care financing in Egypt is highly inequitable with 57% of expenditures being paid by households, mostly in the form of direct out-of-pocket payments to providers [12]. Out-of-pocket payments are the most regressive type of
contribution to health care. Even the distribution of the 43% public spending is regressive. The poorest income quintile receives 16.4% of public health expenditure compared to 23.6% for the richest quintile [29]. Less than 40% of the general population, and only 15% of those over 15 years of age benefit from social insurance coverage [13,25]. Social insurance with nearly 50% contribution from general revenues resembles more a subsidized public finance scheme than a true insurance that only benefits formal sector workers [12], and even excludes spouses and children of employees [13]. As with other forms of insurance, both adverse selection and patient and provider moral hazard are likely to occur in Egyptian health insurance schemes. A positive feature is the protection from catastrophic illness costs through the safety net offered by MOHP services.

Cuba on the other hand finances 83% of health services out of general taxation [10], which is the most progressive way to finance health care. User charges only exist in the form of modest co-payments for drugs and medical supplies. User fees were only put in place during the economic crisis to raise funding and not as a measure to curb demand. Payments are very limited to avoid catastrophic illness costs and minimize financial barriers to access, and an exemption scheme for the poor is operated [16].

**Horizontal equity**

Horizontal equity concerns goals like minimum standards for goods or services, for which supply in a free market would not meet social demand because of failure of one or more of the standard assumptions as is the case in health care, or equal access to these goods and services and the closely related concept of equality of opportunity.

For Egypt, there is plenty of evidence of horizontal inequity by income, gender and geography. Because of the high percentage of out-of-pocket payments, ability to pay is a major barrier to accessing health services. MOHP, the different social insurance organizations, and private providers all offer different benefit packages, which is counter to the goal of equal treatment for equal need. Public spending is strongly biased towards males, who receive 20% more per capita funding than females, although utilization rates are higher for women as in most countries [29]. This is largely due to the pronounced pro-male bias in HIO spending, where males receive almost three times the level of benefits as women [29]. Per capita public spending is 67% higher in richer urban areas compared to poorer rural regions [25].

There is also an important geographic disparity of service delivery in Egypt. Utilization rates for ambulatory and hospital care are nearly double in urban compared to rural regions [30]. These inequities in financing and delivery are certainly one reason for infant and child mortality being three times higher, and maternal mortality being five times higher in rural compared to urban areas [25].

Cuba on the other hand is one of the few developing countries achieving real universal coverage. This is exemplified by 100% of women receiving prenatal care and attended deliveries by trained personnel [16] compared to 39% of mothers receiving prenatal care and 46% attended deliveries in Egypt [9]. There is little variation in health indicators and health care utilization between urban and rural populations. For instance, in 2001 infant mortality ranged from 4.4 to 9 deaths per 100 000 births in the 14 provinces and the Isla de la Juventud, with urban rates (Habana City with 6.7 deaths) close to the average of 6.2 deaths [31]. Data on health expenditure or health status variation by income class are not
available. However, major disparities are unlikely given the overall social structure in Cuba.

Implications of key findings

From the comparison between Egypt’s and Cuba’s health systems, valuable lessons can be derived for health sector reform in Egypt. Although both countries made a rhetoric commitment to universal coverage and access to care \(13,16\), – after the revolution and again in the 1980s in Cuba and in the 1980s in Egypt – only Cuba designed its health system to achieve these goals.

The first lesson is that it is possible to achieve excellent health status which is equitably distributed in a lower-middle income country. This was only possible because the Cuban government committed sufficient public funds to health care.

Egypt’s current total and public spending on health is clearly macro-inefficient, and to overcome this, the government would have to raise public spending on health substantially. At the same time, it would have to make sure that the prevailing inequities in financing are reduced. Vertical equity can only be improved through a reduction in out-of-pocket payments and an increase in the provision of services funded through mechanisms based on solidarity and risk pooling. From the two main options that already exist in Egypt, general taxation and social insurance, funding through taxation is more progressive and was the route chosen in Cuba.

The second lesson is that the current fragmented financing and provision system creates more inefficiencies than a single, public integrated system, which of course is not without problems. Parallel subsystems are clearly micro-inefficient as they create perverse incentives, duplication of services and higher administration costs as well as lower purchasing power of fund-holders. This is best exemplified by the 40% occupancy rate in public hospitals, which are often located side-by-side with health insurance organization hospitals and private hospitals.

The third lesson is that if too much leeway is left to the private sector, services will not be provided in an externally efficient or equitable way. Cuba went to the extreme of banning private medical practice, successfully. The political feasibility of such an extreme measure in Egypt is probably low. However, much stronger regulation of the private sector is urgently needed. An impressive amount of resources in this under-funded system is wasted for inappropriate and expensive pharmaceuticals and for providing tertiary care of low cost-effectiveness, whereas the most basic, highly cost-effective interventions are not available to everyone. The emphasis on cost-effective, basic public health interventions in primary care has been very successful in Cuba. Prospective provider payments, both on an institutional and individual level, that provide incentives for efficient behaviour have to be implemented. Other measures, such as treatment guidelines, essential drug lists and quality assurance mechanisms, which are all in place in Cuba, should also be instituted.

The fourth lesson is that horizontal equity in financing and delivery is key to good health. Cuba made a particular effort to overcome financial and geographic barriers to accessing health care. This involves again the minimization of out-of-pocket payments, but also a process of active redistribution of funds and delivery to disadvantaged regions and groups.

Finally, health care cannot be seen in isolation. Equitable investment in other sectors, in particular education, housing, water and sanitation, and improved traffic
regulation are certainly equally important to improve population health in Egypt and in other countries in the Eastern Mediterranean region.

References


25. Project appraisal document for a proposed credit in the amount of SDR 66.8 million (US$90.0 million equivalent) to the Arab Republic of Egypt for a health sector reform program. Washington DC, World Bank, 1998.


Management of source and drinking-water quality in Pakistan

J.A. Aziz

ABSTRACT Drinking-water quality in both urban and rural areas of Pakistan is not being managed properly. Results of various investigations provide evidence that most of the drinking-water supplies are faecally contaminated. At places groundwater quality is deteriorating due to the naturally occurring subsoil contaminants or to anthropogenic activities. The poor bacteriological quality of drinking-water has frequently resulted in high incidence of waterborne diseases while subsoil contaminants have caused other ailments to consumers. This paper presents a detailed review of drinking-water quality in the country and the consequent health impacts. It identifies various factors contributing to poor water quality and proposes key actions required to ensure safe drinking-water supplies to consumers.

Gestion de la source et de la qualité de l'eau de boisson au Pakistan

RÉSUMÉ La qualité de l'eau de boisson dans les zones urbaines et rurales au Pakistan n'est pas gérée correctement. Les résultats de diverses études fournissent des preuves d'une contamination fécale de la plupart des approvisionnements en eau de boisson. Dans certains endroits, la qualité de l'eau souterraine se détériore à cause des contaminants présents à l'état naturel dans le sous-sol ou d'activités anthropogènes. La mauvaise qualité bactériologique de l'eau de boisson entraîne fréquemment une forte incidence de maladies à transmission hydrique, les contaminants souterrains causant d'autres troubles aux consommateurs. Cet article présente une analyse détaillée de la qualité de l'eau de boisson dans le pays et des répercussions sur la santé. Il identifie différents facteurs qui contribuent à la mauvaise qualité de l'eau et propose des mesures essentielles pour garantir aux consommateurs un approvisionnement sûr en eau de boisson.
Introduction

Pakistan’s population has a current water supply coverage of 79% [1]. This inadequate supply of water also poses health risks to the consumers because of its poor quality. Faecally-contaminated water is a major contributor to waterborne diseases. With rapid urbanization, the chemical aspects of water quality have also become a cause of increasing concern as toxic chemicals in industrial effluents pose a high risk to human health. Unfortunately, little attention is being paid to drinking-water quality issues and quantity remains the priority focus of water supply agencies. There is a lack of drinking-water quality monitoring and surveillance programmes in the country. Weak institutional arrangements, lack of well equipped laboratories and the absence of a legal framework for drinking-water quality issues have aggravated the situation. Above all public awareness of the issue of water quality is dismally low. This paper presents an overview of the prevailing situation regarding source and drinking-water quality and its impact on human health, and delineates management strategies to ensure safe drinking-water supplies to consumers.

Water quality

In Pakistan, drinking-water supplies are generally obtained from surface water sources (such as rivers, canals or lakes) or the underground aquifers. The quality of surface water is deteriorating as a result of the disposal of untreated municipal and industrial wastewaters and saline drainage effluent from agricultural areas [2]. The river waters have very high suspended solids, particularly during high flow conditions. Many rivers have stretches which do not support aquatic life. The range of water quality characteristics in some of the major rivers in Pakistan as reported by Aziz is presented in Table 1 [2]. Table 2 summarizes the range of water quality characteristics of some important lakes in Pakistan, which are used as raw water sources for drinking supplies [3]. It is evident that these waters are faecally contaminated and require elaborate treatment for human consumption. Only a few major urban cities in Pakistan use surface water sources; these include Karachi, Hyderabad, Islamabad and Rawalpindi. In rural areas, where the groundwater is saline, irrigation canal water after treatment is supplied for domestic use. Unfortunately the surface water quality has not been monitored on a routine basis as a raw water source for domestic supplies and no reliable data are available in this respect. Furthermore, no detailed investigations on biological characteristics of waters including algae and parasitic stages have ever been undertaken.

There is a reliance on groundwater as opposed to surface water sources for drinking-water supplies in most areas of Pakistan [2]. Around 70% of drinking-water supplies come from aquifers [4]. This reliance at present is growing. However, groundwaters in Pakistan are being contaminated by raw sewage irrigation and land disposal of industrial effluents, and through the use of deep soakage pits and heavy application of fertilizers and pesticides. The intrusion of saline water into the fresh water zone as a result of over-pumping has also caused the deterioration of groundwater quality. The quality of groundwater ranges from fresh near the major rivers to highly saline farther away. The general distribution of fresh and saline groundwater in the country is well known and mapped. Cholistan area, Makran coastal zone, Thar, Nara and Kohistan are reported to contain highly brackish groundwater [2].
Table 1 Water quality of some rivers of Pakistan [2]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Indus at Kotri</th>
<th>Chenab at Rakh branch canal</th>
<th>River Ravi at Balloki</th>
<th>Haro at Khanpur</th>
<th>Soan at Chira</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>7.1–7.5</td>
<td>7.0–8.0</td>
<td>7.4–8.35</td>
<td>7.7–8.2</td>
<td>7.5–8.0</td>
</tr>
<tr>
<td>Electrical conductivity (µmhos/cm)</td>
<td>257–487</td>
<td>125–286</td>
<td>280–430</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Total dissolved solids (mg/L)</td>
<td>154–315</td>
<td>149–213</td>
<td>98–250</td>
<td>156–204</td>
<td>116–256</td>
</tr>
<tr>
<td>Suspended solids (mg/L)</td>
<td>10–2000</td>
<td>137–340</td>
<td>156–605</td>
<td>16–4320</td>
<td>11–6130</td>
</tr>
<tr>
<td>Dissolved oxygen (mg/L)</td>
<td>1.5–6.9</td>
<td>6.8–7.9</td>
<td>6.3–8.2</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Biochemical oxygen demand (mg/L)</td>
<td>1.5–5.0</td>
<td>1.4–2.5</td>
<td>2.3–3.9</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Chemical oxygen demand (mg/L)</td>
<td>7.0–19.0</td>
<td>11.0–30.5</td>
<td>16–80</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Faecal coliform (/100 mL)</td>
<td>150–400</td>
<td>1050–5000</td>
<td>1200–15000</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Calcium (mg/L)</td>
<td>12–46</td>
<td>35–53</td>
<td>29–59</td>
<td>28–44</td>
<td>24–36</td>
</tr>
<tr>
<td>Magnesium (mg/L)</td>
<td>3–29</td>
<td>13.5–40</td>
<td>8–22</td>
<td>12–23</td>
<td>7–28</td>
</tr>
<tr>
<td>Chlorides (mg/L)</td>
<td>6–100</td>
<td>30–50</td>
<td>20–30</td>
<td>7–13</td>
<td>7–25</td>
</tr>
<tr>
<td>Sulfates (mg/L)</td>
<td>6–140</td>
<td>28.6–46</td>
<td>27.6–39.3</td>
<td>16–77</td>
<td>5–34</td>
</tr>
<tr>
<td>Nitrates (mg/L)</td>
<td>4.2–10.5</td>
<td>2.0–3.6</td>
<td>0.53–6.0</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Values shown are the range of measurements.

Geological settings have also affected the groundwater quality from place to place. The salt range between Kasur and Mianwali has been found to have groundwaters with high fluoride content, ranging from 5 to 29 mg/L in waters obtained from shallow wells and hand pumps [5,6]. Other areas with high fluoride content include Kharan, Kirthar, and other parts of the country.

Table 2 Water quality of some major lakes in Pakistan [3]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Kalari</th>
<th>Haleji</th>
<th>Keenjhar</th>
<th>Rawal</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>8.0–8.2</td>
<td>7.8–9.1</td>
<td>8.0–9.0</td>
<td>7.2–8.4</td>
</tr>
<tr>
<td>Turbidity (nephelometric turbidity units)</td>
<td>20–29</td>
<td>8–46</td>
<td>20–100</td>
<td>–</td>
</tr>
<tr>
<td>Electrical conductivity (µmhos/cm)</td>
<td>150–400</td>
<td>–</td>
<td>–</td>
<td>100–400</td>
</tr>
<tr>
<td>Alkalinity (mg/L as CaCO₃)</td>
<td>82–96</td>
<td>113–148</td>
<td>88–116</td>
<td>98–164</td>
</tr>
<tr>
<td>Total dissolved solids (mg/L)</td>
<td>142–370</td>
<td>196–340</td>
<td>140–300</td>
<td>–</td>
</tr>
<tr>
<td>Chlorides (mg/L)</td>
<td>46–54</td>
<td>44–78</td>
<td>26–80</td>
<td>9–21</td>
</tr>
<tr>
<td>Total coliform (/100 mL)</td>
<td>3400–4600</td>
<td>750–1800</td>
<td>900–1800</td>
<td>2000–3000</td>
</tr>
<tr>
<td>Faecal coliform (/100 mL)</td>
<td>1400–1700</td>
<td>120–200</td>
<td>96–225</td>
<td>50–1800</td>
</tr>
</tbody>
</table>

Values shown are the range of measurements.
Makran Coast, Mastung Valley, Umar Kot and Tharparkar (AA Khan, unpublished data, 1999). Sampling of groundwater in Jhelum, Gujrat and Sargodha districts by the United Nations Children’s Fund has shown concentrations of arsenic in some samples above the World Health Organization (WHO) guideline value of 10 μ/L (B.A. Chandio, A. Majeed, R. Aftab, unpublished report, 1995). A recent survey conducted by the Pakistan Council of Research for Water Resources (PCRWR) has also indicated arsenic concentrations in some groundwater samples obtained from Bahawalpur, Multan, Lahore and Shekhpura are above the WHO guideline value (M.A. Kahlown, unpublished data, 2002). Heavy use of fertilizers has raised nitrate levels in groundwater at various places including Islamabad, Gujranwala, Faisalabad and many areas in southern Punjab [6]. Groundwaters in Karachi, Faisalabad and Raiwind have been found to contain pesticide residues [7]. In the city of Kasur, disposal of tannery effluent on the land has caused high total dissolved solids, chromium and sulfide content in groundwater [6].

Groundwater quality data for some cities in Pakistan as reported through various investigations are presented in Table 3 [6,8, M.A. Kahlown, unpublished data, 2002]. It is evident that a vast concentration range of various quality parameters occurs in groundwaters at different places and WHO guidelines are often exceeded. More recently, detailed investigation on sub-soil water has been undertaken in 14 main districts of the Punjab province [9]. In this study, 280 samples of water were collected from existing wells, tube wells, hand pumps and motor pumps. Depth of water for the samples taken varied from 10 to 150 metres. Bacteriological quality of sub-soil water was found to be very poor as 180 samples were contaminated with coliform bacteria. Table 4 presents details of the limits exceeded for various parameters detected in different samples.

Invariably groundwaters are supplied for human consumption without any treatment at all or after disinfection only. From the reported results it is evident that the contamination of groundwater sources, if not controlled, may cause substantial damage or irreversible deterioration of the groundwater quality in future.

Drinking-water quality is largely influenced by the source water quality, the extent and efficacy of the treatment rendered and the integrity of the distribution system. In many areas where the groundwater is saline and a surface water source is not available, people have no choice but to use such waters for drinking purposes. Poor microbial quality of drinking-water is the most pressing issue. No urban water supply meets WHO drinking-water quality guidelines [10]. The major reasons for this are the intermittent supply through leaking pipes and cross-connections with nearby sewer lines. In rural areas, where surface waters are supplied after slow sand filtration, arrangements for chlorination at many installations do not exist. In addition pre-treatment facilities such as roughing filters have not been provided. This inadequacy often results in shorter filter runs and poor quality of treated water. Hand pumps and wells in rural areas are invariably not protected from contamination resulting from surface drainage and flooding. In rural areas there is no system in place to assess the quality of water. The institutions responsible for water quality monitoring maintain that there is not much point in monitoring the quality of water where alternative sources of supply do not exist. Estimates suggest that 90% of the country’s population is exposed to unsafe drinking-water [11].
The results of some studies [12] carried out on water quality from hand pumps and open wells are shown in Table 5 and clearly indicate that the water is bacteriologically contaminated and unacceptable for human consumption. Similar results were earlier reported by the Public Health Engineering Department in 1991, when a survey concluded that 99% of water samples obtained from hand pumps and wells in 114 villages of Punjab were unfit for human consumption due to faecal contamination [13]. A similar situation is expected to prevail in other provinces. A detailed survey of drinking-water supplies has been undertaken by the Pakistan Council of Research in Water Resources in 21 major cities of Pakistan (MA Kahlown, unpublished data, 2002). The results revealed that the quality of drinking-water exceeded WHO guidelines with respect to various parameters; these are shown in Table 6.

### Health impacts

Due to contamination of drinking-water, people repeatedly suffer from waterborne diseases. Almost 30% of all reported diseases and 40% of all deaths in the country are attributed to faecal contamination of drinking waters [14].
Cases of cholera, typhoid, hepatitis and dysentery are consistently reported in urban and rural areas. However, such cases are hard to quantify because of under-reporting of disease and the fact that no regular records are maintained in health clinics and hospitals regarding illness due to poor water quality. In Punjab, diarrhoea ranks second amongst 15 priority infectious diseases in children under 5 years of age, clearly indicating the faecal contamination of drinking-water supplies [15]. In Islam-

Table 4 Analysis of 280 Punjab groundwater samples [9]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>WHO guidelines</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Mean</th>
<th>No. exceeding WHO guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>–</td>
<td>8.86</td>
<td>6.51</td>
<td>7.6</td>
<td>–</td>
</tr>
<tr>
<td>Turbidity (nephelometric turbidity units)</td>
<td>5</td>
<td>100</td>
<td>0</td>
<td>2.6</td>
<td>25</td>
</tr>
<tr>
<td>Total dissolved solids (mg/L)</td>
<td>1000</td>
<td>4530</td>
<td>140</td>
<td>817</td>
<td>59</td>
</tr>
<tr>
<td>Hardness (as CaCO₃) (mg/L)</td>
<td>–</td>
<td>1900</td>
<td>42</td>
<td>282</td>
<td>–</td>
</tr>
<tr>
<td>Chlorides (mg/L)</td>
<td>250</td>
<td>1740</td>
<td>10</td>
<td>148</td>
<td>45</td>
</tr>
<tr>
<td>Sulfates (mg/L)</td>
<td>250</td>
<td>1500</td>
<td>19</td>
<td>202</td>
<td>60</td>
</tr>
<tr>
<td>Total iron (mg/L)</td>
<td>0.3</td>
<td>1.15</td>
<td>0.01</td>
<td>0.07</td>
<td>9</td>
</tr>
<tr>
<td>Nitrites (mg/L)</td>
<td>50</td>
<td>30.12</td>
<td>0.01</td>
<td>4.8</td>
<td>0</td>
</tr>
<tr>
<td>Fluorides (mg/L)</td>
<td>1.5</td>
<td>11.60</td>
<td>0.02</td>
<td>0.7</td>
<td>28</td>
</tr>
<tr>
<td>Total coliform bacteria (/100 mL)</td>
<td>0</td>
<td>–a</td>
<td>–a</td>
<td>–a</td>
<td>180</td>
</tr>
</tbody>
</table>

*aNot reported.

WHO = World Health Organization.

Table 5 Water quality from hand pumps and open wells in Punjab [12]

<table>
<thead>
<tr>
<th>Cluster No.</th>
<th>Ground-water level (m)</th>
<th>Public hand pumps</th>
<th>Private hand pumps</th>
<th>Open wells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Coliform (/100 mL)</td>
<td>E. coli (/100 mL)</td>
<td>Coliform</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E. coli</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(/100 mL)</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
<td>–</td>
<td>9–800</td>
<td>0–0</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>10–240</td>
<td>1–10</td>
<td>14–72</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>81–690</td>
<td>9–10</td>
<td>125–1400</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>2–180</td>
<td>9–10</td>
<td>48–125</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>31–109</td>
<td>0–20</td>
<td>21–100</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>13–51</td>
<td>6–20</td>
<td>9–225</td>
</tr>
<tr>
<td>7</td>
<td>10</td>
<td>0–14</td>
<td>0–3</td>
<td>0–12000</td>
</tr>
<tr>
<td>8</td>
<td>7</td>
<td>10–700</td>
<td>0–10</td>
<td>0–70</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>0–4000</td>
<td>0–200</td>
<td>0–9000</td>
</tr>
<tr>
<td>10</td>
<td>7</td>
<td>0–200</td>
<td>0–10</td>
<td>0–4000</td>
</tr>
</tbody>
</table>

Values shown are the range of measurements.
### Table 6: Statistical analysis of drinking-water quality in urban centres

<table>
<thead>
<tr>
<th>City</th>
<th>No. of samples collected</th>
<th>Colour</th>
<th>Odour</th>
<th>Taste</th>
<th>Turbidity</th>
<th>Arsenic</th>
<th>Chlorides</th>
<th>Hardness</th>
<th>Flours</th>
<th>Iron</th>
<th>Magnesium</th>
<th>Nitrates</th>
<th>Potassium</th>
<th>Sodium</th>
<th>Sulphate</th>
<th>TDS</th>
<th>MA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Islamabad</td>
<td>27</td>
<td>4</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>Bahawalpur</td>
<td>25</td>
<td>16</td>
<td>4</td>
<td>16</td>
<td>60</td>
<td>4</td>
<td>12</td>
<td>60</td>
<td></td>
<td></td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>16</td>
<td>96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faisalabad</td>
<td>14</td>
<td>29</td>
<td></td>
<td></td>
<td>36</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>36</td>
<td>43</td>
<td>36</td>
<td>43</td>
<td>79</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gujranwala</td>
<td>14</td>
<td>14</td>
<td>7</td>
<td></td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
<td>7</td>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gujrat</td>
<td>9</td>
<td></td>
<td></td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kasur</td>
<td>10</td>
<td>21</td>
<td>10</td>
<td></td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lahore</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td>30</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multan</td>
<td>16</td>
<td></td>
<td></td>
<td>6</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31</td>
<td></td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rawalpindi</td>
<td>15</td>
<td>13</td>
<td></td>
<td></td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
<td>87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shekhipura</td>
<td>11</td>
<td></td>
<td></td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27</td>
<td>9</td>
<td>18</td>
<td></td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sialkot</td>
<td>10</td>
<td>10</td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>10</td>
<td>10</td>
<td></td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hyderabad</td>
<td>16</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>69</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>56</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Karachi</td>
<td>28</td>
<td></td>
<td></td>
<td>11</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>21</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>7</td>
<td>4</td>
<td>8</td>
<td>61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sukkur</td>
<td>12</td>
<td>8</td>
<td></td>
<td>58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>75</td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Khuzdar</td>
<td>8</td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
abad and Rawalpindi, the 1993 epidemic of hepatitis, resulting in 4000 cases, was linked to pollution of the raw water source and inadequate water treatment [16]. Some cases of methaemoglobinaemia in southern Punjab have been reported [17]. Dental fluorosis is quite evident in Kasur, Pattoki and Raiwind [18]. In Manga Mandi, near Lahore, limb deformities in more than 100 patients have been attributed to high fluoride groundwater, although this link is not confirmed [19]. In Kasur, contamination of groundwater with tannery effluent has caused diseases such as skin irritation, nausea and abdominal disorders (UNIDO, unpublished data, 1999).

Management strategies

To ensure the safety of drinking-water supplies, a management strategy should be based on multibarriers of protection from source to the point of use [19]. These barriers include: source protection, water treatment, distribution system integrity, monitoring/surveillance and public information. All these issues are discussed in this section to formulate an effective management strategy.

Table 6: Statistical analysis of drinking-water quality in urban centres (concluded)

<table>
<thead>
<tr>
<th>City</th>
<th>No. of samples collected</th>
<th>Colour</th>
<th>Odour</th>
<th>Taste</th>
<th>Turbidity</th>
<th>Arsenic</th>
<th>Chlorides</th>
<th>Hardness</th>
<th>Fluorides</th>
<th>Iron</th>
<th>Magnesium</th>
<th>Nitrate</th>
<th>Potassium</th>
<th>Sodium</th>
<th>Sulfate</th>
<th>TDS</th>
<th>MA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loralai</td>
<td>11</td>
<td>9</td>
<td>–</td>
<td>–</td>
<td>18</td>
<td>–</td>
<td>–</td>
<td>9</td>
<td>55</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>10</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Quetta</td>
<td>38</td>
<td>5</td>
<td>–</td>
<td>–</td>
<td>16</td>
<td>–</td>
<td>–</td>
<td>13</td>
<td>42</td>
<td>8</td>
<td>3</td>
<td>–</td>
<td>–</td>
<td>5</td>
<td>8</td>
<td>13</td>
<td>50</td>
</tr>
<tr>
<td>Ziarat</td>
<td>8</td>
<td>12</td>
<td>–</td>
<td>–</td>
<td>25</td>
<td>–</td>
<td>–</td>
<td>12</td>
<td>12</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Mangora</td>
<td>10</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>Mardan</td>
<td>12</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Pesha-war</td>
<td>13</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>8</td>
<td>–</td>
<td>–</td>
<td>8</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>8</td>
<td>69</td>
<td></td>
</tr>
</tbody>
</table>

TDS = total dissolved solids; MA = microbiological agents.
drinking-water. The water supply agencies should be authorized to initiate legal action to protect their water sources and distribution system from sources of pollution. There is also a need to establish a groundwater regulatory framework to avoid intrusion of saline water into the fresh groundwater zone. A legal ban also needs to be placed on the disposal of wastewaters on land. All these issues could be addressed by introducing new relevant clauses in the 1997 Environmental Protection Act [20].

**Governance**

Presently, no agency is involved in routine monitoring of drinking-water quality. To ensure safe water supply, the concerned agencies need to design and initiate water-quality monitoring programmes. In urban centres, sampling could be done twice a year for chemical analysis before and after the monsoon. Bacteriological analysis could be done on the basis of the population as proposed in the WHO guidelines [10]. In urban areas monitoring of shallow groundwater should be given priority as it is extensively used for private supplies.

For rural areas, bacteriological quality could be monitored on a needs basis. However, sanitary inspection of their schemes, e.g. wells, hand pumps, stand posts, etc., should be done according to the frequency proposed in the WHO guidelines [10]. In urban areas monitoring of shallow groundwater should be given priority as it is extensively used for private supplies.

Presently, no surveillance of drinking-water quality is undertaken by any agency. For effective management purposes, there is a need for a comprehensive surveillance programme. The responsibility of surveillance could be entrusted to the provincial environmental protection agencies (EPAs). EPAs should also check the illegal practice of disposal of industrial effluent on land. Strict compliance with the National Environmental Quality Standards is also needed under the 1997 Act to protect water bodies from pollution [21].

**Institutional**

For effective water quality management, there is a need to strengthen the capacity of the administration at the district and tehsil (sub-district) levels. Technical assistance will be needed at the tehsil level for collection of samples for transport to district laboratories, use of field test kits and initiation of sanitary inspections. District level administration would require strengthening to start water quality monitoring projects and upgrade water supply systems. Analytical laboratories present at the district level would have to be upgraded in terms of staff and equipment to undertake water quality testing. Technical assistance would also be needed for installing roughing filters and chlorination equipment at treatment plants. Water supply providers (public health engineering departments, water and sanitation agencies, development authorities, municipal committees, local government, rural development authorities, cantonment boards, etc) in urban areas would require funding to shift from an intermittent system to a system of continuous supply and for effective maintenance of the distribution network.

Presently various institutions involved in collecting water quality data do not collaborate and share data with each other. This practice needs to be changed by enhancing the data generation capacity and sharing trends of related institutions. For easy access to the water quality data required
to formulate strategies and monitoring programmes, it is recommended that a national database on water quality be established at the Pakistan Environmental Protection Agency (PEPA) in Islamabad. Data relating to drinking-water quality should be retained at the district level so that water quality problems can be dealt with and also forwarded to the PEPA database.

There is need to develop and provide for special treatment facilities for waters with high fluoride, nitrate or arsenic content. Research institutions could therefore be funded to undertake research to devise low-cost water treatment technologies.

**General**

There is need to launch public awareness campaigns to educate people about the importance of safe drinking-water supplies. Nongovernmental organizations can play a pivotal role in this aspect. Building awareness should also be carried out at the primary education level. Rural communities should be advised to adopt suitable measures for protecting stored water from possible contamination inside the house and about simple techniques for disinfection of the drinking water.

**Conclusions**

It is clear that both urban and rural drinking-water supplies in Pakistan are largely contaminated and pose serious health risks to the consumers. To ensure safe water supplies for drinking, there is need to formulate an effective management strategy. The key actions for such a strategy should comprise of the following strategies.

- Establish drinking-water quality standards.
- Establish a groundwater regulatory framework.
- Ban land disposal of wastewaters.
- Strictly enforce national environmental quality standards.
- Initiate mapping of the rural groundwater quality.
- Define the type of monitoring for urban and rural drinking-water quality.
- Set up district-level drinking-water quality monitoring projects.
- Assign surveillance responsibilities to EPAs.
- Conduct sanitary inspection of rural water sources.
- Strengthen district and tehsil administration for drinking-water quality monitoring.
- Upgrade analytical laboratories in terms of staff and equipment.
- Establish a national database on water quality at PEPA.
- Assist research institutions to develop appropriate water treatment technologies.
- Raise public awareness at all levels about the issues of drinking-water quality.

**References**

2. Chilton PJ et al. Pakistan water quality mapping and management project.

Scoping study – draft final report. Loughborough, UK, Water, Engineering and Development Centre, Loughborough University & London School of Hygiene


19. *Understanding the safe drinking-water act*. Washington DC, United States Environmental Protection Agency,
Second meeting for the WHO technical committee for the preparation of the guidance document on desalination for safe water supply

The World Health Organization (WHO) organized the above-mentioned meeting in Kuwait from 12 to 14 November 2005. The objectives of the meeting were: to review content and completeness of draft background and analysis documents that have been prepared by each technical group; to share information between groups to ensure that each document contains the essential information and interrelates with the other group documents; to prepare revised and expanded drafts of each group’s documents; to recommend specific points and principles to be included in the WHO guidance; to work on editorial and format requirements; and to agree on the plan of work and schedule to complete any remaining needs for the draft guidance after the meeting.

Experts from Australia, Canada, Cyprus, Denmark, Egypt, Germany, Japan, Kuwait, United Arab Emirates, UK, and USA, UNEP/ROWA, ROPME, as well as WHO concerned staff and members of the Steering Committee of the Initiative on Desalination Guidelines from Spain and the Cayman Islands attended the meeting.
Review

Burn and scald injuries

H.A-L. Mousa1

SUMMARY Burns are one of the most harmful physical and psychological traumas. Infection is the major cause of morbidity and mortality in burns. Infections acquired from hospital or from the patient’s own endogenous flora have a significant prevalence after burns. Pseudomonas aeruginosa and Staphylococcus aureus are the most frequent colonizing agents whereas group A beta-haemolytic streptococci are the most virulent bacteria. Anaerobic bacteria and fungi are also prevalent. Viral infection is less frequent. Aggressive resuscitation, nutritional support, thorough surgical excision of infected wounds, early wound closure, grafting and the development of effective topical and systemic chemotherapy have largely improved morbidity and mortality rates of burn patients.

Brûlures par liquide bouillant et autres


1College of Medicine, University of Basra, Basra, Iraq (Correspondence to H.A-L. Mousa: haideramousa@hotmail.com).

Received: 23/09/02; accepted: 01/06/04
Introduction

The skin is the largest organ of the body. It functions as the first line of defence protecting against the invasion of foreign bodies and organisms. It has specific immune and metabolic functions and is important in regulating body temperature, fluid and electrolytes. Loss of the functional skin barrier after thermal injury results in increased susceptibility to infection, which is the major cause of morbidity and mortality following burns. In addition, factors such as extent and depth of injury, patient age, associated conditions and the presence of inhalation injury can adversely affect clinical outcomes [1].

Burns are one of the most harmful and complex physical injuries [2]. They often happen unexpectedly and have the potential to cause death, lifelong disfigurement and dysfunction [3]. It is also commonly assumed that hospitalized patients for burn treatment will experience some level of depression. It has been found that 1 month after hospital discharge, 54% of patients showed symptoms of moderate to severe depression, and 2 years after discharge, 43% of patients still reported moderate to severe depression. Women had higher depression scores than men in both cases [4].

It is important to ascertain the cause of the burn because this may be helpful in determining burn depth. Scalds are the most common cause of thermal injury in children. They commonly occur in the kitchen or bathroom, are usually due to brief contact with hot water, and are usually partial-thickness in nature. Tar, grease, or contact burns typically result in deep-partial or full-thickness injury owing to their higher temperature and longer cutaneous exposure. Flame burns may be of variable depth depending on the patient’s clothing and level of consciousness at the time of injury, and are often associated with smoke inhalation injury. Electrical burns may be associated with cardiac arrhythmias, neurological damage and significant long and short-term morbidity. Burns caused by household current rarely involve tissues beneath the skin; high voltage (> 1000 volts) exposure may, however, cause damage to deeper tissues such as muscle, nerves, blood vessels and bone despite the absence of a major cutaneous injury. Limb loss is not an infrequent consequence of this type of injury [7].

Bacterial colonization and invasive bacterial infection are still major problems in the treatment of burn victims. The standard procedures for bacterial monitoring of the burn are swab-culture, which is non-invasive but only detects bacteria at the very surface; biopsy-culture, which gives a more complete view but has the disadvantage of being invasive; and a new technique of dermabrasion of the upper layers of the wound, which is performed using a small rotating carbon-steel disc of defined roughness [5]. This procedure is superior to the swab culture in identifying different bacterial species. It can be compared with the biopsy technique, but has the advantage of being less invasive. Nevertheless, several investigators have found that the ratios of various species of organisms from the surface burn wounds were roughly proportional to those from blood specimens or from biopsy cultures [6,7]. Because of this, in most centres surface microbial growth is routinely monitored, enabling evaluation of the effect of therapy and prediction of those microbial strains that may become involved in sepsis.

The development of effective topical chemotherapy, prompt burn wound excision, timely closure of burn wounds and the use of biological dressings have significantly decreased the incidence of invasive burn wound infection and have contributed...
to the improvement in survival that has occurred over the past 4 decades [8,9]. This review discusses the recent advances in burn wound care.

**Resources**

The Medline database, Biomedical Reference Collection: Comprehensive, and the Index Medicus for the World Health Organization, Eastern Mediterranean Region were searched through 2002 using the keywords “burn, burn wound infection, burn injuries”. The type of search used was “standard and all words” and was limited to human studies. Some other related references were manually searched.

**Pathophysiology**

Tissue loss following thermal injury is a consequence of coagulation necrosis. The depth of injury is related to heat of exposure and tissue conductance. The classic pathologic description considers the burn wound as having 3 concentric zones [10]. The zone of coagulation represents the area of most intense thermal injury. It is surrounded by a zone of stasis, or ischaemia, which may or may not survive. The outer layer, or zone of hyperaemia, is the least injured area and may confuse the inexperienced caregiver into thinking that cellulitis is present. This hyperaemia typically resolves within 7 to 10 days post-injury.

The injury process remains dynamic during the 24 to 48 hours after the burning process has been arrested. Capillary occlusion can progress during this time and supports the clinical impression that skin necrosis progresses during the first 48 hours post-burn. This phenomenon is not considered a continuation of the burning process but a pathophysiological event that may be the consequence of tissue oedema, dermal ischaemia or desiccation. This occurrence is clinically very important. If the zone of coagulation is above the level of the dermal appendages, spontaneous healing is expected; if this zone extends below this level, however, a deep, partial or full-thickness wound results and skin grafting is usually required [1].

Burns covering more than 10% of the total body surface area are responsible for systemic complications which in very severe cases can represent a vital risk and in all cases affect the wound evolution. Among these general complications, fluid volume and electrolyte changes, leading eventually to burn shock, have the most dramatic consequences. Burn shock is still today a vital risk and can also, in the case of inadequate early fluid resuscitation, results in secondary morbidity and mortality. Fluid replacement during the very first hours after injury is key to the management of severe burn cases [11]. Major burn injury is a lesion where the inflammatory reaction is exported to the whole body. After a short period of haemodynamic changes, the inflammation is sustained by necrotic tissues, persistence of an open wound and the pulmonary and gut reactions. When infection starts, it becomes difficult to distinguish its symptoms among the inflammatory signals [12].

The burn patient is highly susceptible to infection due to the loss of the skin as a barrier to microorganisms. Immune defences are activated in response to the burn injury; however, some of these defences are altered. Neutrophil chemotaxis is compromised by decreased perfusion caused by hypovolaemia and the formation of microthrombi. Chemotaxis and phagocytosis are dependent on complement components that are reduced in a large burn wound. Neutrophil intracellular killing power is reduced as oxygen delivery to the wound is decreased.
Humoral immunity is altered with the drop in IgG levels. Cell-mediated immunity is depressed and T-cell lymphocyte counts are decreased. Suppressor T-cells are generated.

Specific sources of infection for the burn patient include the patient’s own bacterial flora, hospital personnel, respiratory equipment and catheters, both urinary and intravascular [13]. It has been shown in children that in extensive burn wounds, bacterial antigens may not be recognized properly owing to the decreased proportion of CD4 cells and increased proportion of CD8 cells, which enhances bacterial growth in these wounds [14]. Patients with severe burns have a very high metabolic rate, which can lead to a deep nutritional deficit and immunological suppression. It is then of major importance to provide adequate nutritional support [11].

Burn injuries, by their very nature, tend to produce further ischaemia and infection. Both these factors may mean that what is initially considered superficial damage may ultimately affect deeper levels [15]. The mechanism of post-burn pyrexia is not completely understood. Proposed mechanisms include dysfunction of the thermoregulatory system, increased metabolic rate that produces a hypermetabolic state, production of cytokines due to tissue injury, release of endogenous pyrogens and excessive release of endotoxins from the gut or wound [16–18]. The most common cause of death in burn patients is multiple organ failure, despite the clinical absence of uncontrolled infection at the time of death [19].

The post-traumatic response to burn injury leads to marked and prolonged skeletal muscle catabolism and weakness, which persist despite standard occupational and physical therapy rehabilitation programmes. However, the researchers found that the participation of children with thermal injury in a resistance exercise programme resulted in a significant increase in muscle strength and power and lean body mass relative to a standard rehabilitation programme without exercise [20].

**Burn wound assessment**

**Extent**
The “rule of nines” is a rough method of estimating body surface area, assuming adult body proportions. The head and neck are roughly 9%, the anterior and posterior chest are 9% each, the anterior and posterior abdomen (including buttocks) are 9% each, each upper extremity is 9%, each thigh is 9%, each leg and foot is 9%, and the remaining 1% represents the genitals. The palmar surface of the hand (excluding the fingers) is approximately 0.5% of body surface area over all age groups [21].

**Depth**

*First degree*
This type of burn damages only the outer layer of skin (epidermis), which is composed entirely of epithelial cells. These burns are pink or red, dry and painful, sloughing the next day. The skin does not blister, although slight swelling may occur.

*Second degree*
This injury damages epidermis and a small portion of the underlying dermis, which contains blood vessels, nerve endings, sweat glands, hair follicles, and sebaceous glands. This is also where new skin cells are produced. Blisters are common with this type of burn. This burn blanches slowly and capillary refill is slow. These are red, wet and very painful.

*Third degree*
This burn completely destroys both epidermis and dermis. The skin is dry, leathery in

---

**Burn wound assessment**

**Extent**
The “rule of nines” is a rough method of estimating body surface area, assuming adult body proportions. The head and neck are roughly 9%, the anterior and posterior chest are 9% each, the anterior and posterior abdomen (including buttocks) are 9% each, each upper extremity is 9%, each thigh is 9%, each leg and foot is 9%, and the remaining 1% represents the genitals. The palmar surface of the hand (excluding the fingers) is approximately 0.5% of body surface area over all age groups [21].

**Depth**

*First degree*
This type of burn damages only the outer layer of skin (epidermis), which is composed entirely of epithelial cells. These burns are pink or red, dry and painful, sloughing the next day. The skin does not blister, although slight swelling may occur.

*Second degree*
This injury damages epidermis and a small portion of the underlying dermis, which contains blood vessels, nerve endings, sweat glands, hair follicles, and sebaceous glands. This is also where new skin cells are produced. Blisters are common with this type of burn. This burn blanches slowly and capillary refill is slow. These are red, wet and very painful.

*Third degree*
This burn completely destroys both epidermis and dermis. The skin is dry, leathery in
consistency, and firm, and can look white, red, brown or black. The burn does not blanch when pressed, is insensitive to touch and looks waxy.

*Fourth degree*
These wounds involve underlying subcutaneous tissue, tendon or bone. Such burns frequently have a charred appearance [2,21].

**Causative agents of burn wound infection**
The usual cause of burn infection is bacteria, and less frequently fungi or yeasts. Viruses can also cause infection on rare occasions. The surface of every burn wound is contaminated to some degree by bacteria [22]. Burn wound infection is, however, defined as burn wound bacterial proliferation at a density \( \geq 10^5 \) bacteria/g tissue [23]. Of the deaths that do occur in adult burn patients, 50%–75% result from infection [24]. In previous studies, the most common colonizing organisms were *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Klebsiella* spp., *Proteus* spp., *E. coli*, and other Enterobacteriaceae [23,25–32].

Histologically, group A beta-haemolytic streptococcal burn wound infection has been a major source of morbidity and mortality in burn patients, and has prompted the prophylactic administration of antibiotics to patients with burns. These infections in burn patients result in severe cellulitis and sepsis. Recent studies have suggested that routine penicillin prophylaxis of burn wounds was not effective in further reducing the incidence of wound infection involving group A beta-haemolytic streptococci [33,34]. The L-form of *S. aureus* occurring in burn wounds has been reported where the infection was attributed to a decrease in host immunological function and repeated administration of antibiotics [35]. Anaerobic bacteria were isolated from 55.1% of patients with burn wound infection, and were found to have a significant role in burn wound sepsis, especially *Bacteroides* spp. They were also more commonly found in patients who were treated with open wound dressings than those who were treated with occlusive dressings [25]. There are many factors that render burn wounds susceptible to infection with anaerobic organisms. The wounds themselves are composed of necrotic, relatively avascular tissue from which anaerobes are frequently isolated in other clinical settings [36].

Prior to the advent of topical antimicrobials, invasive fungal infections were not common. With the use of these agents, 25% of burn wounds seen post-mortem will harbour fungi [37]. Many fungal species were isolated in previous studies, but the most frequent ones were *Aspergillus* spp. [25,38–40]. Fungal infection was more frequent in patients treated with open dressings than those treated with occlusive dressings [40]. It was established that there was a correlation between fungi infecting burned patients and fungi which were located in burn care units. This indicated there is a potential risk that fungal infection could be acquired from these units [41]. Several species of yeasts, such as *Candida tropicalis*, *C. krusei*, *C. albicans* and *C. rugosa*, have been reported in burn wound infection and were regarded as significant pathogens [42,43]. Yeasts from burn wounds may invade deep organs via the bloodstream, leading to severe complications [43].

Type I herpes simplex virus has been reported as a cause of burn wound infection or activated elsewhere in non-burned skin or, rarely, systemic visceral dissemination. Many people harbour herpes simplex virus, often where there is a known history of cold
sores. During the relatively immunosuppressed state associated with a serious burn, reactivation of such infections can occur. Herpes simplex virus infection is thought to occur relatively frequently in the burn patient. Most commonly, children with significant burns, particularly involving the head and neck, are affected [44–46].

Management

Appropriate first aid treatment of burns can lessen the physical and psychological impact of injury. Eliminating the heat source is the single most important action to be taken at the scene of the injury. A secure airway with adequate ventilation is an absolute priority. Any clothing involved should be removed, as well as rings, watches, and other jewellery. Cold water is regarded as the only suitable substance to stop the burning process, remove heat or chemical agents from the skin and relieve pain. Cooling and/or neutralization with tepid water may also be appropriate to stop the initial burning process; however, once the heat source has been removed, cooling is no longer of benefit and may result in significant hypothermia.

Chemical burns should be copiously irrigated with water; dry chemicals should, however, be gently brushed off the skin before irrigation is begun. Tar burns should be cooled but no attempt should be made at removing the tar from the wound until the patient is evaluated. A petrolatum-based ointment or solvent may be applied to facilitate tar removal. During the resuscitation period, it is also important to assess circumferential burns since tissue perfusion may become restricted as oedema forms beneath the eschar. A surgical escharotomy, properly performed in a timely manner, may be limb-saving or prevent the development of a peripheral neurovascular compromise.

All patients with high-voltage exposure should be admitted for cardiac monitoring and careful observation of the wound for at least 24 hours [I,47].

The most frequent mistake of pre-hospital management of burn patients was inadequate airway management (no intubation) and a lack of an intravenous line and vo-lume resuscitation [48]. Fluid resuscitation with a balanced salt solution by continuous infusion is the mainstay of burn treatment. Extravasation of intravascular plasma into the soft tissue in the form of oedema produces a relative hypovolaemia. Oedema accumulates rapidly during the first 8 hours post-burn and continues more slowly for the next 16 hours. If the loss of intravascular volume is inadequately treated, tissue perfusion pressures diminish and multiple organ system function may become impaired.

It should also be remembered that inhalation injury is associated with increased fluid loss and may have a significant impact upon resuscitation requirements [49]. Intravenous replacement therapy should be initiated promptly via one or more large-bore peripheral intravenous lines if the burn exceeds 10% of total body surface area in children, or 15%–20% in adults. Urine output is a useful tool to monitor the adequacy of resuscitation and should be maintained at 0.5–1.0 mL/kg body weight per hour in children and 30–50 mL/hour in adults. A Foley catheter may need to be inserted if hourly measurements are necessary [I].

Traditional management of the burn wound involves careful debridement of loose necrotic tissue, gentle cleansing of the wound with a bland soap and the application of dressings [50]. The periphery of the burn wound should be shaved to remove hairs that can harbour bacteria. Controversy still exists over the management of blisters. Blisters can be debrided, left intact, or
aspirated (leaving the epithelium to act as a biological dressing). In general, however, blisters greater than 1 to 2 cm in diameter should be debrided. Many investigators have found that occlusive dressings are beneficial in speeding the rate and quality of wound healing [25,51–53]. In contrast, in open dressing there is drying of the burn wound which leads to progressive thrombosis of previously intact vasculature, tissue dehydration, cell death and decreased breakdown of dead tissue and fibrin [53,54]. These changes tend to produce an environment that will encourage the growth of anaerobic bacteria and fungi [25,40].

Early, aggressive and thorough surgical excision of infected burn wounds followed by sound and complete covering of the area with grafting at a suitable time play a crucial role [11–13,27,55–58]. Early covering of the open wound is essential to limit bacterial colonization and prevent infection, and to reduce fluid and electrolyte and heat loss [57].

Topical antimicrobial therapy remains the single most important component of wound care in hospitalized burn patients. The goal of prophylactic topical antimicrobial therapy is to control microbial colonization and prevent burn wound infection. In selected clinical circumstances, topical agents may be used to treat incipient or early burn wound infections. Silver sulfadiazine is the most frequently used topical prophylactic agent; it is relatively inexpensive, easy to apply, well tolerated by patients and has good activity against most burn pathogens. In patients with large burns the addition of cerium nitrate to silver sulfadiazine may improve bacterial control. Mafenide acetate has superior eschar-penetrating characteristics, making it the agent of choice for early treatment of burn wound sepsis. However, the duration and area of mafenide application must be limited because of systemic toxicity associated with prolonged or extensive use [59]. Other agents, such as nitrofurazone or chlorhexidine preparations, may be useful in isolated clinical situations. The undesirable side effects of silver nitrate solution limit its use by most clinicians [59]. Systemic antibiotics are a valuable therapeutic modality in the burned patient when properly used. Injudicious use, however, may not only fail to be beneficial to the patient but also may produce harmful effects, either through direct toxicity or by contributing to the emergence of resistant strains of microorganisms. General guidelines and principles for systemic antibiotic use include the following:

- The burned patient, despite all efforts, will be exposed to microorganisms.
- No single agent or combination of agents can destroy all the organisms to which the burned patient is exposed.
- Treatment involves first identifying the organism responsible for clinical sepsis, then choosing appropriate agents.
- Combinations of antibiotics are not always synergistic, or even additive, in effect.
- Multiagent therapy may have the untoward effect of predisposing to superinfection by yeast, fungi or resistant organisms.
- Antibiotics should be used for a long enough period to produce an effect, but not long enough to allow for emergence of opportunistic or resistant organisms.

In general, prophylactic systemic antibiotics are indicated in only a few clinical situations including the immediate preoperative and postoperative periods associated with excision and autografting, and possibly in the early phases of burns in children [60]. A study in 1999 revealed that ciprofloxacin was the most effective
antibacterial agent: 42.9% of bacteria which were encountered in burn sepsis were susceptible \[31\]. Metronidazole, if administered to patients with burns, besides offering protection against anaerobic infections, might also protect the patients from some aspects of burn-induced oxidative stress, and has promoted healing in partial-thickness burn wounds \[61\]. Vancomycin-resistant enterococci are multi-resistant microorganisms that have emerged as important nosocomial pathogens during the past decade. Emergence of these organisms has been blamed mainly on the increased and inappropriate use of antibiotics, in particular, the cephalosporins and the glycopeptide, vancomycin. Linezolid has a spectrum of activity against Gram-positive bacteria, including methicillin-resistant \(S. aureus\) (MRSA) and vancomycin-resistant enterococci, and can provide a useful treatment alternative to the glycopeptides \[62\]. Treatment of an established herpes simplex virus infection includes use of intravenous acyclovir, meticulous wound care, and efforts to prevent nosocomial spread. The vast majority of cases resolve without sequelae unless complicated by systemic, multiorgan herpes simplex virus infection \[46\].

**Advances in burn wound care**

Thirty years ago, someone with a 40% burn had little chance of survival. Today, burn care can save 50% of those who sustain an 80% burn \[63\]. The development of effective topical and systemic chemotherapy, nutritional support, early burn wound excision and closure, and the use of biological dressings have significantly improved survival rates of burn patients \[8,64\]. The currently available skin substitutes are imperfect, and research endeavours continue in an effort to develop a nonantigenic, disease-free, readily available, physiologically effective tissue that will promptly effect wound closure, reduce scar formation (and thereby improve cosmetic results) and reduce the need for reconstructive surgery. As monitoring and physiological support techniques improve and additional advances in wound care occur, morbidity and mortality in burn patients will be further reduced \[8\].

In the field of technological advances in the area of plastic surgery, burn surgery may be the most progressive, with the evolution of biological, tissue-engineered skin substitutes and the research into growth factors in healing. Further improvements in tissue engineering and technology should result in even more effective skin substitutes and hence more functional and aesthetic outcomes in large burns, in a more economically efficient way \[57\]. An encouraging therapeutic effect of the silicone elastomer TopiGel\textsuperscript{®} was noticed by a group of investigators. They found that it had a positive effect on the reduction, stabilization and normalization of hypertrophic scars. The study revealed no positive therapeutic effect of the silicone sheet on the painfulness of scars or on old, mature, hypertrophic scars \[65\].

On the other hand, the increasing number of new antimicrobial agents has presented a new dilemma to the practising clinician because many of these agents have not been evaluated thoroughly in the burned population. With further studies, the armamentarium of the burn treatment team will inevitably increase. It is in this manner only that so many of the unanswered questions will be solved, and that infection will start to decline as the major cause of death in the burned population \[60\].
References


58. Chai J, Sheng Z, Guo Z. [The experience of the management of burn sepsis with different strategies in our department during the past 29 years]. Zhonghua shao shang za zhi, 2000, 16(2):78–81 [in Chinese].


Short communication

Anti-smoking campaign in Multan, Pakistan

M. Mohsin

ABSTRACT Smoking is a serious public health concern, particularly among young people. This communication describes an anti-smoking campaign targeted at the students of Nishtar Medical College and Bahauddin Zakariya University in Multan. The aim was to promote sports and discourage smoking through community participation and mobilization. A mixed media strategy was adopted and information and education materials were developed. A seminar was held giving information on smoking, its hazards, quitting strategies and experiences. This was followed by a cricket match played between the students at which further brochures were distributed and slogans displayed. The activity was very successful and succeeded in mobilizing the community and putting over the anti-smoking message. Such events could be used to promote other issues related to lifestyle.

Campagne antitabac à Multan (Pakistan)

RÉSUMÉ Le tabagisme constitue une grave préoccupation de santé publique. La présente communication décrit une campagne antitabac destinée aux étudiants de la Faculté de Médecine Nishtar et de l’Université Bahauddin Zakariya de Multan. Le but était de promouvoir le sport et de décourager le tabagisme par la participation et la mobilisation de la communauté. Une stratégie mixte médiatique a été adoptée et des matériels d’information et d’éducation ont été élaborés. Un séminaire d’information sur le tabagisme, les risques qu’il comporte, les stratégies pour arrêter de fumer et les expériences de sevrage tabagique a été organisé, suivi d’un match de cricket entre étudiants à l’occasion duquel d’autres brochures ont été distribuées et des slogans arborés. Cette activité a été un franc succès et a permis de mobiliser la communauté et de faire passer le message antitabac. De telles occasions pourraient être utilisées pour promouvoir d’autres questions liées au mode de vie.

1Department of Community Medicine, Nishtar Medical College, Multan, Pakistan (Correspondence to M. Mohsin: mohdmpk@yahoo.com).
Received: 08/03/03; accepted 06/07/04
Introduction

Many people smoke and are therefore at risk of developing tobacco-related illness such as cancer, heart disease, emphysema and respiratory disease. Those who do not smoke may have colleagues, friends or family members who do, and they risk prematurely losing a friend or relative to a tobacco-related disease. Each year, tobacco causes some 4 million premature deaths, with 1 million of these occurring in countries that can least afford the health-care burden [1]. This epidemic is predicted to kill 250 million children and adolescents who are alive today, a third of whom live in developing countries [1]. By the year 2030, tobacco is likely to be the world’s leading cause of death and disability, killing more than 10 million people annually and claiming more lives than HIV, tuberculosis, maternal mortality, motor vehicle accidents, suicide and homicide combined [2].

Tobacco is a risk factor for some 25 diseases and while its effects on health are well known, the sheer scale of its impact on the global disease burden may still not be fully appreciated. No single disease is expected to make such a huge claim on health as this 1 risk factor. Estimates indicate that tobacco is already responsible for about 2.6% of the total death and disease burden, and that this figure is projected to triple [3].

Smoking is one of the most serious public health issues in Pakistan and the increasing trend amongst youth is of grave concern. The bulk of the huge promotion budget of the tobacco companies is spent on advertising to attract youth. Cultural events and sports are also exploited for the same purpose.

It has been experimentally and epidemiologically proven that smoking is crucially injurious to sportsmen and sportswomen [4]. Young people who smoke cannot perform well on the playing field and are at higher risk of contracting smoking-related diseases [4]. The exploitation of sports by the tobacco companies through sponsorship and by targeting youth is immoral and should be discouraged at the national level.

Taking this into account, the Department of Community Medicine, Nishtar Medical College in Multan devised a plan to launch a target-oriented anti-smoking campaign using the slogans “Smoking is injurious to health” and “Promote sports, discourage smoking”. The aims were to promote sports and discourage smoking through community participation and mobilization of resources and to combat the advertising campaigns of tobacco companies by introducing national and international celebrities campaigning against smoking.

Students at Bahauddin Zakariya University and the medical students at Nishtar Medical College, Multan were targeted. Official permission was obtained from both establishments to approach the students. The Department of Mass Communication at Bahauddin Zakariya University was contacted and invited to participate.

Methodology

A mixed media strategy (including brochures, banners, leaflets, a seminar, radio, newspapers) was adopted to communicate the anti-smoking message. The relevant information, education and communication materials were developed through a series of brainstorming sessions with medical students and doctors. The outcome of this exercise was a number of anti-smoking slogans; a brochure detailing the important aspects of smoking; and lecture materials covering smoking as a world-wide epidemic, promotional issues, hazards of active and passive smoking, alternatives to be
adopted for quitting smoking and the need for action against this social evil. The slogans were used on cloth banners and in the brochure.

A cricket team was formed from the medical students and all the necessary equipment for the cricket match was collected. To encourage active participation, formal prizes comprising certificates of appreciation, trophies and books were obtained and labelled with the campaign slogans.

A staunch effort was made for social mobilization. Repeated visits to the university by the medical college delegation, comprising both teachers and students, motivated the target group very much. The senior staff at Bahauddin Zakariya University and the editor of the daily newspaper Osaaf agreed to actively participate in the campaign.

It was decided that the seminar would be held at Bahauddin Zakariya University followed by the cricket match. The university sports were also being held during that time, so the tying of the anti-smoking campaign with this health-promoting exercise gave further significance to the activities.

The seminar was attended by senior staff from the university and the medical college, the editor of Osaaf, the chairman of Al-Shifa Medical City, lecturers from all the university departments and teachers of community medicine at Nishtar Medical College. The audience comprised a large number of students from the university and medical college.

The seminar included an address by the professor of the chest ward at Nishtar Medical College and a detailed account of smoking presented by some of the medical students. Pathogenesis, the hazards of smoking, withdrawal and epidemiological aspects were described in detail. All the speakers showed serious concern about the increasing incidence of smoking and the availability of cigarettes.

It was emphasized that the government should take strong steps to discourage smoking. It should discount the revenue from tobacco and take bold steps to ban smoking. In the closing address, the Vice Chancellor of Bahauddin Zakariya University recounted his own experience of quitting smoking. He highlighted the findings of the medical professionals concerning the hazards of smoking, what symptoms appeared after quitting smoking and what techniques should be adopted to give up smoking. He has introduced a ban on the sale of cigarettes on university premises as a step towards encouraging students to quit smoking and to encourage others to do so.

The brochure was distributed to all who attended the seminar. The chairperson also announced a special prize for those who volunteered to quit smoking. Under this stimulus, many students announced they would give up smoking for ever. They threw away their packets of cigarette and destroyed them.

After the seminar, a friendly cricket match was played between the students of Nishtar Medical College Multan and Students of Mass Communication. The boundary of the ground was decorated with a display of “No smoking” banners. Many other cricket lovers joined the spectators and enjoyed the activity. The anti-smoking brochure was also distributed among the spectators.

Discussion

The activity was highly successful in achieving the basic objective: communicating the no smoking message. It also succeeded in mobilizing the community, evidenced by the active participation of senior
university staff, students and the media. Most of the participants were keen to contribute in the overall organization and management of the seminar. The Osaaf people provided full sponsorship for the activity, including the banners and trophies.

The target group (youth) who were approached not only actively participated in the activity and showed enthusiasm to discourage smoking at every level but also enjoyed playing in the cricket match. The trophies with the no smoking slogan will remain a memory for ever and will be a reminder to continue the effort against smoking.

The quit smoking message was immediately followed by an alternative to smoking (sports), an example for youth who indulge in smoking as an exciting activity. This cricket match gave them message of real excitement and heroism. The slogan to quit smoking and adopt sports is ideal for the promotion of a healthy lifestyle: it has been rightly said, “Where you find the playing grounds in full swing, there you will find silent and functionless hospitals.”

The university students and medical college students are the select youth of the nation, examples for others. In society, they are often taken as ideals for children and illiterate people. The involvement and mobilization of this group will have a significant effect in the community. In the university and medical college we find students who are representative of a wide variety of communities and areas. If these are well mobilized against smoking, then the message can be communicated to isolated communities as well.

The cricket match developed a permanent, friendly relationship between the medical students and the mass communication students. These friendship ties will be helpful in future to maintain the impetus for organizing health education activities as many of the mass communication students will work in public media and the medical students will have comprehensive technical knowledge.

Resource constraint was the major problem faced in the campaign. Although we had sufficient human resources, managing the project required financial support, which was insufficient and caused some difficulties organizing such a high level activity. However the concentrated efforts of the students, staff members and others made it possible to conduct a successful seminar and hold a unforgettable cricket match.

**Conclusion**

Promotion of healthy lifestyles amongst youth by exploiting sports and formal educational forums like colleges and universities is an efficient strategy and is strongly recommended. Agencies involved in health topics such as smoking, HIV/AIDS and sexually transmitted infection could exploit similar events to achieve their goals.

**References**


3. Involuntary smoking. Summary of data reported & evaluation. Lyon, France.
World No Tobacco Day 2005

World No Tobacco Day (WNTD) 2005 focused on the role of health professionals in tobacco control. Health professionals have a prominent role to play in tobacco control as they have the trust of the population, the media and opinion leaders, and their voices are heard across a vast range of social, economic and political arenas.

At the individual level, they can educate the population on the harms of tobacco use and exposure to second hand smoke. They can also help tobacco users overcome their addiction. At the community level, health professionals can be initiators or supporters of some of the policy measures described above, by engaging, for example, in efforts to promote smoke free workplaces and extending the availability of tobacco cessation resources. At the society level, health professionals can add their voice and their weight to national and global tobacco control efforts like tax increase campaigns and become involved at the national level in promoting the WHO Framework Convention on Tobacco Control (WHO FCTC).

Further information on the Tobacco Free Initiative at the WHO Regional Office for the Eastern Mediterranean can be found at: http://www.emro.who.int/tfi/tfi.htm
Short communication

Bacterial distribution analysis of the atmosphere of two hospitals in Ibb, Yemen

M.F. Al-Shahwani

ABSTRACT A bacteriological distribution analysis of the air was carried out at 8 sites in each of 2 general hospitals in Ibb during the period February–June 2002. Only 3 sites, reception hall, hospital passages and outpatient clinic, gave meaningful values for the distribution of bacteria in the atmospheric air. In these locations, mean values for total plate count, lactose fermenting bacteria, haemolytic bacteria and non-lactose fermenting bacteria were 478.6 colony forming units (cfu)/m$^3$, 24.9 cfu/m$^3$, 6.5 cfu/m$^3$ and 4.8 cfu/m$^3$ respectively. The reception hall had the highest bacterial count, followed by hospital passages and the outpatient clinic. The highest bacterial count was for 08.00, followed by 14.00 and 18.00.

Analyse de la distribution bactérienne dans l’air ambiant de deux hôpitaux à Ibb (Yémen)

RÉSUMÉ Une analyse de la distribution bactérienne dans l’air a été effectuée sur 8 sites dans chacun des 2 hôpitaux généraux à Ibb durant la période février-juin 2002. Seuls 3 sites – le hall de la réception, les couloirs de l’hôpital et le service des consultations externes – ont fourni des valeurs significatives pour la distribution des bactéries dans l’air ambiant. Dans ces lieux, les valeurs moyennes pour la numération totale sur plaque, les bactéries fermentant le lactose, les bactéries hémolytiques et les bactéries ne fermentant pas le lactose étaient de 478,6 unités formant colonies (UFC)/m$^3$, 24,9 UFC/m$^3$, 6,5 UFC/m$^3$ et 4,8 UFC/m$^3$ respectivement. Le hall de la réception avait la plus forte numération bactérienne, suivi par les couloirs de l’hôpital et le service des consultations externes. La numération bactérienne la plus élevée était 08,00, puis 14,00 et 18,00.

1Department of Medical Microbiology, Faculty of Science, Ibb University, Ibb, Yemen (Correspondence to M.F. Al-Shahwani: mahammadfakhri@yahoo.com).

Received: 26/03/02; accepted: 03/05/04
Introduction

Hospitals have a notorious reputation for infection and septic infection has been well documented [1]. Despite dramatic developments in surgical and medical techniques, infection acquired in hospitals remains a major cause of morbidity and mortality, leading directly or indirectly to an enormous increase in the cost of hospital care and to the emergence of new health hazards for the community [2].

Infection may be spread by airborne transmission from the respiratory tract, from the skin by natural shedding of skin scales, during wound dressing or during bed making, and by aerosols from equipment such as respiratory apparatus and air-conditioning plants. Infectious agents may be dispersed in the air as small particles or droplets over long distances [2].

Quantitative and qualitative microbiological measurements are required in premises where safe working depends on the microorganism content of the air being kept at a very low level, e.g. surgical theatres and premises where certain food and pharmaceutical materials are prepared. In hospital wards in which cross-infection is possible, it may be necessary to examine the air for a particular pathogen. The type and number of microorganisms in the air at any time depend on a variety of factors, the most important of which are number of persons present, degree of body movement and amount of disturbance of their clothing [3].

Most of the data available in this field are concerned with fungi [4]; there is little or no data in the literature concerning bacterial load of hospital air. This survey is, therefore, an attempt to assess the bacterial distribution in ambient air in 2 hospitals.

Methods

Sampling sites and times

Air samples were collected weekly during the period February–June, 2002, from Al-Thawra and Al-Nasir general hospitals, the only government hospitals in Ibb City, Yemen, which is located 190 km south of the capital, Sana’a.

Al-Thawra Hospital has a mean of 233 outpatients and 75 admissions per day; the corresponding figures for Al-Nasir Hospital are 60 outpatients and 15 admissions. At both hospitals, air samples were collected from the following sites: operating theatre, male surgical ward, female internal ward, refreshment room, clinical laboratory, outpatient clinic, hospital passages and reception hall. From each site, samples were collected at 3 times, morning (08.00), afternoon (14.00) and evening (18.00). These times were chosen to correspond with patient crowdedness (which is directly proportional to the bacterial atmospheric pollution) in the hospital wards: before working hours (i.e. morning), rush hours (i.e. afternoon) and after working hours (i.e. evening). At each sampling, 3 replicate samples were collected (1 for each type of plate). The time between sample collection and receiving the sample in the laboratory never exceeded 1 hour.

Sample collection and bacteriological media

The samples were collected using a microbiological air sampler, MAS-100 (Merck, Darmstadt, Germany). The air sampler was loaded with Petri dishes that had previously been prepared under sterile condition with the following media: plate count agar (CM0325, for total aerobic bacteria); blood
agar base No 2 with horse blood, (PB0114, for haemolytic bacteria); MacConkey agar (CM0007, for lactose fermenting and non-lactose fermenting bacteria) (all media were from Oxoid, Basingstoke, UK). The height of the air sampler was 1.5 m above the ground level, in a horizontal position. The air sampler was set up to allow the passage of 1000 L (1 m³) of air over the bacteriological media.

Sample processing and analysis
Microbiological analysis for total plate count, lactose fermenting bacteria, non-lactose fermenting bacteria and haemolytic bacteria was carried out according to the method described by Crichton [5]. The plates were incubated at 37 °C for 24 hours (48 hours in case of poor or no growth). After incubation, a colony counter (Gallenkamp) was used for counting the bacterial colonies which had developed.

Since the data from corresponding sites in each hospital were similar, the original data from both hospitals were combined then processed and expressed as either a mean value or as a percentage.

Results
At both Al-Thawra and Al-Nasir hospitals, only 3 sites, i.e. reception hall, hospital passages, and outpatient clinic gave values for the distribution of the bacteria in the atmospheric air of the hospital that were compatible enough to allow a reasonable analysis for the distribution of the bacteria at these sites, therefore these 3 are discussed in detail. Ambiguous (disparate) results were found for the other sites.

Plate counts are shown in Table 1. Mean bacterial counts were: total plate count 478.6 colony forming units (cfu)/m³, lactose-

<table>
<thead>
<tr>
<th>Bacteria count</th>
<th>Time</th>
<th>Reception hall</th>
<th>Hospital passages</th>
<th>Outpatient clinic</th>
<th>Mean</th>
<th>Overall mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total plate count</td>
<td>08.00</td>
<td>1190</td>
<td>640</td>
<td>350</td>
<td>726.7</td>
<td>478.7</td>
</tr>
<tr>
<td></td>
<td>14.00</td>
<td>650</td>
<td>480</td>
<td>240</td>
<td>456.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.00</td>
<td>370</td>
<td>240</td>
<td>148</td>
<td>252.7</td>
<td></td>
</tr>
<tr>
<td>Lactose fermenters</td>
<td>08.00</td>
<td>50</td>
<td>34</td>
<td>12</td>
<td>32.0</td>
<td>22.8</td>
</tr>
<tr>
<td></td>
<td>14.00</td>
<td>35</td>
<td>15</td>
<td>5</td>
<td>18.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.00</td>
<td>29</td>
<td>13</td>
<td>12</td>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td>Non-lactose fermenters</td>
<td>08.00</td>
<td>22</td>
<td>0</td>
<td>0</td>
<td>7.3</td>
<td>4.9</td>
</tr>
<tr>
<td></td>
<td>14.00</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.00</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Haemolytic bacteria</td>
<td>08.00</td>
<td>5</td>
<td>11</td>
<td>1</td>
<td>5.7</td>
<td>6.6</td>
</tr>
<tr>
<td></td>
<td>14.00</td>
<td>9</td>
<td>4</td>
<td>0</td>
<td>4.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>18.00</td>
<td>14</td>
<td>5</td>
<td>10</td>
<td>9.7</td>
<td></td>
</tr>
</tbody>
</table>
fermenting bacteria 24.9 cfu/m³, haemolytic bacteria (e.g. *Streptococcus pyogenes*) 6.5 cfu/m³ and non-lactose fermenting bacteria 4.8 cfu/m³. The counts were generally highest in the morning (08.00) followed by afternoon and evening.

The reception hall had the highest overall count, followed by the hospital passages and the outpatient clinic.

**Discussion**

The highest count, for total plate count, was expected since plate count agar is known to allow the growth of a wide range of saprophytic and other bacteria.

The count for lactose-fermenting bacteria was higher than for non-lactose-fermenting bacteria. This result was also expected since a number of studies have demonstrated that lactose-fermenters are more widely distributed than non-lactose-fermenters [6,7].

The count for haemolytic bacteria (6.6 cfu/m³) was fairly high, unfortunately, no data were noted in the literature for comparison with this value. Haemolytic bacteria are known to be involved in infection of the upper respiratory tract [8]. However, Senior reported that in studies concerned with airborne infection in man, the particles encountered are those that carry bacteria capable of growth on blood agar during aerobic incubation for 24 or 48 hours at 37 °C [9], incubation conditions which also applied in our study.

The highest bacterial count was in the reception hall, followed by the hospital passages and finally the outpatient clinic. The variation could be related to differences in the degree of crowding; the reception hall is usually more crowded than the other locations. Moreover, internal movement produces an increase in both humidity and temperature, which are known to be important factors affecting bacterial viability [10]. Ambiguous results that were found for the other sites may be because of the oscillation of the variables that affect bacterial concentration.

Table 1 also shows that counts were highest in the morning, followed by the afternoon and the evening. This observation may be related to the busy period of the day. The hospitals are usually at their busiest at 08.00, gradually becoming less busy through the afternoon and the evening.

Unlike the other bacteria examined, the distribution of haemolytic bacteria at different hospital locations and different times of the day did not show a clear pattern. Since many virulent strains belong to this bacterial group, further, more extensive, studies are required to determine distribution of these bacteria in the ambient air of hospitals.

It has been reported that most of the contaminants are harmless saprophytes and commensals, and even when carriers or infected students are present, usually less than 1%, and commonly only 0.01%–0.1%, of the airborne bacteria are pathogens [9]. In rooms occupied by patients with tonsillitis or infected wounds, *Streptococcus pyogenes* may be present at a level of 0.1–50 cfu/m³[5]. This level of contamination may seem small, but it must be remembered that a normal adult inhales about 15 m³ of air/24 hours. The probability of a person becoming infected will be greater if he is exposed to a high concentration of airborne pathogens, but no level of contamination, however low, can be regarded as safe. Infection is usually initiated by the deposition of a single infected particle at a favourable site in the respiratory tract, although the probability of any one such particle initiating infection is likely to be low for common pathogens, e.g. $10^{-2}$ to $10^{-5}$ for *Staphylococcus aureus*. 

---

المنشور الصحي لشرق المتوسط، منظمة الصحة العالمية، المجلد الحادي عشر، العددان 5–6، 2005
in the nose [11]. It may be high for some, e.g. for *Mycobacterium tuberculosis* in the lung [12].

Finally, the removal of air contaminants and the control of room temperature and humidity are necessary. Recommendations for air treatment in hospital ambient air include:

- the use of filtration, electronic cleaners, chemical treatment with activated charcoal or other sorbents;
- temperature control in the range of 20.0–24.5 °C;
- humidity control in the range of 20%–60%.

**Acknowledgement**

I would like to thank Abdulla Al-Wajeeh and Mohammad A. Al-Tayeb of the Department of Medical Microbiology, Faculty of Science, Ibb University for their technical assistance.

**References**

Short communication

Effect of Ramadan fasting on secretion of sex hormones in healthy single males

B. Mesbahzadeh, Z. Ghiravani and H. Mehrjoofard

ABSTRACT To determine the effects of Ramadan fasting on the secretion of sex hormones in single healthy males, we measured blood hormone levels of testosterone, luteinizing hormone (LH) and follicle-stimulating hormone (FSH) in 52 single male students aged 18–24 years who were fasting for ≥12 hours during Ramadan. Four blood samples were taken from each, one 2 days before and the others on 10, 20 and 28 Ramadan. Testosterone level was lower, significantly so for the 20th and 28th of the month (P < 0.05); FSH was increased, significantly for the 20th (P < 0.05); LH did not change significantly.

Effet du jeûne du ramadan sur la sécrétion d’hormones sexuelles chez des hommes célibataires en bonne santé

RÉSUMÉ Afin de déterminer les effets du jeûne du ramadan sur la sécrétion d’hormones sexuelles chez des hommes célibataires en bonne santé, nous avons mesuré les concentrations sanguines de testostérone et d’hormones lutéinisante (LH) et folliculostimulante (FSH) chez 52 étudiants célibataires âgés de 18 à 24 ans qui jeûnaient pendant 12 heures ou plus pendant le ramadan. Quatre prélèvements sanguins ont été effectués sur chacun des sujets, le premier 2 jours avant le début du ramadan et les autres au 10e, 20e et 28e jour du ramadan. La concentration de testostérone était plus faible, et ce de manière significative pour le 20e et le 28e jour du mois (P < 0.05) ; la FSH avait augmenté, et ce de manière significative pour le 20e jour (P < 0.05) ; la LH n’avait pas significativement changé.

1Department of Physiology, School of Medicine, Birjand University of Medical Sciences, Khorasan, Islamic Republic of Iran (Correspondence to B. Mesbahzadeh: mesbahmoeen@yahoo.com).

Received: 14/01/03; accepted: 08/06/04
Introduction

Fasting, a principal obligation of Islam, is practised over a vast area of the globe by over 1 billion Muslims for a complete month. In the Islamic Republic of Iran, which has a population of more than 70 million people, the vast majority of the adult population fast in Ramadan. The fast involves abstaining from eating and drinking from early morning to sunset.

The study of the impacts of this act of worship from different angles can offer solutions to hygiene and psychological problems. During the past 2 decades researchers have found that abstinence from eating and drinking accompanied by a change in sleeping and waking pattern may cause changes in the physiology and functioning of the body’s hormonal system [6,8,10].

The main concern of this study was to determine the effects of Islamic fasting on the secretion of sex hormones in single healthy males.

Methods

This study was carried out in Birjand University of Medical Sciences on 52 volunteer students. Criteria for inclusion were being single, male, aged 18–24 years, in good health, not taking any medicines and not being on a diet. The length of daily fasting was ≥ 12 hours and all participants had the same ordinary diet (from the university catering service). There were no drop-outs during the study.

The study was carried out in 2002. There were 4 stages, 1 before Ramadan, and 3 during Ramadan. Four blood samples were taken from each participant by a technician from the University research laboratory. The first sample (control) was taken 2 days before Ramadan; the other 3 (experimental) on 10, 20 and 28 Ramadan. All samples were taken at 16.00, after ≥ 12 hours of fasting. Samples were analysed immediately at Imam Reza Hospital in Birjand.

At the end of each stage an enzyme-linked immunosorbent assay (Stat Fax 2001 ELISA reader; Stat Fax 2600 incubator and washer, Awareness Technology, Palm City, Florida) was used to measure hormone levels. Standard luteinizing hormone (LH), follicle-stimulating hormone (FSH) (Radim SpA, Pomezia, Italy) and testosterone (DRG Diagnostics, Italy) kits were used for estimating hormone levels using the standard manufacturer’s methods, supplied with the kits.

The data were statistically evaluated using the analysis of variance method using SPSS, version 11.5. The level of significance was $P < 0.05$.

Results

Mean blood hormone levels are shown in Table 1. Mean testosterone levels decreased in all 3 test samples. The decrease was significant for the samples from 20 and 28 Ramadan ($P < 0.05$).

Mean FSH levels increased during Ramadan but the increase was only significant in the sample from 20 Ramadan ($P < 0.05$). In contrast, mean LH level did not change significantly in comparison with the control sample (2 days before Ramadan).

Discussion

Previous studies have demonstrated that abstinence from eating and drinking during the Ramadan fast, which is accompanied by variations in the sleeping and waking pattern, and the psychological effects of fasting may bring about rhythmic changes
in the secretion of most of the body’s hormones [4, 5].

From the findings of our study and those of other studies [2, 6–8], it is clear that levels of sex hormones and gonadotrophins, as well as other hormones, vary in healthy single males during the Islamic fasting month of Ramadan.

Besides, the significant decrease in testosterone on the 20th and 28th days of Ramadan (compared with before Ramadan) occurs simultaneously with significantly increases in FSH levels. This is understandable considering the negative feedback system that controls testosterone secretion: following a decrease in testosterone secretion from the testes, the secretion of gonadotrophin-releasing hormone from the hypothalamus increases and this hormone enters the anterior pituitary through the blood of the hypothalamus–pituitary portal system, thus stimulating the secretion of FSH and LH from the anterior pituitary [7, 9].

Moreover, the results of experiments by other researchers confirm the findings of the above study. Studies on a great number of healthy fasting men and women have shown that all quantitative variations observed in gonadotrophin-releasing hormone and sex hormones are within the normal range and do not cause specific clinical changes [7, 9]. Experiments carried out on other hormones such as thyroxin, prolactin, cortisol and endorphin during fasting indicate that their variation is within the normal range [10–13]. It has been reported that despite the disturbance of biological processes of the body caused by the change in the times of eating and sleeping, the endocrine system does not change the concentration of pituitary, thyroid, parathyroid and sex hormones [8, 12].

Islamic fasting is a unique form of abstinence recurring over a definite period of time. On the other hand, biological rhythms are factors that create physiological balance. This balance, according to many researchers, is maintained by the neuroendocrine system [5, 14, 15].

To sum up, Ramadan fasting produces variations in the secretion of gonadotrophins and sex hormones among healthy single men. These variations are within the normal range.

### Acknowledgement

We wish to thank our laboratory technicians Mr Ali Eftekhari and Mr Ali Akbar Hesami for their kind cooperation.

<table>
<thead>
<tr>
<th>Hormone</th>
<th>Mean (SD) hormone level 2 days before Ramadan</th>
<th>Mean (SD) hormone level 10 Ramadan</th>
<th>Mean (SD) hormone level 20 Ramadan</th>
<th>Mean (SD) hormone level 28 Ramadan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Testosterone (ng/mL)</td>
<td>7.17 (0.3)</td>
<td>6.59 (0.3)</td>
<td>5.68* (0.2)</td>
<td>5.92* (0.3)</td>
</tr>
<tr>
<td>Follicle stimulating hormone (mIU/mL)</td>
<td>5.46 (0.4)</td>
<td>5.80 (0.4)</td>
<td>5.90* (0.3)</td>
<td>5.80 (0.3)</td>
</tr>
<tr>
<td>Luteinizing hormone (mIU/mL)</td>
<td>6.75 (0.9)</td>
<td>5.78 (0.4)</td>
<td>6.15 (0.5)</td>
<td>7.35 (0.4)</td>
</tr>
</tbody>
</table>

*Significantly different from before Ramadan.

\(SD = \) standard deviation.
References


Short communication

Human development index adjusted for environmental indicators: case study in one Egyptian village

M.M. Gamal El-Din

1Department of Environmental Health, University of Alexandria, Alexandria, Egypt (Correspondence to M.M. Gamal El-Din: dskgroup@alexnet.com.eg).

Received: 28/12/04; accepted: 18/04/05

ABSTRACT The Egypt Human Development Report 2003 does not take account of the impact of the environment on human development indicators. A case study was made in one village in El-Montaza district, Alexandria governorate, Egypt. The environmental indicators used for calculating the human development index were access to safe water, access to sanitation and environment surrounding the house. The human development index for this village decreased from 0.622 to 0.595 after adjustment for environmental factors.

L’indice de développement humain ajusté en fonction d’indicateurs environnementaux : étude de cas dans un village égyptien

Introduction

The Egypt National Human Development Report 2003 is the seventh in the series issued since 1994 by the Institute of National Planning in collaboration with the United Nations Development Programme (UNDP) [1]. The methodology, concepts, and indicators of these reports have been continuously and steadily adapted to the nature and condition of Egyptian society through the valuable contributions and efforts of national and international specialists in human development. Using the same methodology and indicators, Alexandria governorate, in collaboration with the UNDP, the Ministry of Local Development and the Organization of Reconstruction and Development of the Egyptian Village issued the Alexandria Human Development Report 2003 [2].

However, neither these human development reports utilize any indicators that measure the impact of a poor environment on human development indicators. We believe this leads to a bias in the structure of the human development indicators [2].

El-Prince southern village is located in El-Montaza district of Alexandria governorate. It was selected as a case study to develop its human development indicators and to recalculate the human development index (HDI) adjusted for relevant environmental factors.

Methods

The data for El-Prince village were collected by filling precoded questionnaires through house-to-house surveys in all 349 houses in the village during 2002–03.

The precoded questionnaire sheet included information about the family and the house, such as family size, number of rooms per house, dwelling type, water supply, type of toilet, wastewater disposal and solid waste disposal.

Human development index

Standard methods were used for calculating the HDI, which is a simple average of 3 indicators: life expectancy at birth (number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life); adult illiteracy rate (percentage of adults ages 15+ years who cannot, with understanding, read and write a short, simple statement about their everyday life); gross domestic product (GDP) per capita (GDP divided by mid-year population growth calculated from constant price GDP data in local currency) [3].

Environmental index

We calculated an environmental index using some important environmental indicators which affect the human development index: access to safe water, access to sanitation and environmental conditions surrounding the houses [3].

Three environmental indicators were defined:

- **Safe water.** A household is considered to have access to improve water supply, if it has sufficient amount of water for family use, at an affordable price, available to household members without being subject to extreme effort especially to women and children.

- **Sanitation.** A household is considered to have adequate access to sanitation if an excreta disposal system, either in the form of a private toilet or a public toilet shared with a reasonable number of people is available to household members.

- **Environmental context.** The environmental conditions surrounding the houses.
The environmental index was calculated by assuming that safe water represents 25\% of the environmental indicators, sanitation (type of toilet) represents 25\% of the environmental indicators and environmental context represents 50\% of the environmental indicators. Thus the environmental index was calculated to be: $1/4$ (safe water indicator) + $1/4$ (sanitation indicator) + $1/2$ (environmental context indicator).

The adjusted HDI was calculated from the formula: $(\text{HDI} + \text{environmental index})/2$.

### Results

Table 1 shows the distribution of households in El-Prince village according to the 3 environmental variables. From this we calculate:

- **Safe water indicator** = $(97.7-0.0)/(100-0.0)$ = 0.98
- **Sanitation indicator** = $(99.4-0.0)/(100-0.0)$ = 0.99
- **Environmental context indicator** = $(14.9-0.0)/(100-0.0)$ = 0.149

From the logical weightings of the items, the environmental index is calculated to be: $1/4$ (0.98) + $1/4$ (0.99) + $1/2$(0.149) = 0.245 + 0.248 + 0.037 = 0.568.

Thus the adjusted human development index (including environmental indicators) for El-Prince village becomes: $(0.622 + 0.568)/2 = 1.19/2 = 0.595$.

This compares with the original human development index for El-Prince village of 0.622 [5].

### Discussion

By adjusting the HDI using an environmental index, the HDI for El-Prince village decreased from 0.622 to 0.595. This decrease of only 5\% shows the link between the environmental indicators and the other indicators: education, longevity and GDP. It is expected that an increase in the previous indicators would improve the human environmental index, consequently improving the overall health of the people.

This case study highlights the importance of including environmental indicators when calculating the HDI.

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of households $(n = 349)$</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water supply</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tap water inside the house</td>
<td>324</td>
<td>92.8</td>
</tr>
<tr>
<td>Shared tap water</td>
<td>17</td>
<td>4.9</td>
</tr>
<tr>
<td>From neighbour</td>
<td>8</td>
<td>2.3</td>
</tr>
<tr>
<td><strong>Type of toilet</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eastern</td>
<td>248</td>
<td>71.1</td>
</tr>
<tr>
<td>European</td>
<td>86</td>
<td>24.6</td>
</tr>
<tr>
<td>Eastern and European</td>
<td>13</td>
<td>3.7</td>
</tr>
<tr>
<td>No sanitation facility</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Environmental context</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry area</td>
<td>118</td>
<td>14.9</td>
</tr>
<tr>
<td>Morass or moor</td>
<td>153</td>
<td>19.3</td>
</tr>
<tr>
<td>Domestic waste water</td>
<td>99</td>
<td>12.5</td>
</tr>
<tr>
<td>Solid wastes</td>
<td>154</td>
<td>19.4</td>
</tr>
<tr>
<td>Animals and birds</td>
<td>214</td>
<td>27.0</td>
</tr>
<tr>
<td>Other</td>
<td>55</td>
<td>6.9</td>
</tr>
</tbody>
</table>

$n = total\ number\ of\ households.$
References


Note of appreciation

We would like to draw our readers' attention to the list of reviewers at the end of this issue. The scientific integrity and standard of the information disseminated through EMHJ depends greatly on the critical judgement of our reviewers. We would like to extend our sincere thanks and gratitude to them all for giving voluntarily of their time so willingly.

المجلة الصحية لشرق المتوسط، منظمة الصحة العالمية، المجلد الحادي عشر، العددان 5-6، 2005
The *Eastern Mediterranean health journal* thanks the following experts for their kind assistance in the review of papers considered for publication during the year 2005.

Professor Hilmy Abaza  
Professor Abdal Hamid Omar Abaza  
Professor Hamdy Mahmoud Abdalla  
Dr Fardous Hanem Abdel-Aal  
Professor M. Abdel-Moneim Abdel-Aal  
Professor Said Abdel-Azim  
Professor Salwa Abdel Azim  
Professor Mohamed Talaat Abdel-Aziz  
Dr Moataz Abdel-Fattah  
Dr Muzamnil Hassan Abdelgader  
Dr Sonia Abdelhak  
Professor Abdel-Hakim M. Abdel-Hakim  
Dr Awatif Abdel Maksoud  
Professor Wadie Mikhail Abdel-Masih  
Professor Nagwa Abdel Meguid  
Professor M. Yosri Abdel-Mohsen  
Dr Ibrahim Abdel Rahim  
Professor Mohamed Abdel Rahman  
Professor Mohamed Abdel Sabour  
Professor Ekram Abdel-Salam  
Dr Khalil Abdul-Aziz  
Dr Ahmed Abdo-Rabbo Abdulla  
Professor Mohamed Farid Abdullahatif  
Dr Ahmed Abdul Latif  
Professor Yousef Abdullahazzaq  
Dr Mohamed Abdur Rab  
Professor Mostafa A. Abolfotouh  
Dr Assem Anwar Kotb Abou-Arab  
Dr Ahmed Gamal M. Abou El-Azayem  
Dr Samia Abou-Khatwa  
Professor Samir F. AboulAzm  
Professor Hala Abou Senna  
Professor Mohamed Abou-Steit  
Dr Houssain Abouzaid  
Professor Hamdy Abu Baih  
Professor Mohamed Reda Mohamed  
Abu El-Maati  
Professor Ahmed A. Abdel-Hameed Adeel  
Professor Maha Sadek Ahmad  
Dr Ahmed Abdulla Ahmed  
Dr Samia Abd El-Rahman Ahmed  
Professor Yusuf Hersi Ahmed  
Dr Gururaj Aithala  
Professor Kamel Ajlouni  
Professor Mekkawy Mohamed Ahmed  
Akel  
Dr Tasleem Akhtar  
Dr Salih S. Al-Ansari  
Dr Lubna A. Al-Ansary  
Ms Deena Alasfoor  
Dr Sadika A. Al-Awadi  
H.E. Dr Abdul Rahman Al Awadi  
Dr Salah Al Awaidy  
Dr Abdullah Mohammed Al-Bedah  
Dr Nabil Al-Beiruti  
Dr Suleiman Al-Busaidy  
Dr Fariba Al Darazi  
Professor Eidabd elmohsen Al-Faris  
Dr Tariq Al-Habeb  
Dr Nasser Al-Haddad  
Professor Mohamed Khalil Habib  
Al-Haddad  
Professor Shawky Al-Haddad  
Professor Tahseen Al Hadidi  
Dr Hazem Al-Khawashiki  
Mrs Batool Ali Al-Muhandis  
Professor Faisal Abdul Latif Alnasir  
Professor Mansour Al-Nozha  
Dr Adel Al-Oofi  
Dr Al-Joharah Mohammed Al-Quaiz

1Arranged in alphabetical order according to the family name.
Guidelines for authors

1. Papers submitted for publication must not have been published or accepted for publication elsewhere. The Eastern Mediterranean Regional Office reserves all rights of reproduction and republication of material that appears in the *Eastern Mediterranean health journal* (EMHJ).

2. Original papers written in Arabic, English or French may be sent for consideration to the Editor-in-chief, *Eastern Mediterranean health journal*, WHO Regional Office for the Eastern Mediterranean, PO Box 7608, Nasr City (11371), Cairo, Egypt. Papers can also be submitted by email to EMHJ@emro.who.int. Papers will be abstracted in all three languages.

3. The subject of the paper should pertain to public health or some other related technical and scientific subject within the field of interest of the World Health Organization, with special reference to the Eastern Mediterranean Region.

4. Three copies of each manuscript should be provided. The text, together with the accompanying tables and figures, should not exceed 15 double-spaced typewritten or printed A4 pages (4500 words) and should be printed on one side only. When the manuscript is accepted or conditionally accepted, the author will be requested to submit a 3.5 inch computer diskette containing the text, tables, graphs and illustrations. For English and French papers, please provide the text, upon the editor's request, in both wordprocessed format (we prefer Microsoft Word for the PC but can translate most other formats) and also saved as a text/ASCII file. Papers submitted in Arabic should follow the same guidelines as papers written in English or French. If the paper is a translation of all or part of another unpublished work, a copy in the original language should be submitted too. Where possible, graphs should be provided in Harvard Graphics under Windows or Excel, and the illustrations and photographs should be provided in EPS or TIFF format. However, it is necessary to provide three sets of original photographs and figures with the background data. If there is any text or lettering on the photographs, an additional clean set should be provided without the text/lettering.

5. All papers received will be peer reviewed, and on the basis of the reviewer's comments, the Editorial Board reserves the right to accept or reject any paper. Papers are accepted on the understanding that they are subject to statistical and editorial revision as deemed necessary, including abridgement of the text and omission of tabular or graphic material.

6. The title of the paper should be as concise as possible, preferably around 10 words, and should be placed on a separate sheet, together with the full name(s) of the author(s), institutional affiliations(s) and highest scientific degrees obtained. The mailing address, as well as any other contact information (email address, fax, telephone) of the corresponding author should be provided. The number of authors should not exceed five. All authors should have made material contribution to either the design, analysis or writing of the study and have approved the final version submitted. Authors may be asked to verify their contribution. Other names may be included in the acknowledgements.

7. To facilitate the translation of abstracts and authors' names, authors whose mother tongue is written in Arabic characters and writing in English or French should supply their full names in Arabic script and provide transliterations.
8. Papers reporting original research findings should follow the IMRAD format: Introduction; Materials (subjects) and methods; Results; Analysis; and Discussion. An abstract of no more than 100 words should be supplied, clearly and briefly stating the objectives, context, results and conclusions.

9. Authors should verify where appropriate that all persons on whom research has been carried out have given their informed consent, and where participants (living or dead) were unable to give such consent, that surrogate consent was obtained.

10. Review articles should contain sections dealing with objectives, sources, methods of selection, compilation and interpretation of data and conclusions.

11. In-text citations of published works should be limited to essential up-to-date references. Apart from review articles, a maximum of 25 references is advisable. They should be numbered separately as they occur in the text with sequential Arabic numerals in parentheses [square brackets]. These references should appear in a numbered list on a separate page at the end of the paper. They should contain the following elements of information as appropriate: name(s) and initial(s) of author(s); title of paper or book in its original language plus translation; complete name of journal plus volume number and page range; name of publisher (commercial or institutional) and place of publication (city and country); and date of publication. Papers with inadequate references or references not arranged according to these principles will be returned to the author for correction. The following are examples of the Journal’s preferred style:


12. Figures and tables with appropriate captions should each be on a separate sheet, numbered sequentially with arabic numerals and attached to the end of the paper. Each figure and table should be referred to in the text and its placement in the text should be clearly indicated where appropriate. Where appropriate, sources should be given for each figure or table. If any figures, tables or other materials have been copied from other sources, authors have the sole responsibility for securing the necessary permission. In order to avoid layout problems in final production tables and figures should be limited as far as possible. Not more than one table or figure per 1000 words is preferable. Figures derived from data must be accompanied by those data to enable redrawing if necessary.

13. Original papers and diskettes will not be returned except upon request by the principal author.

14. On publication the authors will receive one copy each of the issue in which the article appears and the principal author will receive 50 reprints. Requests for further reprints and pricing information may be obtained from the Editor-in-chief.
الملحة الصحية لشرق المتوسط
دلال إرشادية للمؤلفين

1. ينبغي أن لا تكون الورقات المقدمة للنشر قد نشرت أو قبّلت للنشر في أي مكان آخر. ويفضل أن يكون المكتب الإقليمي لمنظمة الصحة العالمية لشرق المتوسط جميع حقوق استثناء أو إعادة نشر المواد التي تنشر في اجتماع الصحة لشرق المتوسط.

2. يمكن أن ترسل الورقات الأصلية المكتوبة باللغة العربية أو الإنجليزية، أو الفرنسية، للنشر فيها في مندوب رئيس محضر الساعة الصحية لشرق المتوسط، يعني. (876-1371) بالعربية في مصر. وتتلقى خلاصات الورقات، باللغات الثلاث.

3. ينبغي أن يكون موضوع الورقات مناهجًا للعمل الصحي العمومي، أو أي مكان تقني وعلميا آخر، لصلة بالأعمال ذات الأهمية لمنظمة الصحة العالمية، مع الإشارة بشكل خاص إلى قيمه صحية لشرق المتوسط.

4. ينبغي تقديم ثلاث نسخ من كل مخطوطة أو مطبوعة. كما ينبغي أن لا يتجاوز النص، مع الجداول، والرسومات المرفقة، 15 صفحة مطبوعة على الآلة الكاتبة مع ترك مقاييس بين كل صفحة، من قبل A (4 الصنع 500 كيلوغرام)

5. ينبغي تقديم ثلاث نسخ من كل مخطوطة على الآلة الكاتبة مع ترك مقاييس بين كل صفحة، من قبل A (4 الصنع 500 كيلوغرام).

6. ينبغي تقديم ثلاث نسخ من كل مخطوطة على الآلة الكاتبة مع ترك مقاييس بين كل صفحة، من قبل A (4 الصنع 500 كيلوغرام).

7. ينبغي أن يكون عنوان الورقة مختصرًا على قدر المستطاع، وحيدًا. لا يكون حوالي 10 كلمات، وأن يكون على ورقة منفصلة، مع تحديد اسم المؤلف (أو أسماء المولفين)، وعوضتهم في المؤلفات المتنوعة، وأعلى الدرجات العلمية التي حصلوا عليها. كذلك ينبغي ذكر الأسماء العربية، وال gerekti الأخرى اللازمة للاتصال بالمؤلف (بريد الكتروني، فاكس، هاتف). ويبعد أن لا يزيد عدد المولفين على خمسة، ولا يعد أن يكونوا قد ساهموا جميعًا في تصميم البحث أو تحليل نتائجه أو كاتبيه، وأن يكونوا قد وافقو، جميعًا على النسخة النهائية المقدمة. وقد يطلب من المؤلفين إثبات الإسهام الذي قدموه، ويمكن إدراج أسماء أخرى إلى عبارات الشكر التي تكون في مقدمة الورقة.

8. ومن أجل نشر ترجمة緩 خلافات وأسماء المولفين، على المولفين الذين تكون لهم الطلب، تكتب بموجب توكيل عربية، ويكتبون مؤلفاتهم بالإنجليزية أو الفرنسية، أن يعودوا رئيس التحرير بإسماتهم كاملة، مكتوبة بالحروف العربية، ثم بالحروف اللاتينية.
ورقات البحث الجديدة، ينصح أن تكتب بالترتيب التالي: المقدمة (المؤلفان)، وطرق البحث؛ التحليل؛ المناقشة. ويُنصح أن تُنشر هذه الورقات للقراء لكل منها، لا تزيد على 100 كلمة، ببيان موضوع، وإيجاز الأهداف، والمواضيع، والنتائج، والاستنتاجات.

9. ينصح أن يكتب المؤلفون، بحسب ما يلزم، أسماء الشخص الذين أجري عليهم البحث، قد وافقوا موافقة وإعفاء على ذلك، ونominator المشاركين (أحيانا أو أسماء)، ينصح أن يكتب المؤلفون أنه قد تم الحصول على موافقة وإعفاءهم أو وثيقهم.

10. ينصح أن تتناول مقالات الاستعراض والمرجع المائي، النقاط التالية: الأهداف، المصادر، طرق الانتقاء، تجميع المعطيات، وتسهيلها، والاستنتاجات.

11. ينصح أن يقصر الاستعراض من أي أعمال متشورة، في النص، على المراجع المدينة الأساسية. ولا يتضمن الدراسة المرجع على 25 مرجعًا على الأكتر، باستثناء المقالات النقدية، ويرجى تقريب المراجعة، كما أن مراجعة هذه المراجع في قائمة مرجعة في الصفحة الأولى، في نهاية الوثيقة، وأن يتم تقليل المعلومات التالية، إن أمكن: اسم المؤلف أو اسم المؤلفين، والروابط الأولى من أسمائهم، وعنوان الورقة أو الكتاب في اللغة العربية، إضافة إلى ترجمة اسم الورقة باللغة العربية، مع رقم الجبهة، ومصدر المراجع، وصلاحية النشر، ووصف النشر، ووصف نشر إعادة الورقات التي تكون فيها المراجع غير كاملة، أو غير مرتبة بحسب هذه المبادئ، إلى المؤلف، لتصحيحها. وفي ما يلي نموذج للأسلوب الذي ينصح بتطبيقه في المجلة الصحية لشرق المتوسط أن يُتبع:

كتاب:


مقالة في مجلة:


وليمة:


12. في ما يتعلق بالرسومات والجداول، المشروطة بالشروط الملائمة، فإنه ينبغي أن تُنشر كل منها في صفحة متصلة، ومرتبة على التوالي بالأعداد العربية، ومثبتة في نهاية الوثيقة. كما ينبغي الإشارة إلى كل رسم وكل جدول يشار إليه في النص، وتحديد مكانه بوضوح، بحسب ما يلزم، وحذف أي مكونات أو جداول أخرى في المقدمة، أو المواد الأولية، أو المواد الأولية الملحقة، عن الحقول على الأذون اللازمة. وفي حالة نقل أي رسومات أو جداول من مواد أخرى، فإنه يجب أن يتم إعادة صياغة كل رسم وكل جدول، وفي حالة نقل أي رسومات أو جداول من مواد أخرى، فإنه يجب أن يتم إعادة صياغة كل رسم وكل جدول.

13. لا تُنشر الورقات والقرصيات الأصلية إلا بناءً على طلب من المشرف الرئيسي.

14. بعد النشر، يحصل المؤلفون على نسخة من النص الذي تُنشر فيه المقالة. بينما يحصل المؤلف الرئيسي على نسخة من البحث النشوري. وتتم تقديم الطلبات للاستعلام عن الوثائق عبر الأسئلة، إلى رئيس التحرير.

المجلة الصحية لشرق المتوسط، منظمة الصحة العالمية، النسخة الحالية عشر، المجلد 5-6، 2005
Directives à l'intention des auteurs

1. Les articles soumis pour publication ne doivent pas avoir été publiés ou acceptés pour publication dans d'autres revues. Le Bureau régional de la Méditerranée orientale se réserve tous les droits de reproduction ou de republication des matériels qui paraissent dans La Revue de Santé de la Méditerranée orientale.

2. Les articles originaux en anglais, arabe ou en français peuvent être soumis pour considération au Rédacteur en chef de La Revue de Santé de la Méditerranée orientale, Bureau régional de l'OMS pour la Méditerranée orientale, BP 7608, Cité Nasr (11371), Le Caire (Égypte). Les articles peuvent également être envoyés par courriel à l'adresse suivante : EMHJ@emro.who.int. Ils seront résumés dans les trois langues.

3. Le sujet de l'article doit concerner la santé publique ou d'autres domaines techniques et scientifiques connexes dans le champ d'intérêt de l'Organisation mondiale de la Santé, se rapportant plus particulièrement à la Région de la Méditerranée orientale.

4. Chaque manuscrit doit être fourni en trois exemplaires. Le texte, avec les tableaux et les figures qui l'accompagnent, ne devrait pas dépasser 15 pages, format A4, dactylographiées ou imprimées en double interligne (4500 mots) et devrait être imprimé sur le recto seulement. Lorsque le manuscrit est accepté, avec ou sans conditions, l'auteur doit soumettre une disquette informatique de 3,5 pouces, contenant le texte, les tableaux, les graphiques et les illustrations. Pour les articles en anglais et en français, à la demande de l'éditeur, le texte devra être fourni en format traitement de texte (de préférence Microsoft Word pour PC, mais la plupart des autres formats peuvent être convertis) et sauvegardé également dans un fichier texte ASCII. Les articles soumis en arabe devraient suivre les mêmes directives que les articles rédigés en anglais ou en français. Si l'article est une traduction, dans son intégralité ou en partie, d'un autre document non publié, une copie de ce document dans la langue d'origine devrait également être soumise. Si possible, les graphiques devraient être fournis en format Harvard Graphics pour Windows ou Excel, et les illustrations et photographies devraient être en format EPS ou TIFF. Toutefois, il est nécessaire de fournir trois jeux des photographies et figures d'origine avec les données de base. Si les photographies comportent un texte ou lettrage, un jeu supplémentaire doit être fourni sans ce texte/lettrage.

5. Tous les articles seront revus par des pairs, et sur la base des commentaires du réviseur, le Comité de rédaction se réserve le droit d'accepter ou de rejeter tout article. Les articles sont acceptés sous réserve de la révision dont ils feront l'objet au plan statistique et rédactionnel, comme jugé nécessaire, ce qui peut amener à abréger le texte et supprimer certaines données présentées sous forme de tableaux ou de graphiques.

6. Le titre de l'article devrait être aussi concis que possible, de préférence 10 mots environ, et devrait être mis sur une page séparée, avec le nom complet de l'auteur (ou des auteurs), l'organisme (ou les organismes) d'appartenance et le diplôme scientifique le plus élevé obtenu. L'adresse pour la correspondance, ainsi que toute autre information nécessaire (adresse courriel, copie, téléphone) pour contacter l'auteur correspondant devraient être fournies. Le nombre des auteurs ne devrait pas dépasser cinq. Tous les auteurs devraient avoir apporté une contribution matérielle à la conception, à l'analyse ou à la rédaction de l'étude et avoir approuvé la version finale soumise. Une vérification de cette contribution peut être demandée aux auteurs. Les noms d'autres personnes peuvent être inclus dans les remerciements.
7. Afin de faciliter la traduction des résumés et du nom des auteurs, les auteurs dont la langue maternelle s'écrit en caractères arabes et qui rédigeant en anglais ou en français doivent fournir leur nom complet en écriture arabe ainsi qu'une transcription.

8. Les articles présentant des résultats de recherche originale devront suivre le format IMRAD : introduction, matériel (sujets) et méthodes ; résultats ; analyse ; et discussion. Un résumé de 100 mots maximum sera fourni, mentionnant clairement les objectifs, le contexte, les résultats et les conclusions.

9. Les auteurs devront vérifier, le cas échéant, que toutes les personnes sur lesquelles la recherche porte ont donné leur consentement éclairé, et lorsque des participants (vivants ou décédés) n'ont pas pu donner ce consentement, qu'un consentement de substitution a été obtenu.

10. Les articles d'analyse devront comporter des sections portant sur les objectifs, les sources, les méthodes de sélection, la compilation et l'interprétation des données et des conclusions.

11. Les citations dans le texte de travaux publiés devraient être limitées aux références essentielles récentes. Hormis les articles d'analyse, il est conseillé de ne pas dépasser 25 références. Elles devraient être numérotées en chiffres arabes placées entre parenthèses [crotchet] selon l'ordre dans lequel elles apparaissent dans le texte. Ces références devraient figurer sous forme de liste numérotée sur une page séparée à la fin de l'article. Elles devraient contenir les éléments d'information suivants, selon le cas : nom(s) et initiale(s) de l'auteur/des auteurs ; titre de l'article ou de l'ouvrage dans sa langue originale ainsi que la traduction ; nom complet de la revue ainsi que le numéro du volume et les pages concernées ; nom de la maison d'édition (commerciale ou institutionnelle) et lieu de publication (ville et pays) ; et date de la publication. Les articles comportant des références inadéquates ou dont les références ne sont pas organisées conformément à ces principes seront renvoyés aux auteurs pour correction. Exemples du style préféré de La Revue :


12. Les figures et les tableaux avec les légendes appropriées devraient être placés chacun(e) sur une feuille séparée, numérotés en chiffres arabes selon l'ordre et joints à la fin du document. Chaque figure et chaque tableau devraient avoir une référence dans le texte et son emplacement dans le texte devrait être indiqué clairement le cas échéant. Au besoin, les sources devraient être mentionnées pour chaque figure ou tableau. Si des figures, tableaux ou d'autres matériels ont été copiés d'autres sources, les auteurs portent l'entièr e responsabilité d'obtenir l'autorisation nécessaire. Afin d'éviter les problèmes de mise en page lors de la production finale, le nombre de tableaux et figures devrait être limité autant que possible. Il est préférable de ne pas avoir plus d'un tableau ou d'une figure pour 1000 mots. Les figures établies à partir de données doivent être accompagnées de ces données pour permettre une recomposition, le cas échéant.

13. Les articles originaux et les disquettes ne seront pas renvoyés sauf si l'auteur principal en fait la demande.

14. Lors de la publication, les auteurs recevront chacun un exemplaire du numéro dans lequel l'article paraît et l'auteur principal recevra 50 tirés à part. Les demandes de tirés à part supplémentaires et les informations sur le prix peuvent être obtenues auprès du Rédaacteur en chef.
WHO sales and discount policy

**Objective**

Within the financial obligations of the publishing and distribution process, prices of WHO publications are kept as low as possible in order to maximize their dissemination and reach readers for whom they are intended.

The price and discount policies for WHO/EMRO and WHO/HQ publications are as follows:

**Price and discount policy for WHO/EMRO publications**

- EMRO publications are priced in US dollars.
- Sales agents receive a 40% discount and 30 days credit. Credit limit is US$ 500.00.
- Bulk orders of individual books, i.e. 1000 copies per title, qualify the agent for a 50% discount instead of a 40% discount; however, payment of total value must be made before dispatch of publications is effected.
- Dispatch charges are calculated at 25% of cover prices.
- Present delivery time average is two weeks from date of receipt of firm order.

**Price and discount policy for WHO/HQ publications**

- WHO/HQ publications and subscriptions are priced in Swiss francs. Clients in developing countries are eligible for a special tariff which in all cases is 30% less than the Swiss francs regular prices.
- Sales agents receive a 40% discount for book orders and 20% for subscription orders. Credit limit is Swiss francs 1000.00.
- Bulk orders qualify the agents for a special higher discount, provided the dispatch of the whole order is done to the same consignee. In this case, a proforma invoice will be issued by WHO/HQ, and the order will be dispatched only upon receipt of payment. No return of books or periodicals will be accepted.
- Payment of invoices may be made in US dollars at the official rate of exchange at the date of payment.
- Present delivery time average is four weeks from date of receipt of orders.

* A WHO/EMRO Publications Price List is available on request.
EVALUATION FORM
Eastern Mediterranean Health Journal
Volume II

Readers are kindly requested to comment, with all frankness, on the eleventh volume of this journal. This form is only for guidance, but you are welcome to attach additional information. An online version of the evaluation form is available at: http://www.emro.who.int/publications/emhj/evaluationform.asp

Content: ........................................................................................................................................
........................................................................................................................................

Language and style:......................................................................................................................
........................................................................................................................................

Layout:......................................................................................................................................
........................................................................................................................................

Periodicity & regularity:................................................................................................................

General impression:....................................................................................................................

Other comments:...........................................................................................................................

Are you interested in receiving further issues? ...... □ Yes    □ No

Suggestions for improvement:.....................................................................................................

Name: ......................................................................................................................................

Place of work and position: ........................................................................................................
........................................................................................................................................

Address: .................................................................................................................................
........................................................................................................................................
........................................................................................................................................

Signature: ................................................................................................................................. Date: ........................................................................

Please return the completed form to the Editor-in-chief.
An addressed envelope is provided for your convenience. Thank you.
Member States of the World Health Organization
Eastern Mediterranean Regional Committee
Afghanistan Bahrain Djibouti Egypt Islamic Republic of Iran
Iraq Jordan Kuwait Lebanon Libyan Arab Jamahiriya Morocco
Oman Pakistan Palestine Qatar Saudi Arabia Somalia Sudan
Syrian Arab Republic Tunisia United Arab Emirates Republic of Yemen

États Membres du Comité régional de la Méditerranée orientale
de l’Organisation mondiale de la Santé
Afghanistan Arabie saoudite Bahreïn Djibouti Égypte
Émirats arabes unis République islamique d’Iran Iraq
Jamahiriya arabe libyenne Jordanie Koweït Liban Maroc
Oman Pakistan Palestine Qatar République arabe syrienne Somalie
Soudan Tunisie République du Yémen

Correspondence
Editor-in-chief
WHO Eastern Mediterranean Regional Office

P.O. Box 7608
Nasr City, Cairo 11371
Arab Republic of Egypt
Tel: (202) 670 2535
email: khayat@emro.who.int
Fax: (202) 670 2492
emhj@emro.who.int

Subscription details
Individual copies: US$ 15.00
Annual subscription: US$ 60.00
There is a 50% discount for orders from developing countries
Prices include cost of dispatch
Letter from the Editor .......................................................... 858
Wife abuse in Esfahan, Islamic Republic of Iran, 2002 ...................... 860
Prevalence and determinants of intimate partner violence in Babol city, Islamic Republic of Iran 870
Domestic violence: a cross-sectional study in an Iranian city .......... 880
Reproductive health knowledge, attitudes and practices of Iranian college students ........................................ 888
Quality of life of patients with schizophrenia 2 ......................... 898
Patient satisfaction and related factors in Kerman hospitals ............. 905
Patient satisfaction with dental services at Ajman University, United Arab Emirates .......................... 913
Compliance with good practice in prescription writing at outpatient clinics in Saudi Arabia .............................. 922
Adherence to universal precautions among laboratory personnel in Lebanon .................................................. 929
Planning dental manpower in Lebanon: scenarios for the year 2015 ...... 943
Smoking prevalence, knowledge and attitudes among medical students in Karachi, Pakistan .................. 952
Prevalence and type of anaemia in young Egyptian patients with type 1 diabetes mellitus ....................... 959
Blood pressure distribution among healthy schoolchildren aged 6–13 years in Tehran ............................ 968
Evaluation of a programme for control of Schistosoma haematobium infection in Yemen ..................... 977
Prevalence of pediculosis capitis and determination of risk factors in primary-school children in Kerman .......................................................... 988
Serum interleukins and urinary microglobulin in children with idiopathic nephrotic syndrome .................. 993
Acetylhydrazyl phenotype in Iraqi patients with systemic lupus erythematosus ........................................... 1003
Role of mast cells and T-lymphocytes in pemphigus vulgaris: significance of CD44 and the c-kit gene product (CD117) ........................................................ 1009

Contents

الإصابات الوتية في قطاعات البناء وتشكيل المعادن والصناعات الغذائية في محافظة أزمة فلسطين .............. 1018
Specificity and sensitivity of clinical diagnosis for chronic pneumonia ..................................................... 1029
Changing trends in drug resistance among typhoid salmonellae in Rawalpindi, Pakistan .......................... 1038
Prevalence of asymptomatic bacteruria in pregnant women in Sharjah, United Arab Emirates .................. 1045
Prévalence du virus de l'hépatite G chez les donneurs de sang en Tunisie .................................................. 1053
Medical ethics in the Islamic Republic of Iran .................................................. 1061
Comparison of health care financing in Egypt and Cuba: lessons for health reform in Egypt ...................... 1073
Management of source and drinking-water quality in Pakistan ..................................................... 1087
Burn and scald injuries .......................................................... 1099
Anti-smoking campaign in Multan, Pakistan .......................................................... 1110
Bacterial distribution analysis of the atmosphere of two hospitals in Ibb, Yemen ..................................... 1115
Effect of Ramadan fasting on secretion of sex hormones in healthy single males .................................. 1120
Human development index adjusted for environmental indicators: case study in one Egyptian village .................................................................................. 1124
Eastern Mediterranean health journal reviewers' panel, 2005 ..................................................... 1128
Guidelines for authors ............................................................................. 1134
WHO sales and discount policy .......................................................... 1140
Evaluation form ..................................................................................... 1141