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The Eastern Mediterranean Region now has the lowest recorded number of cases of wild poliovirus transmission in its history; only Afghanistan and Pakistan have reported 13 cases in total so far in 2017. Despite this progress, the goal of final eradication requires great effort to effectively deal with challenging environmental and security concerns.

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المجلة الصحية لشرق المتوسط

هي المجلة الرسمية التي تصدر عن المكتب الإقليمي لشرق المتوسط بمنظمة الصحة العالمية. وهي منبر لتقديم السياسات والمبادرات الجديدة في الخدمات الصحية والترويج لها، ولتبادل الآراء والمفاهيم والمعطيات الوبائية ونتائج الأبحاث وغير ذلك من المعلومات، وخاصة ما يتعلق منها بإقليم شرق المتوسط. وهي موجهة إلى كل أعضاء المهن الصحية، والكليات الطبية وسائر المعاهد التعليمية، وكذا المنظمات غير الحكومية المعنية، والمراكز المتعاونة مع منظمة الصحة العالمية والأفراد المهتمين بالصحة في الإقليم وخارجه.

EASTERN MEDITERRANEAN HEALTH JOURNAL

IS the official health journal published by the Eastern Mediterranean Regional Office of the World Health Organization. It is a forum for the presentation and promotion of new policies and initiatives in health services; and for the exchange of ideas, concepts, epidemiological data, research findings and other information, with special reference to the Eastern Mediterranean Region. It addresses all members of the health profession, medical and other health educational institutes, interested NGOs, WHO Collaborating Centres and individuals within and outside the Region.

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.

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Editorial

The push to eradicate poliomyelitis in the Eastern Mediterranean Region

Christopher Maher¹

The Eastern Mediterranean Region, and the world, has never been closer to eradicating poliomyelitis. Wild poliovirus transmission is at the lowest levels in history and is limited to a few zones in the two remaining polio-endemic countries – Afghanistan and Pakistan. As at 30 October 2017, only 13 cases of poliomyelitis due to wild poliovirus type 1 (WPV 1) had been reported in the Region in 2017: 8 from Afghanistan and 5 from Pakistan. These two countries collectively reported 33 cases in 2016, 74 in 2015, and 334 in 2014 (1).

While the final eradication of poliomyelitis is tantalizingly close, finishing the job has become increasingly complex. The places and populations where polio is hanging on are some of the most challenging and complex environments in the world for implementing public health initiatives; the very densely populated slums of Karachi, and the two main corridors of movement between Pakistan and Afghanistan, (the Quetta block area of Baluchistan in Pakistan and the Southern Region of Afghanistan, and Peshawar in Khyber Pakhtunkhwa and Eastern Region of Afghanistan). Implementing immunization activities that reach every child is made more challenging by the very high levels of population movement, whether seasonal movements of tribal populations within local areas or over longer distances, movements of families for economic reasons, or long distance traditional nomadic movements. A further challenge in Afghanistan is securing consistent access to all communities for immunization, as the security situation

regularly compromises access in parts of the country.

Governments and partners in both countries are implementing National Emergency Action Plans (NEAPs) for Polio Eradication, which include innovative strategies to reach chronically missed children and those living in inaccessible areas (2,3). Implementation of these plans is coordinated through Emergency Operation Centres (EOCs) in both countries, and also through the EOCs, the national programmes strive to develop collaborative approaches and achieve coordination. Both programmes are guided by Technical Advisory Groups, whose recommendations help inform the development of the NEAPs (4,5).

Strategic communications to build and maintain community demand for polio vaccination continues, and understanding the reasons why children are missed by vaccination remains a priority. Vaccinators continue to be placed at the heart of the eradication effort to foster community trust, and targeted interventions by religious support persons, under the guidance of Islamic Advisory Groups, continue to help address misconceptions relating to vaccination.

In addition to the remaining transmission of wild poliovirus in Pakistan and Afghanistan, there is an ongoing challenge posed by Circulating Vaccine Derived Poliovirus (cVDPV). An outbreak of cVDPV type 2 is currently occurring in the north-eastern area of the Syrian Arab Republic (1). The development of cVDPV is a threat to

communities with low routine immunization coverage, particularly those in areas of conflict and inaccessibility, and type 2 is the poliovirus most likely to regain virulence and cause outbreaks. For this reason, live virus vaccines containing type 2 poliovirus are now no longer being routinely used globally. The current outbreak in the Syrian Arab Republic, where the first identified cases had onset in March 2017, is a stark reminder of the need for unhindered access to children in all areas for immunization. As at 30 October, 53 cases of cVDPV2 were confirmed in three governorates (1). The national programme and local authorities, supported by WHO, UNICEF and international partners, have carried out immunization responses in the affected areas despite tremendous difficulties due to the conflict. Further response may yet be needed to bring this outbreak to a close.

There is also the ongoing challenge of keeping the rest of the countries in the Region free of poliomyelitis. Supplementary immunization activities (SIAs) continue to be carried out in the two endemic and six at-risk countries across the Region (at risk countries include: Iraq, Libya, Somalia, Sudan, Syrian Arab Republic and Yemen), to achieve and maintain high levels of population immunity. In 2016 and 2017, the Regional Polio team has facilitated 23 Polio Outbreak Simulation Exercises in 17 countries to test and improve individual country preparedness to respond to polio outbreaks (1).

Surveillance for acute flaccid paralysis in the Region is stronger. AFP

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surveillance systems reported more than 16 000 AFP cases in 2016 compared to slightly over 13 000 in 2015 – a 21% increase, reflecting improvements in surveillance sensitivity, which have been maintained and extended in 2017 (1). The Regional Laboratory Network is performing with a high level of proficiency. Environmental surveillance is helping the poliomyelitis programme cast a wider net for poliovirus detection. In 2017, environmental surveillance has expanded from the original 3 to 6 countries and it is expected that a further 3 countries will commence environmental surveillance before the end of the year (1).

In the past 30 years of effort to eradicate poliomyelitis, a tremendous amount has been learned about planning and managing multi-partner initiatives, delivering services to all communities, and engaging communities as part of the process. As we come closer to final eradication, the issue of the transition of the polio eradication knowledge, experience and networks to benefit other public health programmes becomes increasingly important. Afghanistan, Pakistan, Somalia and Sudan are among 16 globally prioritized countries for transition planning. Iraq, Libya, the Syrian Arab Republic and Yemen are also among the Region's priority countries.

Member States and partners are determined to finish the job of eradicating poliomyelitis, and to protect all polio-free countries in the process. The overriding priority in the coming months is to stop wild poliovirus transmission in Afghanistan and Pakistan. The cVDPV2 outbreak in the Syrian Arab Republic must also be definitively stopped. Resources must be found to finish poliomyelitis eradication while maintaining high levels of immunity in all countries, and ensuring the highest possible quality of AFP surveillance, all the way through to final certification that the world is free of poliomyelitis. Finishing the job will not be easy, but it can and will be done.

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Outcomes of children with attention deficit/hyperactivity disorder: global functioning and symptoms persistence

Ahmed Al Ansari¹, Randah R. Hamadeh¹, Haitham Jahrami² and Eman A. Haji²

النتائج المتعلقة باضطراب فرط الحركة وقصور الانتباه في صفوف الأطفال: الأداء العام واستمرار الأعراض

أحمد الأنصاري، رندة حماده، هيثم جحرمي، إيمان حاجي

الخلاصة: يظهر كثير من المراهقين ممن يعانون من "اضطراب فرط الحركة وقصور الانتباه" سلوكاً معادياً للمجتمع وانخفاضاً في مستوى التحصيل التعليمي. ولم يتم التحقق من هذه القضايا في منظمة الصحة العالمية لإقليم الشرق المتوسط. وتمثل الهدف من هذه الدراسة في تقييم الأداء العام وسلوك الأطفال المصابين باضطراب فرط الحركة وقصور الانتباه مع نموهم وانتقالهم إلى فترة المراهقة بعد 10 سنوات من التشخيص المبدي. وأجريت مقابلات مع الآباء باستخدام جدول زمني مهيكل، و النسخة القصيرة لاختبار كونر، ومقياس التقييم العالمي للأطفال. وسجل نحو نصف أفراد العينة مستوى تحصيل تعليمي منخفض، في حين أشار 36٪ منهم إلى عدم وجود أصدقاء لهم. وتبين أن ربع الحالات من المدخنين، واعترف أحدهم بتعاطيه مواد الإدمان في حين اعترف آخر بمحاولة الانتحار. واستمر ثلث أفراد العينة في المعاناة من أعراض الاضطراب. وأبدى المراهقون المصابون "باضطراب فرط الحركة وقصور الانتباه" نفس النتائج الواردة في التقارير المنشورة فيما يتصل بالأداء المدرسي وعلاقات الأقران، وإن بأشكال مختلفة فيما يتعلق بتعاطي المخدرات والانتحار وغيره من السلوكيات الاندفاعية. ويوصى بإجراء دراسة متابعة في مرحلة البلوغ باستخدام مجموعة ضابطة.

ABSTRACT Many adolescents with ADHD show antisocial behaviour and low educational achievement. These issues have not been validated in the World Health Organization Eastern Mediterranean Region. The objective of this study was to assess the global functioning and behaviour of children with ADHD growing into adolescence 10 years after initial diagnosis. Parents were interviewed using a structured questionnaire, Conner's Short Version Test and the Children's Global Assessment Scale. Nearly half of our sample had low academic achievement and 36% had no friends. A quarter of the cases were smokers, one admitted abusing drugs and one had attempted suicide. One third of the sample continued to have ADHD symptoms. Adolescents with ADHD had similar school performance and peer relationships to those reported previously, but differences with regard to drug use, suicide and other impulsive behaviour. A follow-up study into adult life using a control group is recommended.

Impact du trouble de déficit de l'attention avec hyperactivité chez l'enfant : fonctionnement général et persistance des symptômes

RÉSUMÉ De nombreux adolescents affectés par le trouble de déficit de l'attention avec hyperactivité (TDAH) montrent des comportements antisociaux et des faibles résultats scolaires. Ces problèmes n'ont pas été validés dans la Région de la Méditerranée orientale de l'Organisation mondiale de la Santé. L'objectif de la présente étude était d'évaluer le fonctionnement général et le comportement des enfants passés à l'adolescence 10 ans après le diagnostic initial du TDAH. Les parents ont été interrogés au moyen d'un questionnaire structuré, de la version abrégée du questionnaire de Conners et de l'échelle d'évaluation globale du fonctionnement de l'enfant. Près de la moitié de l'échantillon avait des faibles résultats scolaires et 36 % n'avaient pas d'amis. Un quart des cas étaient des fumeurs, un d'entre eux avait admis l'usage de substances psychoactives et un autre avait fait une tentative de suicide. Un tiers de l'échantillon avait continué d'avoir des symptômes du TDAH. Les adolescents affectés par le TDAH avaient les mêmes performances scolaires et les mêmes relations avec les pairs que dans les rapports publiés. Par contre, ils avaient des représentations différentes en ce qui concerne la consommation de drogues, le suicide ainsi que d'autres comportements impulsifs. Une étude de suivi menée à l'âge adulte à l'aide d'un groupe témoin a été recommandée.

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Introduction

Attention deficit hyperactivity disorder (ADHD) is the most common psychiatric disorder encountered among children with disruptive behaviour (1). The disorder affects 3–7% of school-aged children (2). Several studies have shown the persistence of ADHD symptoms into adolescence and adult life with prevalence rates that vary according to several factors including age, gender and presenting symptoms (3–6). Some studies have suggested that symptom severity and early onset are prognostic factors regardless of treatment type (7–10). Adolescents with ADHD show academic underachievement in comparison to their non-ADHD peers (11–13). They are at increased risk of developing mental health and behavioural problems (14,15). Furthermore, social problems such as rejection by peers and inability to maintain friendships complicate the learning process further and lead to decreased motivation to study and increase the chance of school dropout (16). The presence of ADHD in childhood increases the risk of developing antisocial behaviour and substance abuse later in adolescence, which in turn increases the risk of delinquency, such as increased number of arrest records, conviction and imprisonment (17).

Prevalence data on ADHD in the Middle East vary: Saudi Arabia (16.3%), United Arab Emirates (1.0%), Qatar (9.4%), Yemen (1.3%), Oman (8.2%) and Palestine (4.3%) (18). However, published data on ADHD follow-up studies in the World Health Organization (WHO) Eastern Mediterranean Region are lacking. Data on the prevalence rate of ADHD in Bahrain are not available and outcome studies are not reported in the Region, however, it was estimated that ~20% of the new referrals had a diagnosis of ADHD at the Child and Adolescent Psychiatric Unit (CAPU) in 2011 at the Bahrain Psychiatric Hospital (19). The CAPU has

been the main facility for children with psychiatric and behavioural problems in Bahrain since 1981. The Unit has a busy outpatient clinic (400 new referrals and > 2000 visits annually) and an inpatient unit/day care programme of 12-bed capacity for children aged ≤ 12 years. Bahrain is an archipelago situated in the Arabian Gulf Region, east of Saudi Arabia. It covers an area of ~765 km², and had an estimated population of 1.37 million in 2015. Non-Bahrainis represented 52.7% of the population with a male to female ratio of 2.5.

The purpose of the present study was to assess the global functioning and behaviour of a cohort of ADHD patients in Bahrain diagnosed in childhood and later examined in adolescence.

Methods

This was a cross-sectional study of 46 children aged 6–8 years who were diagnosed with ADHD at CAPU in 2004–2006 based on the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition criteria and Conner's Rating Scale – Revised for Parents and Teachers (2, 17). Thirty-three (71.9%) patients and their parents were interviewed in winter 2015. Thirteen (28%) of the cases were unreachable due to outdated contact details. None of the patients or their parents refused to participate. ADHD patients who had low cognitive ability (intelligence quotient < 80) and/or received a dual diagnosis of autism spectrum disorders (ASDs) were excluded.

The data for this research were collected from the parents of children with ADHD, and no questioning was directed to the children themselves. The parents were interviewed face-to-face (n = 5) or by telephone (n = 28); during the interviews the children were aged 10–12 years, following their initial diagnosis by 1 team member. The researcher followed a structured interview questionnaire designed for the study,

completed the Conner's Test – Short Version (20), a 30-point scale to detect ADHD symptoms, and the Child Global Assessment Scale (C-GAS) for functional impairment (21). The study questionnaire was designed to obtain information, regarding demographic data for patients and their parents, presence of ADHD symptoms and educational status. History of substance use and smoking, history of juvenile justice involvement, suicide and suicide attempts, risk-taking behaviour in the last 12 months, and lifestyle dimensions including relationships, weight, sleep and eating habits were also collected. The questionnaire also included a section on treatment duration and type, and parents' views of their children's outcomes during the study period. The interview lasted 45 minutes. Social class was defined following a modified Hollingshead and Redlich 5-point Likert scale with class 1 being high and 5 low (22).

Ethical approval was obtained from the Research Technical and Support Committee, Ministry of Health, Bahrain. Study participation was voluntary and each participant gave signed consent.

Data analysis was mostly descriptive using IBM SPSS Statistics version 22. Counts and percentages for each distinct value found for a variable were displayed in a frequency table. The χ^2 or Fisher's exact test was used to measure the association between 2 categorical variables.

Results

Patients' demographic data are presented in Table 1. Boys (n = 25) outnumbered girls (n = 8) and accounted for 75.8% of the study population, with a male to female ratio of 3: 1. The mean age at diagnosis was 7.3 [standard deviation (SD) 2.4] years and the mean current age 16.9 (1.9) years. Fourteen (42.4%) had inappropriate educational

Table 1 Demographic Data

Patient characteristics	No.	%
Sex		
Male	25	75.8
Female	8	24.2
Educational level		
Age appropriate	19	57.6
Not appropriate for age	14	42.4
Employment		
Employed	2	6.1
Unemployed	6	18.2
Student	25	75.8
Social Class		
1st	0.0	0.0
2nd	6	18.2
3rd	8	24.2
4th	17	51.5
5th	2	6.1
Consanguinity		
First degree	6	18.2
Second degree	3	9.1
No relation	24	72.7
Birth order		
First	13	39.4
Last	5	15.2
Other	15	45.5
Birth type		
Normal delivery	27	81.8
Caesarean section	3	9.1
Difficult labour	3	9.1
Total	33	100.0

level for their age that was determined using a cutoff of 2 academic years/standards below the expected grade for their age. Twenty-five (75%) of the patients were still students, with only 2 holding a regular job, and another 6 were neither in school nor working. More than half of the patients belonged to lower social classes 4 and 5 and a quarter were from class 3. Most patients were either first or last born (85%) and had a normal delivery (82%), and more than a quarter had related parents (27%). None of the patients were engaged or married or died from accident or suicide. There was only 1 attempted suicide by overdose of paracetamol.

One patient admitted using alcohol and cannabis on an irregular basis. One had legal involvement with the police after a fight at school. Over a quarter (27.3%) were current or ex-smokers. Four patients (12%) were involved in an accident/injury and another 4 were involved in a fight that needed medical attention in the year preceding their interviews. Two patients admitted having relationships with the opposite sex and 36.4% denied having close friends. One patient complained of being underweight compared to 5 (15.0%) who were overweight and 9 (27.7%) who had eating disorders. Only 3 (9%) patients had sleep-related problems.

Six cases (18.2%) received medication only, 17 (51.5%) behavioural therapy only and 10 (30.3%) combination treatment. Only 3 cases (9%) did not receive any treatment after completing their evaluation. Treatment duration was 6 months ($n = 22$, 66%), 1 year ($n = 4$, 12.1%), 2 years ($n = 2$, 6.1%), 3 years ($n = 1$, 3%) and ≥ 4 years ($n = 4$, 12.1%). Thirty-one (94%) parents, mostly mothers, reported improvement in their children's conditions and the rest reported no change. The mean score for the Conner's Test Short Version was 13.1 (4.5). The C-GAS score was "absent-no symptoms" in 20 (60%) patients. Symptoms were present in 12 (33.4%) patients and 1 (6.6%) patient scored major impairment. Although the study sample was small we compared those who were symptom free with those who still had symptoms according to Conner's Test Short Version, using 15 points as the threshold, and those who were impaired with C-GAS ≤ 80 points compared to those who were not impaired with C-GAS > 80 , to ascertain differences between the persistent group and the dissentient group. The χ^2 test showed a nonsignificant P value for both comparisons.

Discussion

The gender ratio and social class of the nonrespondents were not different from the interviewed sample. The male to female ratio of 3: 1 was similar to the worldwide gender representation among ADHD cohorts (23). Nearly half of the patients had educational underachievement; something expected and frequently reported in the literature (11, 14). The majority of patients were students, with a mean age of 17 years. The number of patients holding a regular job was small and comparable to that in similar age groups in other studies and national statistics (24). The social class representation among the sample was half from lower social classes and

a quarter from the middle class; similar to that reported for the child psychiatry population attending the same clinic (19).

The birth history including the rate of caesarean section delivery was in agreement with internationally acceptable ratios (25). The rate of caesarean section delivery was lower by more than half that of patients with ASDs attending the same clinic (26). However, the rate of consanguineous marriages among the parents of ADHD patients was similar to that reported in the general population and among patients with ASDs (26,27).

The number of persons aged ≤ 17 years in the general population who are engaged in deliberate self-harm or who have committed suicide is small, hence it was not surprising to find a low rate of suicide among the study sample (28). Adolescents in Bahrain are permitted to obtain a driving licence at age 18 years; therefore, the question about road traffic accidents might not have been appropriate at this stage. The number of patients who abused drugs was low in comparison to that reported in western countries, although we do not have figures for this variable in the community to make accurate comparisons. The hospital records were the only available source of information about drug use and they showed a low prevalence rate of drug use among adolescents, with the vast majority aged > 18 years. Glue solvents and cannabis were the main types of drugs misused by the adolescent population. It seems that drug addiction among them is only well established after the age of 18 years due to availability and financial reasons.

The number of ADHD patients who have ever smoked was high at 27.3%, and it was even higher than that reported in the same age group in the general population (29). Adolescents who had ADHD with a focus

on attention symptoms were 3 times more likely to start smoking than their unaffected peers (30,31). We should take into consideration that smoking is generally higher among men and most smokers in our study were male.

The number of patients who reported no same-sex friendship was higher (36%) than that reported for their peers in high school by school counselling services.

We do not have national figures to compare rates of eating and sleeping problems. Our figures for eating disorders among ADHD patients were similar to those in a cohort of ASD patients, however, our figures for sleep problems differed (32,33). Patients with ASDs have reported more sleep problems (40%) than ADHD patients have (9.0%) (34). Weight-related problems (18%) were similar to those reported for the WHO Eastern Mediterranean Region (15.6% and 17.4% among boys and girls, respectively) (30). A recent study conducted on 1st year medical students showed a rate of sleep-related disorders of 43% compared to 9% in our sample (31). We are aware of the fact that discussing these variables can only be accurately addressed in the presence of a community control group.

Most of our patients received behaviour therapy only, while one third received a combination of both treatments. Recently, parents of ADHD patients have been requesting psychosocial treatment more often because of fear of adverse drug effects. Noncompliance to treatment is reported to be high among ADHD patients and their parents (31,35). Two thirds of our sample continued treatment for 6 months only; the percentage fell to 12% by the end of the 1st year and continued at the same rate for the next 3 years. Patients with severe impairments adhered better to follow-up appointments than those with mild or moderate symptoms.

The majority of mothers of ADHD patients reported improvement in the condition of their children. It was totally subjective in nature and no effort was made to confirm the improvement objectively by the investigators. Two thirds of the sample scored > 60 on the C-GAS, which meant no significant symptoms. However, some symptoms persisted in one third and severe impairment in 3%. This is in accordance with other reported studies (3–5).

The study had some limitations including the absence of a control group. Furthermore, the small sample size made it difficult to perform detailed analysis. Data for the 13 excluded cases might have differed from the study sample data, although the excluded cases were similar in gender and social class distribution to those included in the study.

In conclusion, our cohort of 33 ADHD cases diagnosed in childhood and followed into adolescence showed that the symptoms persisted in one third of cases. Patients were mostly students living at home with considerable educational underachievement, few friends, and were cigarette smokers. Few patients had legal issues, attempted suicide or abused alcohol or drugs. These findings can be explained by the fact that Bahrain has a low rate of suicide and aggressive behaviour. These preliminary findings need to be supported by a long follow-up study that includes a control group.

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Multiplex polymerase chain reaction-based serotype analysis of dengue virus during 2015 dengue outbreak in Pakistan

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تحليل الأنماط المصلية المتعدد القائم على تفاعل البوليميراز المتسلسل لفيروس حمى الضنك أثناء تفشيها عام 2015 في راولپندي، باكستان
إعجاز غني، سعدية مشتاق، سليم أحمد خان

الخلاصة: تعد حمى الضنك أحد أهم الأمراض الفيروسية المنقولة بواسطة الحشرات. وهذه الحمى متوطنة في 125 بلداً ومنها باكستان، حيث تبلغ الإصابة العالمية بها 50–200 مليون إصابة. وقمنا بتحديد وتيرة الأنماط المصلية المختلفة لفيروس الضنك لإبراز توطنها المفرط في راولپندي بباكستان. وفي الفترة من مايو/ أيار إلى أكتوبر/ تشرين الأول 2015، عمدنا إلى تحليل عينات مصلية لما مجموعه 140 مريضاً يشتبه في إصابتهم بالذنك، وذلك باستخدام مقاييس الـ ELISA وتفاعل البوليميراز المتسلسل المتعدد. وبلغت نسبة المصابين بالعدوى من النمط المصلي 2 ما مقداره 77٪، وبالنمط المصلي 3 ما مقداره 11٪، وبالنمط المصلي 4 ما مقداره 5٪، وبالنمط المصلي 1 ما مقداره 2٪. كما بلغت نسبة الإصابة بالنمطين المصليين 1، 2 (2٪)، النمطين المصليين 1، 4 و 2، 3 (1٪ لكل مجموعة). وتضاعفت الإصابة بحمى الضنك في السنوات الخمسين الماضية وانتشرت لتشمل مناطق كانت خالية من هذا المرض في السابق. ويسود النمط المصلي 2 بين السكان يليه النمط المصلي 3. ولا يوجد علاج محدد حالياً لحمى الضنك، وتعد مكافحة ناقلات الأمراض والتطعيم الأسلوبين الفعالين حصراً للحيلولة دون تفشي المرض في المستقبل.

ABSTRACT Dengue is one of the most important arthropod-borne viral diseases. It is endemic in > 125 countries including Pakistan, with a global incidence of 50–200 million. We determined the frequency of different serotypes of dengue virus to highlight its hyperendemicity in Rawalpindi, Pakistan. Between May and October 2015 we analysed the serum samples of 140 patients with a suspicion of dengue, using ELISA and multiplex polymerase chain reaction. One hundred and eight were infected with serotype 2, 16 with serotype 3, 7 with serotype 4 and 3 with serotype 1. Three patients were infected with serotypes 1 and 2, and 1 each with serotypes 1 and 4 and serotypes 2 and 3. Incidence of dengue has increased many fold in the past 50 years and has expanded to areas that were previously free from the disease. Serotype 2 was predominant in our population followed by serotype 3. There is currently no specific treatment for dengue, and vector control and vaccination are the only effective methods to prevent future outbreaks.

Analyse des sérotypes du virus de la dengue par amplification en chaîne par polymérase multiplexe pendant la flambée de dengue de 2015 à Rawalpindi (Pakistan)

RÉSUMÉ La dengue est l'une des plus importantes maladies virales transmises par des arthropodes. Elle est endémique dans plus de 125 pays dont le Pakistan, l'incidence mondiale étant comprise entre 50 et 200 millions. Nous avons déterminé la fréquence des différents sérotypes du virus de la dengue pour mettre en évidence son hyperendémicité à Rawalpindi (Pakistan). Les échantillons de sérum de 140 patients susceptibles d'avoir contracté le virus de la dengue ont été analysés entre mai et octobre 2015 à l'aide du test ELISA et de l'amplification en chaîne par polymérase multiplexe. Cent huit patients étaient infectés par le sérotype 2, 16 par le sérotype 3, sept par le sérotype 4 et trois par le sérotype 1. Trois patients étaient infectés par les sérotypes 1 et 2, un patient par les sérotypes 1 et 4 et un autre par les sérotypes 2 et 3. L'incidence de la dengue a considérablement augmenté ces 50 dernières années et elle s'est étendue à des zones qui étaient précédemment exemptes de la maladie. Le sérotype 2 était prédominant dans notre population suivi par le sérotype 3. Il n'existe actuellement aucun traitement spécifique pour la dengue. La lutte antivectorielle et la vaccination constituent les seules méthodes efficaces pour prévenir les flambées futures.

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Introduction

Dengue virus infection has emerged as one of the most important arthropod-borne viral diseases worldwide (1). It is endemic in > 125 countries including Pakistan (2,3). Globally, there are 50–100 million cases of dengue fever and 500 000 of dengue haemorrhagic fever (DHF) reported annually (4). The first recorded symptoms of dengue were reported in the Chinese Medical Encyclopedia in the year 992 (5). It was called a water poison then, however, the viral aetiology and transmission by mosquitoes were discovered in the 20th century after the major outbreak in World War II (4, 5). The first case of dengue was documented in Pakistan in 1994 in Karachi and the first outbreak occurred there in 2005 (6–8). The first case was documented in 1998 in the Armed Forces Institute of Pathology (AFIP), Rawalpindi.

Dengue is caused by dengue virus complex, which consists of 4 antigenically and immunogenically distinct serotypes, DENV1, DENV2, DENV3 and DENV4 that belong to the family Flaviviridae (6,7). Primary dengue infection with 1 serotype provides lifelong immunity to the infecting type, however, secondary infection with a heterologous serotype predisposes the patient to complications like DHF and dengue shock syndrome (DSS) due to non-neutralizing-antibody-dependent enhancement of the disease (8,9). Dengue virus is a single-stranded positive-sense RNA virus whose genome encodes 3 structural proteins, capsid (C), precursor of membrane (prM) and envelope (E) and 7 nonstructural proteins, NS1, NS2A, NS2B, NS3, NS4A, NS4B and NS5 (10). Only E and NS1 proteins bear virus neutralization epitopes and play an important role in protective immunity. However, only NS1 is produced in both membrane-associated and secreted forms and expressed by all serotypes (8–10). It is present in high concentrations early in the course of the

disease in the sera of infected patients and is therefore used as a diagnostic marker in clinical practice (11).

Dengue virus is transmitted to humans through bites from infected female mosquitoes, *Aedes aegypti* and *Aedes albopictus* (12). The only vertebrate hosts of dengue virus in nature are humans and several species of Asian and African subhuman primates (13). The virus originates in the sylvatic cycle and is transmitted initially to a rural and then an urban cycle (12,13). The 5th serotype of dengue virus, which was discovered in 2011, is currently confined to the sylvatic cycle, however, it is hypothesized that it will be transmitted from nonhuman primates to humans in the coming years like the other serotypes are (14). Transmission of dengue virus has increased markedly in recent years especially in the Americas, Southeast Asia and the Western Pacific (15). It is believed that dengue virus was first introduced to Pakistan through importation of tyres containing eggs of infected mosquitoes at Karachi sea port (16).

The objective of this study was to determine the frequency of different serotypes of dengue virus among patients with dengue fever, DHF or DSS during the 2015 outbreak in Rawalpindi. The variables investigated were age group and sex most commonly affected during this outbreak and the frequency of the respective serotypes.

Methods

From May to October 2015, we collected and analysed the clinical and laboratory data of 140 patients [121 (86%) male and 19 (14%) female, mean age 34 years]. The presence of dengue virus infection was determined in patients with suspicion of dengue fever who were referred to the Virology Laboratory, AFIP, Rawalpindi, Pakistan, and in hospitalized patients whose samples were sent for testing from the special

dengue wards of mainly 2 tertiary care teaching hospitals in Rawalpindi, after obtaining informed consent. The study was approved by the Ethics Committee of the AFIP.

Serum samples that tested positive for NS1 antigen by ELISA were processed by multiplex polymerase chain reaction (PCR) in which the presence of all 4 serotypes (DENV1, DENV2, DENV3 and DEN4) was detected simultaneously using 4 primer–probe sets in a single reaction mixture. RNA was isolated from the serum by automated extractor (Neosense; Euro Genomas, Vilnius, Lithuania). Dengue virus RNA in the patient samples was amplified using the Sacace Dengue Real Time PCR Kit and thermal cycler (Como, Italy), and the amplified products were detected using fluorescent dyes. These were linked to oligonucleotide probes that bound specifically to the amplified products. Serotype analysis was performed simultaneously on the same amplified products. The sensitivity of this assay was 98% and the specificity was 99%.

We determined the frequency of different dengue virus serotypes in 4 different age groups, 1–20, 21–40, 41–60 and 61–80 years. We also determined the sex distribution of dengue virus serotypes.

Data were compiled and analysed using SPSS version 21 (SPSS Inc., Chicago, IL, USA).

Results

One hundred and eight (77%) patients were infected with DENV2, which was the most common serotype found during this outbreak. The second most common was DENV3 with a frequency of 11% (16 patients). The frequency of DENV4 was 5% (7 patients) and DENV1 was present in 3 (2%) patients. There were also some mixed infections with multiple serotypes of dengue virus. Three (2%) patients were infected with

DENV1 and 2, and 1 (0.7%) each with DENV1 and 4 and DENV2 and 3.

The most common DENV2 was present in 16 patients in age group 1–20 years, 34 patients in age group 21–40 years, 22 patients in age group 41–60 years and only in 5 patients in age group 61–80 years (Figure 1). The age group most affected by any serotype was 21–40 years.

Discussion

Dengue serotype analysis during a 2015 outbreak in Rawalpindi, Pakistan showed that serotype 2 was predominant in 108 patients, followed by serotype 3 in 16 patients, serotype 4 in 7 patients and serotype 1 in 3 patients. We also found mixed infections with dengue virus serotypes 1 and 2 in 3 patients, serotypes 1 and 4 in 2 patients and serotypes 2 and 3 in 1 patient.

Dengue fever has emerged as the most important arboviral infection in different geographical regions of the world (17). Pakistan has witnessed several outbreaks of dengue virus infection since 1994, which have led to significant morbidity and mortality in the past and imposed a great economic burden on the country (16,18). The disease was initially restricted to Southern Pakistan, particularly Karachi, the capital of Sindh Province, and subsequently extended to cause major epidemics in Northern Pakistan as well (19). During 2006–2009, major dengue epidemics occurred in Karachi and the emergence of DENV3 in Pakistan was first reported during 2005 in a DHF outbreak in Karachi (18). Koo et al. conducted a study in Pakistan between 2006 and 2011 that showed that DENV3 was the predominant serotype (19). A major dengue epidemic was reported in 2011 in Lahore. Khan et al. conducted a study during that outbreak on 34 patients and showed that DENV2 was the predominant serotype (20).

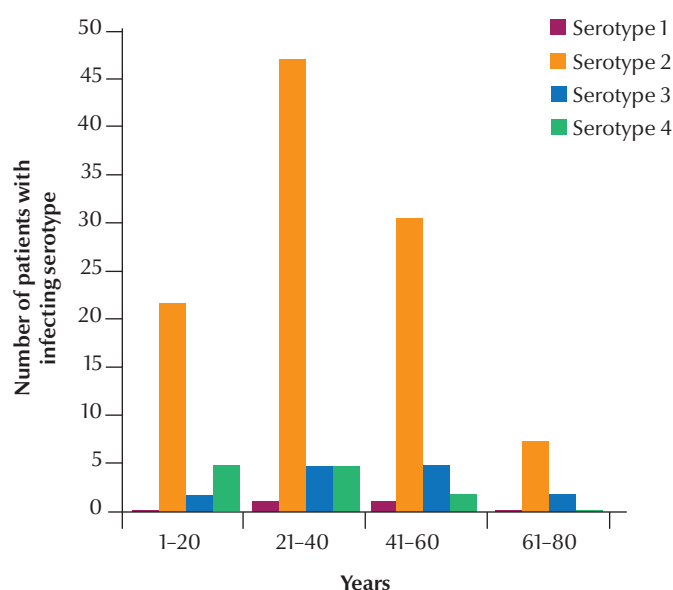


Figure 1. Frequency of dengue virus serotypes in different age groups during the 2015 outbreak in Rawalpindi, Pakistan.

We conducted the present study during the 2015 dengue outbreak in Rawalpindi, which is believed to be the first study in Pakistan on an adequate sample size (140 patients). Our study highlighted the hyperendemic potential of dengue virus in Pakistan by detecting the predominant DENV2 and the presence of the other three serotypes, which is alarming. There are not many data available on dengue virus serotypes in Pakistan and the predominance of DENV2 was not unexpected, as it is the most prevalent serotype worldwide and has been associated with severe epidemics (21). The outcome for patients in our study was good and neither young nor old were found to develop complications. Cocirculation of multiple dengue virus serotypes can result in major epidemics of severe disease. If these patients are re-infected with a heterologous dengue virus serotype, they are vulnerable to develop complications like DHF and DSS.

Many studies have reported the prevalent serotypes of dengue virus worldwide. Hansley et al. conducted a study in South America during 2005–2010 and reported the presence

of DENV1 and 3 (22). A study from Lucknow, India in 2013 showed the presence of DENV1 and 3 (23). A Malaysian study also showed the prevalence of DENV1 and 3 (24).

For the correct molecular characterization of the virus, all the patient samples included in our study were collected during the acute phase of infection. Serum samples were used first for NS1 detection and those that tested positive were then used for viral RNA extraction. All samples that were positive for NS1 antigen were positive by PCR as well. So, NS1 antigen positivity is a good surrogate marker of dengue virus viremia because NS1 antigen is expressed by all 4 dengue virus serotypes.

Our study had some limitations. It was conducted in a single centre and in 1 city. In future, patients from all virology reference centres in different cities of Pakistan should be included for a better analysis of prevailing dengue serotypes in Pakistan.

In South Asia, all dengue serotypes have circulated periodically (25). The current study concluded that the predominant serotypes of dengue virus circulating in Rawalpindi are DENV2

followed by DENV3. A significant number of cases with mixed serotypes were seen and might be common in all regions of the country. This hyperendemicity is indicative of a large outbreak of DHF in the future, so prevention of dengue fever and control of its vectors has become increasingly important.

Apart from sustainable vector control, timely diagnosis and case management is crucial for early recognition of DHF, especially in patients with a history of dengue fever. It had been hoped that the tetravalent vaccine that was in phase III clinical trials would bring an end to dengue virus disease. However,

the vaccine suffered a setback because of the discovery of a 5th serotype of dengue virus (14). Much effort needs to be made to develop a holistic approach to control this disease in the future.

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Third study on WHO MPOWER Tobacco Control Scores in Eastern Mediterranean countries 2011–2015

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الدراسة الثالثة لمبادرة منظمة الصحة العالمية المتعلقة بمكافحة التبغ في بلدان إقليم شرق المتوسط عام 2011-2015

غلام رضا حيدري، آرزو ابن احمدي، هاري لندو، فهيمه شامياني، محمد رضا مسجددي، محمد شادمهر، ليدا فدائي زاده

الخلاصة: أجريت هذه الدراسة لتحديد تنفيذ سياسات المبادرة وتقييم أي تغييرات محتملة في مختلف بلدان إقليم شرق المتوسط خلال السنتين الماضيتين. وأُعدت قائمة مرجعية في إطار هذه الدراسة المقطعية المقارنة استناداً إلى 10 فئات مذكورة في تقرير 2013/15. وأعطيت درجات من 0 إلى 4 لسبع أسئلة ومن 0 إلى 3 لثلاث أسئلة. وصُنِّفت بلدان إقليم شرق المتوسط البالغ عددها 22 بلداً وقورنت بمجموع درجاتها على مقياس من 0 إلى 37. وحققت جمهورية إيران الإسلامية ومصر أعلى الدرجات. وأظهرت باكستان واليمن والسودان تقدماً، في حين تراجع درجات كل من البحرين والأردن وعمان والكويت والجمهورية العربية السورية. أن الدرجة الإجمالية لبلدان إقليم شرق المتوسط انخفضت مقارنة بعام 2013. وبالتالي، لا يزال ثمة حاجة لزيادة التركيز على سياسات الضرائب على التبغ وسياسات منع التدخين لمواجهة هذه الخطوة العكسية.

ABSTRACT This study was conducted to quantify the implementation of the MPOWER policies and to assess any possible changes across Eastern Mediterranean Region (EMR) countries. In this comparative cross-sectional study based on 10 categories mentioned in MPOWER report 2015 a checklist was designed. Seven questions were scored from 0–4 and three from 0–3. The 22 EMR countries were ranked and compared by their total score on a scale of 0–37. The highest scores were achieved by Egypt and the Islamic Republic of Iran. Pakistan, Sudan and Yemen showed progress, while Bahrain, Jordan, Kuwait, Oman, and the Syrian Arab Republic had decreased scores. The total score of the EMR countries had decreased compared to 2013. Thus, there remains a need for greater focus on tobacco taxation and smoke-free policies to address this retrograde step.

Troisième étude sur les scores MPOWER OMS en matière de lutte antitabac dans les pays de la Région de la Méditerranée orientale durant la période 2011- 2015

RÉSUMÉ La présente étude a été conduite pour quantifier la mise en œuvre des politiques MPOWER et évaluer les changements éventuellement survenus dans les pays de la Région de la Méditerranée orientale entre 2013 et 2015. Dans la présente étude transversale comparative basée sur 10 catégories mentionnées dans le rapport MPOWER de l'année 2015, une liste de contrôle a été mise au point. Sept questions ont été notées sur une échelle de 0 à 4 et trois questions sur une échelle de 0 à 3. Les 22 pays de la Région de la Méditerranée orientale ont été classés et comparés selon leurs scores totaux sur une échelle de 0 à 37. Les scores les plus élevés ont été obtenus par l'Égypte et la République islamique d'Iran. Le Pakistan, le Soudan et le Yémen ont montré des progrès, alors que Bahreïn, la Jordanie, le Koweït, Oman et la République arabe syrienne ont obtenu des scores inférieurs par rapport aux études précédentes. Les scores totaux des pays de la Région de la Méditerranée orientale ont baissé par rapport à l'étude de 2013. Il est donc nécessaire d'accorder une plus grande importance aux taxes sur le tabac et aux politiques sans tabac pour faire face à cette régression.

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Introduction

Since 1980, large reductions in the estimated prevalence of daily smoking have been observed globally for both men and women. However, due to population growth, the number of smokers has increased significantly despite these reductions. Although trend analysis has revealed that several industrialized countries have achieved large reductions in the prevalence of smoking, in other countries the number of smokers is increasing and intensified tobacco control efforts are urgently needed (1). Total tobacco-attributable deaths are projected to rise from 5.4 million in 2005 to 6.4 million in 2015 and 8.3 million in 2030 and tobacco will continue to be the single largest preventable cause of death (2).

In the World Health Organization (WHO) Eastern Mediterranean Region, where smoking rates are high among men and are projected to grow, there is a need for a comprehensive tobacco control programme (3,4). However, a major barrier to implementation of such a programme is the tobacco industry, which has used huge profits to expand its production, distribution and sale of tobacco products (4). WHO has developed the Framework Convention on Tobacco Control to provide new legal dimensions for international health cooperation in combating the global tobacco epidemic (5). WHO has introduced a package of measures under the acronym MPOWER with the aim of reducing tobacco consumption and prevalence. This package focuses on 6 proven measures: **M**onitoring tobacco use and prevention policies; **P**rotecting people from tobacco smoke; **O**ffering help to quit tobacco use; **W**arning about the dangers of tobacco; **E**nforcing bans on tobacco advertising, promotion and sponsorship; and **R**aising taxes on tobacco (6). Global experience has demonstrated that implementation of these measures provides a favourable environment for reduction in tobacco

consumption and its health effects (7–9).

WHO has published 3 MPOWER reports in 2011, 2013 and 2015 on the activities of the Eastern Mediterranean countries in relation to these 6 policies (10). We subsequently undertook 2 studies based on the 2011 and 2013 WHO MPOWER reports. We rated the 6 recommended programmes in the Islamic Republic of Iran and Egypt, which were the 2 countries with the highest scores, indicating that these countries had acceptable tobacco control programmes (11,12). In the current study, we assessed and compared changes in tobacco control scores with the same methods used in the 2011, 2013 and 2015 WHO reports.

Methods

This was a comparative cross-sectional study of data from the WHO programme of tobacco prevention in the Eastern Mediterranean Region (MPOWER 2011, 2013 and 2015 reports) (12,13). We used the same checklist as in the previous 2 studies. The checklist was designed previously by Iranian and international tobacco control specialists and its cutoffs were set according to the scoring of key sections of the MPOWER 2011, 2013 and 2015 reports. The checklist contained 7 questions with 5 options ranging from a minimum score of 0 to a maximum of 4, and 3 questions ranging from a minimum score of 0 to a maximum of 3, resulting in a maximum possible score of 37. Each point for which data were not available was scored as 0. Consistent with the 2 previous studies, 2 trained raters administered the assessment (an intraclass correlation coefficient of 0.8 was calculated between these 2 raters). Data entry was done by the 1st rater independently and was checked by the 2nd rater. The principal investigator (GH) randomly selected 2 or 3 of the entered data to monitor their ratings.

The scores were summed and the rankings calculated. The checklist, together with its scoring and scale, is shown in Table 1.

Results

Countries were ranked by scores obtained for each indicator for each activity, and the total scores are shown in Table 2. The highest total scores were achieved by the Islamic Republic of Iran, Egypt, and Pakistan. Despite its overall high score, the Islamic Republic of Iran did not score high on smoke-free compliance and tobacco taxation. Thirteen countries did not report adult daily smoking prevalence. The indicators with the highest and lowest combined score for all countries were advertising bans and smoke-free policy compliance (67 and 18, respectively).

Table 3 shows changes in the MPOWER scores among Eastern Mediterranean countries over a 5-year period based on the 2011, 2013 and 2015 WHO reports on tobacco control. Thirteen countries achieved more than half of the maximum score (≥ 19). However, only 7 countries showed improvement in their overall tobacco control programmes and a decrease in total points for all countries was seen in 2015 when compared to 2013. Saudi Arabia and Morocco received the same scores in 2013 and 2015. The largest improvements in total scores from the 2013 report were for Pakistan (increase of 6) and Yemen (increase of 5). Surprisingly, we noted a decrease in scores for adult daily smoking prevalence scores, from 44 in 2011 (11) to 25 in 2015; advertising ban compliance, from 55 in 2013 (12) to 31 in 2015; and smoke-free policy compliance, from 30 in 2013 (12) to 18 in 2015 (Table 2). For monitoring and taxation score we had no changes and for other MPOWER measures we had a slight increase in scores.

Table 1 Checklist for assessment of tobacco control in Eastern Mediterranean countries based on the 2011 WHO MPOWER report

Adult daily smoking prevalence	4
Estimates not available	0
≥ 30%	1
20–29%	2
15–19%	3
< 15%	4
Monitoring: prevalence data	3
No known or recent data or data that are not both recent and representative	0
Recent and representative data for either adults or adolescents	1
Recent and representative data for both adults and adolescents	2
Recent, representative and periodic data for both adults and adolescents	3
Smoke-free policies	4
Data not reported	0
Up to 2 public places completely smoke free	1
3–5 public places completely smoke free	2
6 or 7 public places completely smoke free	3
All public places completely smoke free	4
Cessation programmes	4
Data not reported	0
None	1
NRT and/or some cessation services (neither cost-covered)	2
NRT and/or some cessation services (≥ 1 of which is cost-covered)	3
National quit line, and both NRT and some cessation services cost-covered	4
Health warning on cigarette packages	4
Data no reported	0
No warnings or small warnings	1
Medium-size warnings missing some appropriate characteristics	2
Medium-size warnings with all appropriate characteristics	3
Large warnings with all appropriate characteristics	4
Anti-tobacco mass media campaigns	4
Data not reported	0
No campaign conducted between January 2009 and August 2010	1
Campaign conducted with 1–4 appropriate characteristics	2
Campaign conducted with 5 or 6 appropriate characteristics	3
Campaign conducted with all appropriate characteristics	4
Advertising bans	4
Data not reported	0
No ban on print media	1
Ban on national television, radio and print media only	2
Ban on national and some international television, radio and print advertising	3
Ban on all forms of direct and indirect advertising	4
Taxation	4
Data not reported	0
≤ 25% of retail price is tax	1
26–50% of retail price is tax	2
51–75% of retail price is tax	3
> 75% of retail price is tax	4
Compliance bans on advertising	3
Complete compliance (8/10 to 10/10)	0
Moderate compliance (3/10 to 7/10)	1
Minimal compliance (0/10 to 2/10)	2
Not reported	3
Compliance with smoke-free policy	3
Complete compliance (8/10 to 10/10)	0
Moderate compliance (3/10 to 7/10)	1
Minimal compliance (0/10 to 2/10)	2
Not reported	3
Total	37

NRT = nicotine replacement therapy

Table 2 Eastern Mediterranean countries ranked by total WHO MPOWER score on tobacco control in 2015

Country	Smoking prevalence	Monitoring	Smoke-free policies	Smoke-free policy compliance	Cessation programmes	Health warning on cigarette packages	Mass media campaigns	Advertising bans	Advertising bans compliance	Taxation	Total scores 2015
Islamic Republic of Iran	4	3	4	2	4	4	4	4	3	1	33
Egypt	2	3	2	2	3	4	3	4	2	4	29
Pakistan	3	3	4	1	3	3	3	3	1	3	27
Lebanon	2	2	4	1	3	2	4	3	1	2	24
Kuwait	0	3	3	1	4	3	3	3	1	2	23
Saudi Arabia	4	2	4	3	3	3	1	1	1	1	23
Libya	0	2	4	1	3	1	4	4	3	1	23
Yemen	0	2	3	1	2	3	2	4	2	3	22
West bank and Gaza Strip	0	3	4	1	2	1	2	3	1	4	21
Morocco	3	1	2	2	2	1	1	3	3	3	21
Tunisia	0	1	1	0	3	1	4	3	4	3	20
Djibouti	0	2	3	0	2	4	3	4	0	2	20
Jordan	1	1	2	1	3	2	1	3	1	4	19
Qatar	0	3	1	0	3	3	1	3	3	1	18
United Arab Emirates	0	1	0	0	4	3	3	4	0	1	16
Sudan	0	1	1	0	1	1	3	3	3	3	16
Bahrain	2	0	0	0	3	3	1	4	0	2	15
Oman	4	1	1	0	3	3	1	1	0	1	15
Iraq	0	1	2	1	3	2	1	3	1	1	15
Syrian Arab Republic	0	1	3	0	3	1	1	3	0	0	12
Afghanistan	0	0	2	1	2	1	1	3	1	1	12
Somalia	0	0	1	0	1	1	0	1	0	0	4
Total	25	36	51	18	60	50	47	67	31	43	428

Discussion

The study found that during 5 years of implementation of the MPOWER package in Eastern Mediterranean countries, tobacco control programmes in the Islamic Republic of Iran and Egypt continued to compare favourably with those of other countries in the region. Although several countries such as Pakistan, Libya, Yemen, Qatar and Sudan improved their scores, many others, Lebanon, Kuwait, West Bank and Gaza Strip, Tunisia, Djibouti, Jordan, United Arab Emirates, Bahrain, Oman, Iraq, Syrian Arab Republic, Afghanistan and Somalia, saw a reduction

in their scores. More recent tobacco control programmes have attempted to decrease smoking rate (by using MPOWER measures), but they might need more time to be effective in Eastern Mediterranean countries. Our previous 2 studies (11,12) used the same methodology that was used for the MPOWER report in 2015. Our 3 studies demonstrate that countries in the region need to take steps to achieve improvements in tobacco control.

It is important that the countries concerned carefully examine their scores, especially those that had reduced scores, in order to have greater focus on implementation of MPOWER

policies and improving areas of weakness. In 2006, Joossens and Raw (13) compared tobacco control scores in European countries through a checklist. We used the same method to compare 22 Eastern Mediterranean countries, among which the Islamic Republic of Iran, Jordan and Egypt received the highest scores (14). Our previous 2 studies (11,12) compared tobacco control programmes among Eastern Mediterranean countries based on the WHO MPOWER reports published in 2011 and 2013. By using a coherent and similar checklist and a hand-scoring system among the studies, we were provided an opportunity to monitor trends in

Table 3 Eastern Mediterranean countries ranked by total WHO MPOWER score on tobacco control in reports from 2011, 2013 and 2015

Categorization based on total score 2015	Country	Total scores 2011	Total scores 2013	Total scores 2015	Total scores changed from 2011 to 2015
Countries that received > 70% of the total scores	Islamic Republic of Iran	29	31	33	4
	Egypt	28	28	29	1
	Pakistan	20	21	27	7
Countries that received 50–70% of the total scores	Lebanon	17	26	24	7
	Kuwait	21	28	23	2
	Saudi Arabia	19	23	23	4
	Libya	21	22	23	2
	Yemen	17	17	22	5
	West Bank and Gaza Strip	20	25	21	1
	Morocco	18	21	21	3
	Tunisia	17	21	20	3
	Djibouti	19	21	20	1
	Jordan	26	25	19	7
Countries that received < 50% of the total scores	Qatar	17	17	18	1
	United Arab Emirates	24	17	16	-8
	Sudan	19	13	16	-3
	Bahrain	21	22	15	-6
	Oman	14	21	15	1
	Iraq	15	18	15	0
	Syrian Arab Republic	18	17	12	-6
	Afghanistan	9	13	12	3
	Somalia	7	6	4	-3
Total		416	453	428	12

increases and decreases in tobacco control indicators. In comparing the total scores of countries in the Eastern Mediterranean Region in 2011, 2013 and 2015 we found a decline of 25 points in 2015 compared to 2013 in contrast to the 37-point increase in 2013 compared to 2011. Of particular importance is the fact that tobacco taxation programmes often have been unsuccessful even in countries with high overall scores, such as the Islamic Republic of Iran (10 of 22 Eastern Mediterranean countries were unsuccessful in implementing a tobacco taxation programme during the past 5 years). The Islamic Republic of Iran needs more emphasis on improving its tobacco taxation programme, while Egypt, which also scored high overall, needs more concentration on smoke-free policies.

Our study had some limitations. We used data from the 2015 WHO MPOWER report, which were not surveillance data. It is important to use surveillance data for more critical analysis, but such data are not available for all Eastern Mediterranean countries. Also, the MPOWER report did not refer to water pipe and another forms of tobacco smoking; political, social and economic environmental issues that are supportive or act as barriers to tobacco control; industry interference; and other particular policies that would be likely to reduce smoking prevalence (15). These factors could be investigated in future studies.

In conclusion, based on a comparison of MPOWER reports published in 2013 and 2015, tobacco control

programmes have improved in the Islamic Republic of Iran, Egypt and Pakistan. However, the overall situation in the Eastern Mediterranean countries is still far from ideal and the total score actually declined between 2013 and 2015. More emphasis is especially needed on smoke-free and taxation policies in this region.

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Mood and anxiety disorders among adolescent students in Jordan

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الاضطرابات المزاجية والاضطرابات المرتبطة بالقلق في صفوف الأطفال المراهقين في الأردن

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الخلاصة: تحدث الاضطرابات النفسية لدى المراهقين آثاراً سلبية على الجوانب المتعلقة بالصحة والحياة ويمكن الحد منها عن طريق الكشف المبكر والإحالة. وهدفت هذه الدراسة إلى تقدير مدى انتشار الاضطرابات المزاجية والمرتبطة بالقلق والتحقيق في ارتباطها بالنوع وغيرها من العوامل الاجتماعية-السكانية في صفوف الطلاب المراهقين. واستُخدم تصميم مقطعي وصفي في هذه الدراسة. واستُخدمت عينة من 1103 طلاب مدارس مراهقين استكملوا القسمين الأولين في استبيان صحة المرضى المراهقين. وبلغ معدل انتشار الاضطرابات النفسية 28.6 في المائة. وبلغ معدل انتشار الاضطرابات المزاجية والمرتبطة بالقلق 22.4٪ و16.3٪ على التوالي. وتبين وجود علاقات ارتباط ذات دلالة بين اضطرابات الصحة النفسية والنوع أو العمر أو الوضع المعيشي مع الآباء والأمهات أو وضع الصحة النفسية مع الآباء والأمهات. ويلزم إجراء مزيد من الدراسات في الأردن لفهم طبيعة الاضطرابات النفسية وعوامل الخطر في صفوف المراهقين. ويُوصى بفحص الصحة النفسية في المدارس والمجتمع المحلي، كما يوصى بإجراء برامج للترويج والوقاية وذلك للحيلولة دون انتشار الاضطرابات النفسية وخفضها في صفوف المراهقين.

ABSTRACT Mental disorders in adolescents have negative impacts on aspects of health and life that can be reduced by early detection and referral. This study aimed to estimate the prevalence of mood and anxiety disorders and to investigate their association with gender and other socio-demographic factors among adolescent students. A descriptive cross-sectional design was used in this study. A sample of 1103 adolescent students was recruited from schools who completed the first two sections of Patient Health Questionnaire for Adolescents (PHQ-A). The prevalence of any mental disorders was 28.6%. The prevalence of mood and anxiety disorders was 22.4% and 16.3%, respectively. Significant associations were found between mental disorders and gender, age, living status with parents, or mental health status of parents. Further studies are needed to be conducted in Jordan in order to understand the nature and risk factors of mental disorders among adolescents. School and community-based mental health screening, promotion and prevention programmes are recommended to prevent and reduce the prevalence of mental disorders among adolescents.

Les troubles de stress et d'anxiété chez des élèves adolescents en Jordanie

RÉSUMÉ Les troubles mentaux chez les adolescents ont des impacts négatifs sur des aspects concernant la santé et la vie quotidienne, mais les données relatives à leur prévalence manquent en Jordanie. La présente étude avait pour objectif d'estimer la prévalence des troubles de stress et d'anxiété et d'enquêter sur leur association avec le sexe et d'autres facteurs socio-démographiques chez des élèves adolescents. Une conception transversale descriptive a été utilisée dans cette étude. Un échantillon composé de 1103 élèves adolescents ayant terminé les deux premières sections du questionnaire de santé du patient pour les adolescents a été recruté dans des écoles. La prévalence des troubles mentaux était de 28,6 %. La prévalence des troubles de stress et d'anxiété était respectivement de 22,4 % et 16,3 %. Des associations significatives ont été trouvées entre les troubles mentaux et le sexe, l'âge, le fait d'habiter avec ses parents ou l'état de santé mentale des parents. D'autres études doivent être réalisées en Jordanie pour comprendre la nature et les facteurs de risque des troubles mentaux chez les adolescents. Des programmes de dépistage, de promotion et prévention dans le domaine de la santé mentale en milieu scolaire et communautaire sont recommandés pour prévenir et réduire la prévalence des troubles mentaux chez les adolescents.

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Introduction

Mental health problems in children and adolescents are a great public concern and important health issue (1). Most mental problems among young people start before the age of 14 years (2). In any given year, it has been estimated that at least 20% of adolescents will experience some form of mental disorder (2), the most common being depression (3) and anxiety (4).

Depression in adolescents negatively affects daily functions at school, home and in the community, and relationships with family and peers (5); it can have serious consequences, including suicide (5–7). Depressive disorders are estimated to affect up to 8.9% of adolescents (7). However, the reported prevalence in different countries varies considerably (8–14). In Middle Eastern countries, the prevalence of depression among female adolescents in Saudi Arabia ranged between 13.9% and 41.5% (12,15). On the other hand, only 7% of adolescent males in Egypt and 10.6% in Oman had depression (16), while in Lebanon, 17.6% of children and adolescents were reported to have anxiety or depression (17). In Kuwait, the prevalence of depression was 14.4% among participants aged 6–33 years (18) and the prevalence of depressive disorders in Oman was 17% (19).

Anxiety disorders often develop during adolescence and can range from mild to serious. The lifetime prevalence of anxiety disorders is reported to be 15–20% (4). The prevalence of anxiety disorders in children and adolescents younger than 18 years is about 5–13% (20). Anxiety disorders in adolescents are associated with social and school problems (21), and are a strong predictor of depression disorders (4). The reported prevalence of anxiety disorders among adolescents again varies by country with reported rates ranging from 5.7% to 18.4% (15,22–24). In Kuwait, the reported prevalence of anxiety disorders was 14.9% (18). In

Saudi Arabian female adolescents, however, the prevalence of anxiety disorders varied between 14.3% (15) and 66.2% (12).

Early detection of mental disorders, especially in school settings, can provide an opportunity to identify students at risk and facilitate their referral for treatment (25). In Jordan, national studies on the prevalence of mental disorders among adolescents are scarce and there is a need to build epidemiological information about mental disorders. Therefore, this study was conducted to estimate the prevalence of mental disorders (mood and anxiety) among adolescent students in Irbid, Jordan. The study also aimed to investigate the sociodemographic factors associated with mental disorders.

Methods

Study design

A descriptive, cross-sectional design was used in this study. It was carried out in November 2011.

Study population and sample

The study population was all adolescent students in the ninth to eleventh grades (ages 13 to 18 years) attending public schools in Irbid. Two-stage stratified random cluster sampling was used to select participants. There are 7 educational directorates in Irbid. In the first stage, 2 secondary schools were randomly selected from each educational directorate from the list supplied by the directorate, 1 for girls and the other for boys. In the second stage, 3 classes (one each from the 9th, 10th and 11th grades) were randomly selected from each of the 14 schools. Thus 42 classes were selected; all students in these classes were eligible to participate.

Screening instrument

The Patient Health Questionnaire for Adolescents (PHQ-A), which is a self-reported questionnaire developed to

assess mental disorders among adolescent populations (26), was used. PHQ-A includes 83 items and is divided into 4 sections to assess anxiety, mood, substance use and eating disorders according to the diagnostic criteria in the DSM-IV-TR (26). The PHQ-A has acceptable sensitivity (75%), specificity (92%), diagnostic agreement coefficient ($\kappa = 0.65$) and overall diagnostic accuracy (89%), compared with clinical interview (27). In our study, the Cronbach alpha was 0.92 for all items, and 0.73 and 0.92 for mood and anxiety dimensions respectively.

Because only the prevalence of anxiety and mood disorders was estimated, only the first 2 sections of PHQ-A were used. The first 15 items assess mood disorders (major depressive, dysthymic and minor depressive disorders). Items 16–41 assess anxiety disorders (panic and generalized anxiety disorders). PHQ-A is not based on total scores. Instead, specific conditions or responses must be met to provide a provisional diagnosis. Because Arabic is the native language in Jordan, the PHQ-A was translated into Arabic and adapted based on the World Health Organization guidelines for translation and adaptation of instruments (28). A pilot study was conducted using the questionnaire before the study.

Data analysis

Data were analysed using SPSS, version 21. Descriptive statistical analysis was done to estimate the prevalence of mental disorders. Because PHQ-A is not based on total scores, the existence of each disorder (major depression, dysthymic, minor depression, generalized anxiety and panic attack disorders) was checked separately according to the specific conditions. If the student had at least one of the disorders, he/she was classified as having any mental disorder. Students, who had at least one mood disorder, were classified as having any mood disorder. If the student had at least one anxiety disorder, he/she was

classified as having any anxiety disorder. To compare the prevalence of mental disorders between males and females, the chi-squared test of independence was used. Logistic regression analysis was used to investigate the risk factors for mental disorders. Sociodemographic characteristics were the independent variables and the dependent variable was mental disorders; all variables were entered in one step. $P < 0.05$ was considered statistically significant.

Ethical considerations

Approval was obtained from the institutional review board committee of Jordan University of Science and Technology. The study purpose and procedures were explained to the students and they were assured that they had the right to refuse to participate or withdraw at any time without penalty. Consent forms were signed by the parents of the adolescents at home before data collection. Students whose parents signed the consent form were included in the study. Verbal consent was obtained from the students before data collection, which was confirmed if the participants voluntarily completed the questionnaire. Data were coded for anonymity and the students were assured that all the information obtained would be confidential and that no one at school or other persons would know or be able to identify them.

Results

A total of 1175 students were eligible for inclusion; 10 students were excluded because their parents refused to allow them to participate and 62 questionnaires were excluded because of missing data. As a result, a total of 1103 students were included in the study.

The students' ages ranged between 13 and 18 years with a mean of 15.27 (SD 0.937) years. More than half of the students were females (605, 54.9%). Of the 1175 students, 316 (28.6%) had

any mental disorder; 247 (22.4%) had mood disorders and 180 (16.3%) had anxiety disorders (Table 1). The prevalence of mental disorders was higher among females than males (Table 2), a statistically significant difference ($\chi^2 = 39.85, P < 0.0001$).

In the logistic regression analysis, girls were 2.4 times more likely to have mental disorders than males (OR = 2.4; 95% CI: 1.77–3.25, $P < 0.0001$). In addition, older students were significantly more likely to have mental disorders than younger ones (OR = 1.34; 95% CI: 1.15–1.57, $P < 0.0001$), as were students whose parents (one or both) had mental disorders (OR = 4.67; 95% CI: 2.85–7.65, $P < 0.0001$). Adolescent students who were living with one parent or people other than their parents were less likely to have mental disorders than those who were living with both parents (OR = 0.15; 95% CI: 0.03–0.85, $P = 0.032$) (Table 3).

No statistically significant associations were found between mental disorders and parents' marital status, school performance, number of family members, adolescent birth order, household income, parents' educational level or job status, and student or parents health status.

Discussion

The prevalence of mood and anxiety disorders in our study was 28.6%. This indicates that mental disorders are a

serious public health problem among adolescent students in Irbid.

The prevalence of any mood disorder was 22.4%. This figure is similar to that found in the United States of America (USA) (21%) and Australia (22%) (13,14). In addition, the prevalence is comparable to that found in Oman (17%) (19) and Poland (26.7%) (9). However, the prevalence in our study was higher than that in Kuwait (14.4%) (18), Egypt (15.3%) (29) and Saudi Arabia (13.9%) (15). On the other hand, a higher prevalence (54.7%) was reported in Turkey (10). As we could not find studies that used the same instrument, same setting (school) and same age group, this variation in the prevalence of depressive disorders could be related to different screening instruments, age groups, samples or lifestyles and cultures. For instance, in Kuwait, the participants, were aged between 6 and 33 years, were from military families and were screened using the Child Behavior Inventory. In Egypt and Saudi Arabia, the studies were conducted on female adolescents rather than in both genders and they were screened using the Arabic version of the symptom-revised checklist 90 (SCL 90-R) in Saudi Arabia (12) and the Children Depression Inventory in Egypt (29). In contrast, another study was carried out in Saudi Arabia on the same sample of female adolescents ($n = 545$, aged 14–19 years) but using a different instrument (the Arabic version of the Depression, Anxiety and Stress

Table 1 Prevalence of mental disorders among study sample

Disorder	No. (n = 1103)	%
Any mental (mood and anxiety) disorder	316	28.6
Any mood disorder	247	22.4
Major depressive disorder	78	7.1
Dysthymic disorder	108	9.8
Minor depressive disorder	124	11.2
Any anxiety disorder	180	16.3
Generalized anxiety disorder	137	12.4
Panic attack disorder	104	9.4

Table 2 Gender and mental disorders among study sample

Gender	Students with no mental disorder		Students with any mental disorder		Total	
	No.	%	No.	%	No.	%
Male						
Within males	403	80.9	95	19.1	498	100
Within all students	403	51.2	95	30.1	498	45.1
Female						
Within females	384	63.5	221	36.5	605	100
Within all students	384	48.8	221	69.9	605	54.9
Total	787	71.4	316	28.6	1103	100

$\chi^2 = 39.85$, $P < 0.0001$, degrees of freedom = 1.

Scale), and the result showed a higher prevalence (41.5%) (15). Although both studies in Saudi Arabia were carried out with the same sample and study design, the prevalence of depression varied considerably according to the screening instrument. In addition, in Turkey, the adolescents were screened by the Children Depression Inventory (10).

Different symptoms of mental disorders might be reported or experienced by different cultures. Symptoms of depression, for example, may be reported as a somatic form rather than sadness in some cultures, while in other cultures, depression might be expressed as "being heartbroken". In addition, other cultures, such as Latino and Mediterranean cultures, may experience nervousness and headaches. In Asian cultures, in contrast, weakness and tiredness may be experienced (6). The seriousness of reported symptoms can be influenced by cultural judgement or beliefs. For instance, some cultures may have more concerns about irritability rather than sadness or withdrawal (6).

We found a prevalence of 16.3% for any anxiety disorder, which is consistent with the findings in Australia (17%) (14), Kuwait (14.9%) (18), Saudi Arabia (14.3%) (12) and the USA (18.4%) (22). On the other hand, our result is higher than that found in Denmark (5.7%) (24), Italy (5.8%) (23) and China (6.9%) (11). Again the

difference in prevalence of anxiety disorders might be due to different samples, age groups, screening methods, and lifestyle and culture. In Denmark, for example, the participants were children and adolescents between 0 and 19 years who were referred for psychiatric evaluation and treatment. In addition, they were screened by psychiatrists based on the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10). In our study, in contrast, the self-reported questionnaire was based on DSM-IV criteria. In Italy, the participants were 10–14 years old and the response rate was low (61%), which may mean that more adolescents with mental disorders were not screened. Another possible explanation might be that in the Italian study the participants were screened by both self-reported and clinical interview methods, and the diagnosis was made by 5 experienced psychiatrists (23). In China, however, adolescents and their parents completed the youth and parent versions of the Diagnostic Interview Schedule for Children-Version (DISC-IV). Furthermore, the sample represented adolescents in 7th to 9th grades (11).

Other studies in the Arab world, such as Gaza and Saudi Arabia, showed that the prevalence of anxiety disorders was much higher than our finding (15,30,31). In Gaza, for example, the prevalence of severe anxiety was around 95%. A possible explanation

for this result is the long and ongoing conflict in Gaza, and the majority of the participants reported that they had witnessed traumatic events such as killing, shooting and destruction (31). Two studies conducted in Saudi Arabia found a prevalence of anxiety disorders of 66.2% among female adolescents and 48.9% among male adolescents using the Arabic version of the Depression, Anxiety, and Stress Scale (DASS-42) in both studies (15,30). This high prevalence may be related to the social and cultural changes and challenges in Saudi society. Looking for independence and recognition during adolescence, study problems and stressors during secondary school, as well as choosing a career might be other reasons for the high prevalence of anxiety. Again, it might be attributed to different screening instruments.

Female adolescents were significantly more likely to have mental disorders than males. This finding is consistent with the findings in western countries (10,32), and Arab countries (16,17,19). Female adolescents are more likely to have internalized disorders such as anxiety and depressive disorders than male adolescents (33). The higher prevalence among females might be due to the effect of puberty; it has been suggested that female adolescents are more negatively affected by puberty than males (33). This negative effect during puberty could result from biological and hormonal changes which

Table 3 Variables associated with mental (mood and anxiety) disorders: logistic regression analysis

Variable	No mental disorder	Mental disorder	Adjusted OR (95% CI)	P-value
	No. (%)	No. (%)		
Gender				
Male	403 (80.9)	95 (19.1)	1.00	
Female	384 (63.5)	221 (36.5)	2.40 (1.77–3.25)	< 0.0001
Age			1.34 (1.15–1.57)	< 0.0001
School average			0.99 (0.98–1.00)	0.184
Number of family members			1.04 (0.96–1.12)	0.392
Birth order in the family			1.01 (0.94–1.09)	0.697
Student living status				
Both parents	729 (71.0)	298 (29.0)	1.00	
One parent or others	58 (76.3)	18 (23.7)	0.15 (0.03–0.85)	0.032
Parent marital status				
Married	732 (71.3)	295 (28.7)	1.00	
Divorced or dead parents	55 (72.4)	21 (27.6)	4.40 (0.79–24.44)	0.091
Total household income (JD)				
≤ 600	665 (70.4)	279 (29.6)	1.00	
> 600	122 (76.7)	37 (23.3)	0.86 (0.55–1.36)	0.524
Father's educational level				
Secondary or below	544 (71.0)	222 (29.0)	1.00	
Diploma or above	243 (72.1)	94 (27.9)	1.25 (0.88–1.77)	0.210
Mother's educational level				
Secondary or below	544 (69.2)	242 (30.8)	1.00	
Diploma or above	243 (76.7)	74 (23.3)	0.74 (0.49–1.10)	0.138
Father's job status				
Unemployed	89 (71.8)	35 (28.2)	1.00	
Employed	698 (71.3)	281 (28.7)	1.34 (0.84–2.12)	0.218
Mother's job status				
Unemployed	634 (70.6)	264 (29.4)	1.00	
Employed	153 (74.6)	52 (25.4)	1.17 (0.77–1.80)	0.462
Student health status				
No chronic disease	727 (72.4)	277 (27.6)	1.00	
Chronic disease	60 (60.6)	39 (39.4)	1.59 (0.99–2.56)	0.057
Parent health status				
No chronic disease	560 (73.1)	206 (26.9)	1.00	
Chronic disease	227 (67.4)	110 (32.6)	1.04 (0.76–1.43)	0.800
Parent mental status				
No mental disorder	757 (74.5)	259 (25.5)	1.00	
Mental disorder	30 (34.5)	57 (65.5)	4.67 (2.85–7.65)	< 0.0001

have a greater effect on females. In addition, female adolescents have lower self-esteem and a poorer body image than males, which might lead to a higher prevalence of depression as well as other disorders (33).

Our results showed a statistically significant association between age and mental disorders. Older adolescents were more likely to have mental disorders than younger adolescents. This concurs with findings in the USA (34), Italy (23) and Egypt (16). This

may be due to more worries, difficulties in concentration and social concerns which affect older adolescents more than younger adolescents, such as concerns about their careers, future, and responsibilities (33).

Surprisingly, adolescents who were living with both parents were significantly more likely to have mental disorders than those living with one parent or other people. This is in contrast to other studies which found that adolescents who lived with one parent or others were significantly more likely to have mental disorders (23). In our sample, only 6.9% of the adolescents reported living with one parent or others; therefore the comparison between the 2 groups might not be valid due to small number in this subgroup. Another explanation might be that when both parents are present, any conflict between them might affect the mental health and anxiety levels of their adolescent offspring.

Our study also showed that adolescents whose parents (one or both) had mental disorders were significantly more likely to have mental disorders than other adolescents. This result is consistent with the results reported in the literature (29,32). Furthermore, many studies have shown that parental or family history of depression puts adolescents at risk of depression (9,16), and this is possibly due to the link between genetic factors and mental disorders (29).

Our study did not find significant associations between parents' marital status, student's school performance, number of family members, adolescent's birth order, total household income, father's and mother's educational level or job status, and student

or parents' health status, and mental disorders. This might be because our sample of students has broadly similar characteristics in regard to these variables. Our results are in agreement with the results of other studies in Saudi Arabia (12,15). In Egypt, in contrast, female adolescents with lower school performance and socioeconomic status were found to be more likely to have depression (29). However, this study only involved adolescent females. In the USA, a significant association was found between mental disorders and lower family income, lower caregiver level of education (35), poor health status and poor school performance (35). Similarly, in Italy, a significant association was found between poor school performance, parents' educational level, and income (23). These variations between our study and others might be attributed to the cultural effect, sample characteristics and variability.

The generalizability of our findings is limited to public school adolescents in Irbid rather than all Jordanian cities. Adolescents were recruited from schools which may have led to an underestimation of the prevalence of mental disorders because many adolescents drop out of or do not attend school. Additionally, the diagnosis of mental disorders was based on a self-reported questionnaire without any clinical interview to confirm the diagnosis.

Conclusions

Our result indicate that mental disorders are a serious public health problem among adolescents in Irbid. Females were more likely to have mental disorders than males. Being an older adolescent, living with both parents and parental mental disorders were significantly associated with mental disorders among adolescents.

Health professionals, especially public health nurses, should regularly screen for mental health disorders among adolescents in collaboration with school staff. Public health nurses should conduct school- and community-based mental health promotion programmes directed toward adolescents, their families, educational staff and others who have direct contact with adolescents in collaboration with other health providers and school staff. Such mental health promotion and prevention programmes are needed in order to increase awareness about mental disorders during adolescence, identify adolescents with or at risk of mental disorders and facilitate access to counselling and referral for adolescents with mental disorders. Further studies are needed in Jordan in order to understand the nature and risk factors of mental disorders among adolescents.

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Midwives' educational needs and knowledge about sexually transmittable infections in the Islamic Republic of Iran

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الاحتياجات التثقيفية والمعلومات اللازمة للقابلات الإيرانيات والمتعلقة بعدوى الأمراض المنقولة جنسياً في جمهورية إيران الإسلامية

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الخلاصة: هدفت هذه الدراسة إلى تقييم الاحتياجات التثقيفية والمعلومات اللازمة للقابلات الإيرانيات والمتعلقة بعدوى الأمراض المنقولة جنسياً. ولقد أجري استقصاء لما مجموعه 144 قابلة في مدينة راشث بجمهورية إيران الإسلامية في إطار دراسة مقطعية في عام 2014. واستُخدمت النسخة الفارسية من استبيان المعرفة بالأمراض المنقولة جنسياً واستبيان من تصميم باحثين لتقييم الاحتياجات التثقيفية والمرتمس التثقيفي. وحصل المشاركون على 74٪ من الدرجة الكلية في استبيان المعرفة بالأمراض المنقولة جنسياً. وصُنِّفَ 31٪ من المشاركين في فئة الأشخاص الذين هم في حاجة شديدة أو شديدة للغاية للتثقيف. وذكر 70٪ من القابلات أنهم تلقين تدريباً على جميع الأمراض المنقولة جنسياً في المرحلة الجامعية. في حين كان 6.3٪ من القابلات على وعي بالمبادئ التوجيهية القائمة بشأن الأمراض المنقولة جنسياً. وأفادت المشاركات أنهن لم تتلقين خلال العامين الماضيين إلا تثقيفاً بشأن فيروس العوز المناعي البشري/ الإيدز والالتهاب الكبدي في مكان عملهن. ومن ثم، يُوصى بإجراء برنامج تثقيفي شامل لتمكين القابلات من استكمال مكافحة عدوى الأمراض المنقولة جنسياً.

ABSTRACT This study aimed to evaluate the educational needs and knowledge about sexually transmittable infections (STIs) demonstrated by midwives. In a cross-sectional study in 2014, 144 midwives in Rasht, Islamic Republic of Iran, were surveyed. The Persian version of the Sexually Transmitted Disease Knowledge Questionnaire (STD-KQ) and a researcher-made questionnaire to evaluate educational needs and profile were used. The participants obtained 74% of the total score of STD-KQ. Thirty-one percent of participants were categorized in high or very high need of education. Seventy percent of midwives mentioned they were trained on all STIs at university. However, only 6.3% of midwives were aware of existing STIs guidelines. Participants reported that in the last two years they were only educated about HIV/AIDS and hepatitis B at their workplace. Thus, a comprehensive educational programme to empower midwives for complete STIs control is recommended.

Besoins éducatifs et connaissances des sages-femmes iraniennes au sujet des infections sexuellement transmissibles en République islamique d'Iran

RÉSUMÉ La présente étude avait pour objectif d'évaluer les besoins éducatifs et les connaissances des sages-femmes iraniennes au sujet des infections sexuellement transmissibles. Lors d'une étude transversale réalisée en 2014, 144 sages-femmes ont fait l'objet d'une enquête à Rasht (République islamique d'Iran). La version perse du questionnaire sur les connaissances en matière d'infections sexuellement transmissibles ainsi qu'un questionnaire réalisé par un chercheur ont été utilisés afin d'évaluer les besoins et le profil éducatifs. Le score total au questionnaire sur les connaissances en matière d'infections sexuellement transmissibles obtenu par les participantes étaient de 74 % ; 31 % des participantes ont été classées comme ayant des besoins éducatifs importants voire très importants. Soixante-dix pour cent des sages-femmes ont mentionné qu'elle avaient été formées à la prise en charge de toutes les infections sexuellement transmissibles durant leurs études universitaires. Toutefois, seules 6,3 % d'entre elles connaissaient les directives existantes relatives aux infections sexuellement transmissibles. Les participantes ont signalé que durant les deux dernières années, elles n'avaient été formées que sur le VIH/sida et le virus de l'hépatite B sur leur lieu de travail. Par conséquent, un programme éducatif exhaustif est recommandé pour donner les moyens aux sages femmes de lutter contre toutes les infections sexuellement transmissibles.

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Introduction

Sexually transmitted infections (STIs) are a global public health problem. Worldwide, it is estimated that every day about 1 million people become infected (1). Valid data about the epidemiology of STIs in the Islamic Republic of Iran do not exist, but based on recent estimates, the incidence rates for *Neisseria gonorrhoeae*, *Chlamydia trachoma*, and syphilis per 1000 women are 2.44, 5.02 and 0.04 respectively; the corresponding figures per 1000 men are 0.43, 0.82 and 0.005 (2). STIs are more prevalent in developing countries, where infected people often do not receive appropriate and timely treatment. The control of STIs, especially in developing countries, cannot be successful without integrating it into the primary health care system (2,3). The integration of STIs, HIV/AIDS, family planning, and mother and child health is emphasized by international health and development organizations (3).

However, there are many obstacles to controlling STIs in developing countries; some are related to the social environment and some to the weakness of the health care system (1,2,4). Among the factors related to the health care system, the weak performance of health professionals in providing STI services has been highlighted (1,4). In fact, health care providers in developing countries usually do not receive appropriate education about STIs (5–9).

To have a successful STI control programme, all involved staff should be adequately trained about STIs (10,11). Midwives have an important role in STI control because they are a main source of information about these diseases and because they have a high interaction with women (12), who are more vulnerable to STIs and suffer more complications than men because of their genital system and gender-based inequalities (3). In addition, STIs can affect contraceptive effectiveness, fertility and pregnancy outcomes (12,13). The

integration of STIs in primary health care can provide the opportunity to detect and treat suspected STI cases in a timely fashion (10,11).

An STI control programme is integrated in the Iranian primary health care system (14). However, continuing education for midwives in the workplace is necessary in order to have a successful STI control and prevention programme (10,15). To design and provide an effective educational programme, the first step is to have information about midwives' knowledge of STIs and gaps where education is needed. However, this information is currently lacking. To the best of our knowledge, this is the first report about midwives' knowledge of STIs and their educational needs in the Islamic Republic of Iran. In previous studies, only health care providers' knowledge about HIV/AIDS and hepatitis B were assessed (5,9,16–20). In this study, we evaluated the knowledge of midwives in Rasht, Guilan Province, about STIs, their educational profiles and educational needs.

Methods

Study design and sampling

This was a cross-sectional study conducted from October to November 2014 among all midwives working in the Rasht health centre. The Rasht health centre is the only district health care centre in Rasht, the capital of Guilan province, northern Islamic Republic of Iran. The centre provides health care services for about 1 million inhabitants through 41 rural and urban health centres.

At the time of our study, 152 staff with a midwifery degree were working for the Rasht health centre; of these, 87 were midwives and 65 were family health care experts. During sampling, 144 midwives were recruited, 2 did not agree to participate and 6 were not present at the time of the study because of maternity or medical leave.

Questionnaires

Two questionnaires were used for data collection: the Sexually Transmitted Disease Knowledge Questionnaire (STD-KQ) (21), to evaluate the knowledge of the participants about STIs, and a questionnaire we designed to collect data about the educational profiles and needs of the midwives.

The STD-KQ contains 27 items (21). The Persian version was validated for use among health care providers in the Islamic Republic of Iran. The Cronbach alpha coefficient was 0.84 for overall STD-KQ (22). An STD-KQ item was excluded because of the unavailability of natural condoms in our country; hence, the Persian version of STD-KQ contains 26 items. Participants select true, false or do not know for each item. Correct answers were scored as 1 and incorrect or don't know were scored as 0. Therefore, scores ranged from 0 to 26.

Our questionnaire contained two parts. The first part included questions about the participant's demographic characteristics, and STI educational profile and work. The second part contained the names of 11 of the most prevalent STIs that were extracted from available regional data and a WHO report (23). The participants were asked to indicate their perceived educational need about each STI on a 1–5 point Likert scale (1 = very low, 2 = low, 3 = moderate, 4 = high, 5 = very high). The scores for educational need ranged from 11 to 55. The overall score was categorized as: 11–19, very low; 20–28, low; 29–37, moderate; 38–46, high; and 47–55, very high.

To develop our questionnaire we used the opinions of 2 infectious diseases specialists, 1 gynaecologist, 2 epidemiologists and 2 midwives.

Data collection

During the study period, a co-worker went to the different health centres on different days and explained the study objectives to the participants and

delivered the questionnaires to them at their workplaces. The participants were asked to fill out the questionnaire without any interference or assistance of others, place the completed questionnaire in an envelope and seal it. The questionnaire usually took 15 minutes to be filled out and the co-worker waited to collect the completed questionnaires.

Ethical considerations

The ethical committee of the Guilan University of Medical Sciences approved the study protocol. Informed verbal consent was obtained from each of the participants. All the participants were free to participate in this study and all questionnaires were anonymous; we used envelopes to assure participants' anonymity.

Statistical analysis

Data analysis was done using SPSS software, version 21.0. We had less than 3% missing data in some demographic (age) and work-related questions (location of work, years since graduation) which were imputed based on the other characteristics of the participants or data from other similar participants. To compare means among the groups, the independent *t*-test, one-way analysis of variance (ANOVA) and least significant difference post-hoc test were used. The Fisher exact test and chi-squared test were used to compare counts among the groups. In addition, the Pearson correlation coefficient was determined to assess the correlation between the perceived need for education score and STI knowledge score. $P < 0.05$ was considered statistically significant.

Results

Characteristics of the participants

The mean age of the participants was 40.10 (SD 6.14) years (range 24–54). Most of the 144 participants had a bachelor degree (59.0%), had more than 15

years work experience (57.6%), had graduated more than 15 years before (56.3%), were working as a midwife (57.6%) and were working in an urban area (69.4%) (Table 1).

Education at the workplace and university

Only 37 (25.7%) and 33 (22.9%) midwives had received training in HIV/AIDS and hepatitis B respectively at their workplace in the past 2 years. As regards the other listed STIs, none of the participants had had any training at their workplace.

More than 70% of the midwives reported that they had received training on all of the listed STIs at university. However, the 2 STIs with the lowest percentage were granuloma inguinale (70.8%) and chancroid (73.6%). The majority of the midwives reported that educational material was available at the workplace on HIV/AIDS (68.8%) and hepatitis B (66.7%). However, less than 4% said educational materials were available for the other STIs. The majority of the midwives reported that they

had read about HIV/AIDS (72.9%) and hepatitis B (63.2%) in the past year. Reading about granuloma inguinale and chancroid were reported by only 12.5% and 13.9% of the midwives respectively (Table 2).

Preferred educational methods

We asked participants to select one of the educational methods that we listed. Attending class was the most popular method for receiving training about STIs (61.1%), followed by receiving printed educational material (22.2%), seeing educational films (7.6%), accessing educational websites (6.9%) and receiving electronic educational materials (2.1%). Only 9 of the midwives (6.3%) were aware of existing STIs guidelines, only 4 (44.4%) of whom had read them.

STI knowledge

The overall mean score for STD-KQ was 19.24 (SD 4.01) and the participants obtained about 74% of the total score of STD-KQ. The item that all midwives answered correctly was about

Table 1 Sociodemographic characteristics of the participants

Sociodemographic characteristic	No. (%) (n=144)
Educational level	
Associate degree	59 (41.0)
Bachelor degree	85 (59.0)
Job title	
Midwife	83 (57.6)
Family health expert	61 (42.4)
Location of work	
Rural	44 (30.6)
Urban	100 (69.4)
Years since graduation	
≤ 5	15 (10.4)
6–10	17 (11.8)
11–14	31 (21.5)
≥ 15	81 (56.3)
Duration of work (years)	
≤ 5	13 (9.0)
6–10	31 (21.5)
11–14	17 (11.8)
≥ 15	83 (57.6)

Table 2 Training at university, availability of educational material at workplace and reading in the current year on to sexually transmitted infections (STIs)

STI	Received training at university	Educational material available at the workplace	Read about it in the current year
	No. (%)	No. (%)	No. (%)
HIV/AIDS	125 (86.8)	99 (68.8)	105 (72.9)
Genital herpes	127 (88.2)	3 (2.1)	39 (27.1)
Genital warts	122 (84.7)	3 (2.1)	35 (24.3)
Hepatitis B	135 (93.8)	96 (66.7)	91 (63.2)
Gonorrhoea	123 (85.4)	2 (1.4)	26 (18.1)
Chlamydia	119 (82.6)	4 (2.8)	34 (23.6)
Syphilis	122 (84.7)	3 (2.1)	30 (20.8)
Chancroid	106 (73.6)	2 (1.4)	20 (13.9)
Granuloma inguinale	102 (70.8)	2 (1.4)	18 (12.5)
Trychomoniasis	133 (92.4)	4 (2.8)	68 (47.2)
Candidiasis	133 (92.4)	5 (3.5)	72 (50.0)

a vaccine for hepatitis B. Items that were answered correctly by less than 50% of the midwives were “A man must have vaginal sex to get genital warts” (27.8%), “Frequent urinary infections can cause chlamydia” (47.2%), “If a person tests positive for HIV, the test can tell how sick the person will become” (48.6%), and “Having anal sex increases a person’s risk of getting hepatitis B” (49.3%) (Table 3).

Education needs

The overall mean score of reported need for education was 34.23 (SD 8.36), which was categorized as the moderate; 31.3% of the participants expressed a high or very high need for education. The 2 topics that the midwives felt they most needed education on were granuloma inguinale (3.51, SD 1.01) and chancroid (3.48, SD 0.98); 54.9% and 54.8% of the midwives reported the need for education as high or very high respectively. The lowest reported need for education was on HIV/AIDS (2.70, SD 1.17), where only 25% of the participants reported a high or very high need for education (Table 4).

There was significant negative correlation between perceived need for education and knowledge score (STD-KQ) score ($r = -0.186$, $P = 0.026$).

Midwives who had received HIV/AIDS training in the workplace in the past 2 years reported a lower need for education about the disease (2.38, SD 1.21) than those who had not had such training (2.81, SD 1.14), but the difference was not statistically significant ($P = 0.051$). The results were similar for hepatitis B (2.64, SD 1.25; 2.99 SD 1.01, $P = 0.097$).

Having training at university did not have an effect on the reported need for education about STIs. However, reading about the listed STIs in the current year significantly reduced the perceived need for education about chlamydia ($P = 0.012$), syphilis ($P = 0.040$), chancroid ($P = 0.002$) and granuloma inguinale ($P = 0.005$) (Table 5).

Discussion

Based on our findings, midwives need training on STIs because they are not well informed about these diseases. Midwives at their workplace usually do not receive educational courses and materials about STIs except HIV/AIDS and hepatitis B but not on such STIs as granuloma inguinale and chancroid which are endemic in the Islamic Republic of Iran.

Worldwide, HIV/AIDS is one of the most common STI; therefore, it is reasonable that it is highlighted in health care systems. The importance of HIV/AIDS makes it a priority to have educational programmes (1,24). Hepatitis B is also a common disease in our country and so it is a targeted disease for control within the Iranian population (25).

In addition, hepatitis B vaccination is routine in health centres in our country (26). These facts may affect health care professionals’ perceived educational needs and knowledge. All midwives in our study were working for health centres where hepatitis B vaccination is routine. To improve staff knowledge about a disease that is targeted for control, health centres usually provide educational programmes and material about it. On the other hand, although granuloma inguinale and chancroid are uncommon diseases worldwide, both are endemic in the Islamic Republic of Iran (27). Despite the integration of STI control and prevention within the Iranian health care system, usually Iranian health care professionals are not well educated about these 2 and other STIs (5,9,16–20,28).

Previous studies in the Islamic Republic of Iran have been conducted to evaluate health care professionals’

Table 3 Participants' knowledge of sexually transmitted infections (STIs)

Item	Correct answer No. (%)
1. Genital herpes is caused by the same virus as HIV	129 (89.6)
2. Frequent urinary infections can cause chlamydia	68 (47.2)
3. There is a cure for gonorrhoea	102 (70.8)
4. It is easier to get HIV if a person has another STI	95 (66.0)
5. Human papillomavirus is caused by the same virus that causes HIV	105 (72.9)
6. Having anal sex increases a person's risk of getting hepatitis B	71 (49.3)
7. Soon after infection with HIV a person develops open sores on his or her genitals (penis or vagina)	124 (86.1)
8. There is a cure for chlamydia	123 (85.4)
9. A woman who has genital herpes can pass the infection to her baby during childbirth	111 (77.1)
10. A woman can look at her body and tell if she has gonorrhoea	136 (94.4)
11. The same virus causes all of the STIs	129 (89.6)
12. Human papillomavirus can cause genital warts	122 (84.7)
13. Human papillomavirus can lead to cancer in women	110 (76.4)
14. A man must have vaginal sex to get genital warts	40 (27.8)
15. STIs can lead to health problems that are usually more serious for men than women	90 (62.5)
16. A woman can tell that she has chlamydia if she has a bad smelling odour from her vagina	80 (55.6)
17. If a person tests positive for HIV, the test can tell how sick the person will become	70 (48.6)
18. There is a vaccine to prevent a person from getting gonorrhoea	117 (81.3)
19. A woman can tell by the way her body feels if she has an STI	120 (83.3)
20. A person who has genital herpes must have open sores to give the infection to his or her sexual partner	84 (58.3)
21. There is a vaccine that prevents a person from getting chlamydia	126 (87.5)
22. A man can tell by the way his body feels if he has hepatitis B	134 (93.1)
23. If a person had gonorrhoea in the past, he or she is immune (protected) from getting it again	126 (87.5)
24. Human papillomavirus can cause HIV	96 (66.7)
25. A man can protect himself from getting genital warts by washing his genitals after sex	118 (81.9)
26. There is a vaccine that can protect a person from getting hepatitis B	144 (100.0)

Table 4 Perceived need for education about sexually transmitted infections (STIs) among the midwives

STI	Very low need	Low need	Moderate need	High need	Very high need	Mean score (SD)
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	
HIV/AIDS	27 (18.8)	35 (24.3)	46 (31.9)	26 (18.1)	10 (6.9)	2.70 (1.17)
Genital herpes	10 (6.9)	17 (11.8)	63 (43.8)	41 (28.5)	13 (9.0)	3.21 (1.0)
Genital warts	10 (6.9)	18 (12.5)	66 (45.8)	38 (26.4)	12 (8.3)	3.17 (0.99)
Hepatitis B	15 (10.4)	35 (24.3)	52 (36.1)	32 (22.2)	10 (6.9)	2.91 (1.08)
Gonorrhoea	5 (3.5)	23 (16.0)	50 (34.7)	52 (36.1)	14 (9.7)	3.33 (0.97)
Chlamydia	11 (7.6)	26 (18.1)	56 (38.9)	41 (28.5)	10 (6.9)	3.09 (1.02)
Syphilis	4 (2.8)	18 (12.5)	60 (41.7)	50 (34.7)	12 (8.3)	3.33 (0.90)
Chancroid	7 (4.9)	13 (9.0)	45 (31.3)	62 (43.1)	17 (11.8)	3.48 (0.98)
Granuloma inguinale	6 (4.2)	15 (10.4)	44 (30.6)	57 (39.6)	22 (15.3)	3.51 (1.01)
Trychomoniasis	27 (18.8)	32 (22.2)	43 (29.9)	30 (20.8)	12 (8.3)	2.78 (1.21)
Candidiasis	30 (20.8)	31 (21.5)	43 (29.9)	28 (19.4)	12 (8.3)	2.73 (1.23)
Total	6 (4.2)	28 (19.4)	65 (45.1)	36 (25.0)	9 (6.3)	34.23 (8.36)

SD = standard deviation.

Table 5 Perceived educational need about sexually transmitted infections (STIs) according to training received at university and reading during current year

STI	Perceived educational need [Mean (SD)]		<i>P</i> -value	Perceived educational need [Mean (SD)]		<i>P</i> -value
	Received training on it at university			Read about it in the current year		
	No	Yes		No	Yes	
HIV/AIDS	2.79 (1.18)	2.69 (1.17)	0.726	3.00 (1.12)	2.59 (1.17)	0.062
Genital herpes	3.12 (1.05)	3.22 (1.0)	0.693	3.27 (1.01)	3.05 (0.97)	0.253
Genital warts	3.05 (1.05)	3.19 (0.98)	0.534	3.26 (0.98)	2.89 (0.96)	0.053
Hepatitis B	3.11 (0.60)	2.90 (1.10)	0.564	3.02 (0.99)	2.85 (1.12)	0.355
Gonorrhoea	3.38 (0.92)	3.32 (0.99)	0.782	3.39 (0.94)	3.04 (1.08)	0.096
Chlamydia	3.32 (0.95)	3.04 (1.04)	0.218	3.21 (1.01)	2.71 (1.00)	0.012
Syphilis	3.32 (0.84)	3.34 (0.91)	0.932	3.41 (0.86)	3.03 (1.00)	0.040
Chancroid	3.47 (1.11)	3.48 (0.94)	0.968	3.58 (0.93)	2.85 (1.09)	0.002
Granuloma inguinale	3.64 (1.06)	3.46 (0.99)	0.327	3.60 (0.95)	2.89 (1.23)	0.005
Trychomoniasis	3.09 (1.30)	2.75 (1.21)	0.375	2.92 (1.22)	2.62 (1.20)	0.135
Candidiasis	2.91 (1.14)	2.71 (1.24)	0.615	2.92 (1.18)	2.54 (1.26)	0.067

SD = standard deviation.

knowledge about HIV/AIDS and hepatitis B (5,9,16–20). These studies used their own questionnaire to evaluate participants' knowledge. Therefore, comparison with our findings has some limitations. Despite there being HIV/AIDS and hepatitis B educational programmes, previous studies reported that Iranian health care providers had insufficient knowledge about them (5,9,16–20). In a study conducted in Iranian health centres, only about 56% of health care providers had good knowledge about HIV/AIDS (5). In another study, about 50% of health care providers were aware of HIV transmission routes (16). A study on health care providers working in hospitals reported sufficient knowledge about HIV/AIDS transmission routes, treatment and preventions in only 59.3%, 52.1% and 52.9% of participants, respectively (19).

A study in Tehran, showed that less than 50% of nurses had sufficient knowledge about HIV/AIDS (17), while a study in Mashhad, north-east of Iran, found only 11% of midwives had sufficient skills to manage hepatitis B-infected pregnant women (18). Another study in Tehran, reported that only 11.7% of midwives and 8.3%

of midwifery students had sufficient knowledge about hepatitis B (20). In a study that assessed educational needs of midwives working for health centres, STI education was reported a priority for midwives (8).

In a study in Peru, midwives answered about 63% of STI questions correctly (29), while a study in Indonesia showed midwives had moderate knowledge about HIV/AIDS (30). Ugandan midwives are reported to have a low knowledge about HIV (7), and about 30% of primary health care providers in Sri Lanka knew all methods of HIV transmission and 12% were aware of mother-to-child transmittable STIs (6). In Thailand, 54% of health care providers working in STIs services, had no STI training, and their knowledge about STI causes, transmission routes and symptoms was inadequate (31).

Based on our finding, only about 6% of midwives were aware of existing Iranian STI guidelines, 44.4% of whom had read them. This has an important impact on the effectiveness of the STI surveillance system. To have a high quality STI control programme, guidelines should be well designed and available

for all STI service providers, and providers should be educated about the content and use of the guidelines (10).

In our study, the effect of having had training in the workplace about HIV/AIDS and hepatitis B on perceived need for education was not significant. It can be concluded that the educational programme did not provide the midwives with sufficient knowledge. Many factors can affect the perceived need for education. It seems that educational content is important to meet the target groups' educational needs and so well designed programmes are needed to have a successful educational outcome (29).

Our findings showed that having training at university did not affect the reported need for education about STIs. However, reading about the listed STIs in the previous year significantly reduced the perceived need for education about some of the STIs. Education at university is for a finite time; therefore in the workplace, education should be continued. In our study, the majority of midwives had graduated more than 15 years before; after 15 years of last receiving education at university it would not be expected that there would be

a reduction in the current perceived educational needs. Additionally, in the workplace, midwives encounter many issues that are not addressed at university; they therefore need to read about STIs to keep up-to-date (12,32). In our study, reading about STIs in the current year illustrates the importance of providing educational materials to meet the needs of health care professions. Hence, a well designed continuous educational programme in the workplace for midwives is needed in order to have a successful STI control and prevention programme (12).

Using a self-administered questionnaire with lists of some of the prevalent STIs to assess educational needs may not show the actual need for education. However, conducting focus group discussions also has limitations; therefore,

in this study we preferred to use a questionnaire to collect data about perceived educational needs. Another limitation of our study was the sample size, as we only recruited midwives working for health centres in the city of Rasht.

Conclusion

Based on our findings, midwives in Rasht are not adequately prepared to carry out STI prevention and control programmes in their workplace. Continuing and good quality educational programmes are needed for midwives to improve their knowledge. Policy-makers should pay attention to the educational needs of midwives and recognize the important role this group of health care providers has in leading successful STI prevention and control

programmes. Further studies to evaluate midwives' performance and skills for STI prevention and treatment are recommended.

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Development of an Eastern Mediterranean Region search strategy for biomedical citations indexed in PubMed

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تطوير استراتيجية لإقليم شرق المتوسط للبحث عن الاستشهادات المنقولة عن البحوث الطبية البيولوجية المفهرسة في قاعدة بيانات PubMed

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الخلاصة: لقد استخدمت قاعدة البيانات PubMed، وهي قاعدة بيانات بلوغرافية "مفتوحة" تغطي التخصصات الطبية والصحية، في تحديد عدد كبير من المؤشرات التي تساعد في تحليل الاتجاهات العالمية في إنتاج البحوث الطبية البيولوجية. وتمثل الدراسة الحالية محاولة أولية لتطوير بنية بحث خاصة بإقليم شرق المتوسط وتحسينها على النحو الأمثل في PubMed لتمهيد الطريق لإجراء تحليلات وصفية لاحقة. وتتضمن الاستراتيجية المثالية للبحث لإقليم شرق المتوسط تركيب تفصيلي للجمل مما يسهل التحكم في عملية البحث ويحافظ على التوازن السليم بين حساسية النتائج التي عثر عليها ودقتها. وقد جرى تحليل بيانات الاستشهادات الخاصة بالبلاد يدوياً للكشف عن النتائج الإيجابية الكاذبة. وتشير نتائجنا إلى أن إنتاج البحوث المنشورة قد زاد بنحو خمسة أضعاف في إقليم شرق المتوسط خلال الفترة ما بين 2004-2013. ووُجد أن خمسة بلدان فقط (هي جمهورية إيران الإسلامية ومصر والمملكة العربية السعودية وتونس وباكستان) قد ساهمت بمقدار 80٪ من جميع منشورات إقليم شرق المتوسط خلال هذه الفترة. وساهمت كل من البلدان السبعة عشر المتبقية في إقليم شرق المتوسط بما يقل عن 4٪. ونحن نعتقد أن المنهجية المعروضة في هذه الدراسة يمكن استخدامها جنباً إلى جنب مع مقاييس أخرى لاستخراج مؤشرات لا تقدر بثمن لوصف نظم البحوث الصحية في الإقليم.

ABSTRACT PubMed, a 'barrier-free' bibliographic database covering biomedical and health disciplines, has been successfully used to identify a multitude of indicators that assist in analyzing global trends for biomedical research productivity. The current study represents an original attempt to develop and optimize an Eastern Mediterranean Region (EMR) search strategy in PubMed to pave the way for subsequent descriptive analyses. The refined EMR search strategy contains elaborate syntaxes which facilitate controlling the search process and maintaining a proper balance between sensitivity and precision of the obtained results. Country-specific citation data were manually scanned for false positive publications. Our results indicate that publication productivity increased nearly five-fold in the EMR from 2004 to 2013. Five countries (Islamic Republic of Iran, Egypt, Saudi Arabia, Tunisia and Pakistan; in order of total publications) contributed to 80% of all EMR publications during this period. Each of the remaining 17 EMR countries contributed less than 4%. We believe that the methodology presented in this study can be used in conjunction with other metrics to extract invaluable indicators to describe EMR health research systems.

Mise au point d'une stratégie de recherche pour la Région de la Méditerranée orientale en matière de citations biomédicales indexées dans PubMed

RÉSUMÉ PubMed, une base de données bibliographiques en libre accès, couvrant les disciplines des sciences biomédicales et de la santé, est utilisée avec succès pour identifier de nombreux indicateurs qui permettent d'analyser les tendances mondiales en matière de productivité de la recherche biomédicale. La présente étude constitue une tentative originale en vue de définir et d'optimiser une stratégie de recherche pour la Région de la Méditerranée orientale dans PubMed afin d'ouvrir la voie à des analyses descriptives ultérieures. Cette stratégie optimisée comporte des syntaxes complexes qui facilitent le contrôle du processus de recherche et assurent un juste équilibre entre la sensibilité et la précision des résultats obtenus. Les données de citation spécifiques à chaque pays ont été soumises à un examen manuel afin de repérer les fausses publications positives. Les résultats que nous avons obtenus indiquent que la productivité des publications a quasiment été multipliée par cinq dans la Région de la Méditerranée orientale entre 2004 et 2013. L'étude a montré que seuls cinq pays (la République islamique d'Iran, l'Égypte, l'Arabie saoudite, le Pakistan et la Tunisie ; par ordre de nombre de publications totales) ont contribué à 80 % de toutes les publications pour la Région de la Méditerranée orientale pendant cette période. La contribution de chacun des 17 pays restants de cette Région a été inférieure à 4 %. Nous pensons qu'il est possible d'utiliser la méthodologie présentée dans cette étude en association avec d'autres mesures afin de définir des indicateurs précieux permettant de décrire les systèmes de recherche en santé au sein de la Région de la Méditerranée orientale.

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Introduction

Health research is an important aspect of health care delivery, since it plays a significant role in the global economic growth and contributes to improving the living standards and quality of life (1). Assessing the quantity and quality of the scientific output in a country or region is a key indicator to understand and improve its research system.

Bibliometric analysis of scientific publications involves the application of mathematics and statistical methods to determine the extent and quality of research in a given territory (2,3). In the biomedical and health fields, scientists utilize many high-quality citation databases to search for published literature. Of these databases, PubMed has been acknowledged to be the most significant 'barrier-free' biomedical resource available on the World Wide Web (4).

PubMed citations come from the MEDLINE© (Medical Literature

Analysis and Retrieval System Online, or MEDLARS Online) bibliographic database, manuscripts deposited in the PubMed Central (PMC) free digital repository, and freely accessible citations from biomedical books published in the National Center for Biotechnology Information (NCBI) Bookshelf (5). In fact, PubMed provides a strong health discipline indexing coverage, and currently catalogues over 26 million biomedical articles that were published in more than 44 000 journals in 37 languages (6). PubMed depends on a text-based search that uses an indexing system for rapid retrieval of information. Effective search strategies provide references that are more specific for the intended topic compared with other popular search engines. In PubMed, the citation information is broken into index fields (e.g., journal name, author name, title, primary author's address, language of publication, and others). The power of PubMed search could

then be further enhanced by the use of search rules, syntaxes, and qualifying terms in combination with search field abbreviations. PubMed has been used with success to perform bibliometric studies aiming at the assessment of various aspects of research outputs (7).

The free access to PubMed and its friendly interface have led to the development of elaborate techniques to analyze global trends for biomedical research productivity and provide objective and useful tools to evaluate the results of scientific activity in different locations worldwide (7,8–10). To the best of our knowledge, most of these studies required manual checks at the data collection phase for the quality of the data collected. There are inherent difficulties when the search strategies are intended towards certain geographical locations, as most validated search strategies are not limited by geographical concerns. No single study has been undertaken to consider the comprehensive collection



Figure 1 Countries of the WHO Eastern Mediterranean Region.

of biomedical and health research outputs in different countries of the WHO Eastern Mediterranean Region (EMR; Figure 1). While a previous study used a simple search strategy to identify “access to medicine” studies related to EMR (11), there is a need for a search strategy that is tested and applicable to different research needs. It is for this reason we aimed in the present study at the development and optimization of the EMR search strategy in PubMed to pave the way for subsequent analyses that could be based on the automated monitoring of biomedical research outcomes in the Region, and the subsequent instantaneous forecasting of research activities in the region as a prerequisite for proper policy development.

Methods

We conducted a comparative analysis of three types of search strategies at PubMed (<http://www.pubmed.com>) to obtain a collection of biomedical and health research citations published between 2004 and 2013, by principal researchers affiliated to institutions from any country in the EMR. The main outcome of this comparative analysis is to develop an optimized EMR Search Strategy that can be used in performing automated collections of biomedical citations from the Region, which could be used in various analysis or for forecasting research activities in the Region. The search strategies that were implemented included: a “classical” search strategy, a “pitfall” search strategy, and a suggested EMR search strategy (Supplement 1 [online]) that combines the benefits of the former strategies.

The “classical” search strategy was based on simple queries using standard Medical Subject Heading (MeSH) terms corresponding to EMR countries and the [AD] tag which has the function of collecting all published articles carrying the requested country name in the affiliation (or address) field (e.g. Iran

[AD], Egypt [AD], Saudi Arabia [AD]). The “pitfall” search strategy involved the use of elaborate syntaxes previously developed by Tadmouri and Bissar-Tadmouri (12–14). A previously developed search strategy for EMR (Pre-EMR) contained more sophisticated syntaxes that allowed further control over the search processes. In certain cases, the search was either “specific”, based on excluding false-positive results using the Boolean operator NOT; or “sensitive”, based on the use of the inclusive Boolean operator OR, and/or the “star” wildcard character (*); or “optimized”, based on a mixed use of the “star” wildcard character and the OR and NOT Boolean operators (Supplement 1 [online]).

For some countries, variant names in several world languages were also incorporated in the search syntaxes to cover non-English citations (14). All types of search strategies were directed to PubMed within a limit of few hours on 30 July, 2015. Since address-based searches on PubMed automatically exclude letters to the editors and commentary articles, citations that were investigated in this study included reviews, original journal articles, and case reports. In addition, address-based searches also restricted results to papers in which only the principal investigators are affiliated to institutions located in the EMR.

The resulting country-specific citation data were collected in an offline file of Extensible Markup Language (XML) database format and then converted into Excel tables. Subsequently, the address field in citation records were manually scanned for false positives or inconsistent addresses (12). In many instances scientific papers suffer from a variety of inconsistencies including the absence of uniformity in reporting addresses at the level of city, institution, faculty, and department names (15), the transliteration of addresses from native languages into English or French (12) and the use of misspelled names

or abbreviations to express names of universities or research centers (14).

The leading author in this study undertook the task of deleting false-positive entries and building up an exclusion dictionary to formulate a new enhanced EMR search strategy comprising optimized search strategies for citations from EMR countries (Supplement 1 [online]). With the exception of Djibouti and Pakistan, retrieving data from PubMed for the rest of the EMR countries required careful implementation of elaborate queries that are specific or sensitive due to the occurrence of false-positive entries. This task becomes more imperative because the National Library of Medicine ceased, at the beginning of October 2013, performing quality control review and editing of the author affiliation field in citations indexed in PubMed and started to rely on data supplied directly by journal publishers (16). Therefore, the method used in this study is not recommended to be used for papers published since 2014.

Following data collection and control reviews, specific-country databases were built using text-file systems that included raw Medline Format citations in the health disciplines and published by first authors affiliated to EMR countries during years 2004–2013. Data from these raw Medline files were then transferred, according to the need, to other flat-file database containers to conduct various types of descriptive analyses and draw relevant statistics, especially those related to the geographic distribution of health research in the EMR (Table 1).

Results

During the period from 2004 to 2013, biomedical and health publication productivity increased nearly five-fold in the EMR region (Table 2). A few countries represent the majority of publications from the Region. This study indicated a dominance of the

biomedical research publications by Iranian scholars, who contributed to a sizeable portion—39.3% of all EMR publications during the study period (2004–2013). In the EMR, the share from the Islamic Republic of Iran is almost equivalent to the combined productivities of researchers from the following four countries: Egypt (14.1%), Saudi Arabia (10.6%), Tunisia (8.1%), and Pakistan (7.8%). The remaining 17 EMR countries had each a contribution of less than 4% and an overall EMR share of about 20% (Table 1).

Using the EMR search strategy approach (described above), 140 911 citations were found to be indexed in PubMed for all EMR countries during the study period 2004–2013 (Table 1). This overall figure is not very different from overall figures obtained using the “classical” and “pitfall” search strategies.

By looking at the details, however, each of the search strategies exhibited some peculiar characteristics for a number of EMR countries, and had significant limitations as compared with the EMR search strategy as described below.

Using the classical search strategy, data extracted for Afghanistan, Bahrain, Djibouti, Egypt, Iraq, Islamic Republic of Iran, Kuwait, Libya, Oman, Pakistan, and Saudi Arabia (half of the countries in the Region) remained very close to those obtained using the refined EMR search strategy (95–100%; Table 1).

In the case of Qatar, Sudan, and Yemen 6–7% of the citations were excluded when applying the EMR search strategy because some of the papers’ authors affiliated to the institutions in these countries were not principal investigators. This observation was further noted in the cases of Jordan and

Lebanon that included 21% and 45% false-positive citations, respectively. Part of this deviation is blamed on the fact that many of the excluded citations included Jordanian and Lebanese authors who were not principal investigators. Yet, a larger part of this deviation is explained by the fact that Jordan and Lebanon could also refer to several cities and neighborhoods in Great Britain, Northern Ireland, and the United States (12). Because of all reasons mentioned above, the classical search strategy proved to be less sensitive for countries like the Syrian Arab Republic (8% less sensitive), the United Arab Emirates (20% less sensitive), and Palestine (29% less sensitive). The extreme positions of Tunisia (53% less sensitive) and Morocco (66% less sensitive) is mainly due to the fact that the classical search strategy is not capable of detecting address

Table 1 Ratios corresponding to the raw results obtained by the “classical”, the “pitfall”, and the pre-EMR search strategies compared to those obtained by the refined EMR search strategy for every EMR country from 2004 to 2013. (Dark-coloured and light-coloured cells indicate value levels deviating above and below the average values, respectively).

Country	CSS	EMRSS:CSS	PSS	EMRSS:PSS	Pre-EMRSS	EMRSS:Pre-EMRSS	EMRSS	%
Islamic Republic of Iran	55608	0.99	55608	0.99	55730	0.99	55322	39.3
Egypt	20159	0.99	20163	0.99	20172	0.99	19889	14.1
Saudi Arabia	14991	1.00	15450	0.97	15547	0.96	15002	10.6
Tunisia	7472	1.53	10845	1.05	11482	0.99	11395	8.1
Pakistan	11158	0.99	11158	0.99	11162	0.99	11009	7.8
Morocco	3258	1.66	5434	0.99	5475	0.99	5396	3.8
Lebanon	7821	0.55	4356	0.99	8134	0.53	4334	3.1
Jordan	5045	0.79	4084	0.98	5045	0.79	4000	2.8
Kuwait	3184	0.99	3185	0.99	3177	0.99	3140	2.2
United Arab Emirates	2362	1.20	2909	0.97	2909	0.97	2827	2.0
Oman	2091	0.97	2057	0.99	2123	0.96	2030	1.4
Qatar	1605	0.93	1605	0.93	1600	0.93	1493	1.1
Iraq	1257	0.96	1262	0.96	1268	0.95	1207	0.9
Sudan	1153	0.94	1143	0.94	1168	0.92	1079	0.8
Syrian Arab Republic	625	1.08	723	0.93	728	0.93	675	0.5
Palestine	500	1.29	659	0.98	866	0.74	643	0.5
Bahrain	577	0.96	577	0.96	577	0.96	556	0.4
Libya	378	1.00	405	0.93	396	0.95	377	0.3
Yemen	401	0.93	397	0.94	397	0.94	372	0.3
Afghanistan	126	0.95	126	0.95	124	0.97	120	0.1
Djibouti	39	1.00	39	1.00	39	1.00	39	0.0
Somalia	14	0.43	27	0.22	27	0.22	6	0.0
EMR	13 9074	1.01	14 1458	1.00	14 7326	0.96	14 0911	100.0

details when written in French, as many authors from these countries publish in the French language.

Using the “pitfall” search strategy, citation data for most of the EMR countries came closer to the results obtained by the application of the refined EMR search strategy (95–105%; Table 1). Data for Libya, Qatar, Sudan, Syrian Arab Republic and Yemen contained non-specific citations for the reason that in approximately 6–7% of those papers; authors affiliated to institutions

in these countries were not principal investigators.

The pre-EMR search strategy was formulated with the aim to increase the sensitivity of the “pitfall” search strategy mainly by the proper use of the wildcard character “*” (e.g. Syrian Arab Republic), the use of country name abbreviations (e.g. United Arab Emirates) or polymorphs (e.g. Palestine), and the use of language-specific country name variants (e.g. Morocco, Tunisia, and Lebanon). This model worked well for many

of the EMR countries, but returned false-positives especially in the case of Jordan (21%), Palestine (26%), Lebanon (47%), and Somalia (78%). This is mostly because those country names intersect with various world locations and also because many citations did not include first authors affiliated to these countries. This observation becomes more obvious when EMRSS:Pre-EMRSS ratios are computed for the top most health research productive countries for each year of the studied

Table 2 Annual ratios corresponding to the results of the pre-EMRSS search strategies when compared to those obtained by the refined EMRSS for every EMR country for the period from 2004 to 2013. (Dark-coloured and light-coloured cells indicate value levels deviating above and below the average values, respectively).

Country	Search Strategy	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Islamic Republic of Iran	EMRSS	1169	1643	2459	3832	4301	4930	6104	7972	10511	12401	55322
	Pre-EMRSS	1177	1649	2464	3844	4327	4949	6125	7999	10599	12597	55730
	EMRSS:Pres-EMRSS	0.99	1.00	1.00	1.00	0.99	1.00	1.00	1.00	0.99	0.98	0.99
Egypt	EMRSS	871	1003	1153	1383	1597	1949	2413	2866	3085	3569	19889
	Pre-EMRSS	870	1002	1152	1383	1604	1956	2429	2881	3117	3778	20172
	EMRSS:Pres-EMRSS	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.94	0.99
Saudi Arabia	EMRSS	893	884	887	936	1004	1227	1620	2073	2440	3038	15002
	Pre-EMRSS	904	893	909	946	1025	1243	1642	2118	2509	3358	15547
	EMRSS:Pres-EMRSS	0.99	0.99	0.98	0.99	0.98	0.99	0.99	0.98	0.97	0.90	0.96
Tunisia	EMRSS	502	690	869	1016	1188	1334	1407	1531	1455	1403	11395
	Pre-EMRSS	503	693	872	1020	1193	1338	1410	1534	1465	1454	11482
	EMRSS:Pres-EMRSS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.96	0.99
Pakistan	EMRSS	378	563	629	738	973	1165	1404	1556	1669	1934	11009
	Pre-EMRSS	379	564	630	738	974	1167	1409	1566	1692	2043	11162
	EMRSS:Pres-EMRSS	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.95	0.99
Morocco	EMRSS	255	306	346	402	447	518	567	707	870	978	5396
	Pre-EMRSS	256	308	349	402	452	520	568	714	879	1027	5475
	EMRSS:Pres-EMRSS	1.00	0.99	0.99	1.00	0.99	1.00	1.00	0.99	0.99	0.95	0.99
Lebanon	EMRSS	261	312	379	389	459	430	450	484	546	624	4334
	Pre-EMRSS	532	606	713	720	798	833	870	894	959	1209	8134
	EMRSS:Pres-EMRSS	0.49	0.51	0.53	0.54	0.58	0.52	0.52	0.54	0.57	0.52	0.53
Jordan	EMRSS	235	273	316	341	390	481	476	471	486	531	4000
	Pre-EMRSS	319	367	391	445	481	562	581	572	608	719	5045
	EMRSS:Pres-EMRSS	0.74	0.74	0.81	0.77	0.81	0.86	0.82	0.82	0.80	0.74	0.79
Kuwait	EMRSS	255	305	287	305	324	302	322	348	325	367	3140
	Pre-EMRSS	257	305	287	306	325	303	323	348	328	395	3177
	EMRSS:Pres-EMRSS	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	0.93	0.99
EMR	EMRSS	5414	6674	8079	10169	11684	13468	16051	19441	23051	26880	140911
	Pre-EMRSS	5806	7105	8544	10650	12208	14027	16658	20103	23815	28410	147326
	EMRSS:Pres-EMRSS	0.93	0.94	0.95	0.95	0.96	0.96	0.96	0.97	0.97	0.95	0.96

period (Table 2). In the majority of the cases, most of the deviation occurred in data extracted for the year 2013. The least affected country is the Islamic Republic of Iran with a ratio of 0.98 for the year 2013 compared to a 0.99 overall ratio. Egypt, Tunisia, Pakistan, and Morocco were moderately affected (2013 ratios: 0.94–0.96 vs. overall ratio: 0.99). Saudi Arabia and Kuwait were significantly affected (2013 ratios: 0.90–0.93 vs. overall ratio: 0.99). In the cases of Lebanon and Jordan, deviating ratios were not restricted to the year 2013 and occurred throughout the studied period (Table 2).

Discussion

Our study provides systematic evidence of important errors and pitfalls that may occur if sub-optimal search strategies are used for the identification of geographically bound publications. More importantly, we demonstrated that such errors are not equally distributed among the countries, and different countries are affected with different types of searching errors and by varying states. As such, our proposed refined EMR search strategy is a useful tool for future studies that look for EMR publications. It also provides a platform for future research on how to assess and test alternative search strategies concerned with other bibliographic databases, different regions or different time-frames.

Biomedical and health publication productivity increased nearly five-fold in the EMR region in the study period. Five countries in the region represented 80% of biomedical and health research publications indexed in the PubMed (2004–2013): Islamic Republic of Iran (39.3%), Egypt (14.1%), Saudi Arabia (10.6%), Tunisia (8.1%), and Pakistan (7.8%).

Assessing biomedical and health research outputs in a specific region is key for the evaluation and improvement of its research productivity and

direction. In the study period regional publications increased nearly five-fold. Despite their many imperfections, indicators of biomedical bibliometrics offer a means by which countries and regions of varying geographic sizes and socio-economic development may be monitored and compared (17,18).

Using inappropriate search strategies on PubMed may lead to conclusions that are contradictory to the realities with regards to biomedical research activity in the region (19). For this reason we aimed in this study to develop a validated EMR Search Strategy that is both sensitive and specific, while attempting to retrieve all possible biomedical research citations produced in EMR countries. The implementation of the EMRSS would help in collecting citations missed by non-sensitive strategies and to automatically avoid false-positive citations for EMR countries that have names overlapping with several world geographical locations.

By comparing the number of citations obtained using the “classical” search strategy, which depends on the use of standardized MeSH terms for EMR countries, versus our optimized EMRSS search strategy, results demonstrated that our structured approach allowed us to enhance the sensitivity and/or specificity of representative data for several countries in the Region. However, the NLM’s recent policy to include the affiliation data for all authors citations indexed in PubMed caused serious deviations in the results, especially for data for the year 2013. If a selective search method to assemble citations based on the country of affiliation of the first authors is not devised, it will be too difficult to conduct similar analyses beyond the year 2014.

To overcome this obstacle, we carried out manual checking procedures to remove false-positive citations in which EMR country names were not associated with first/principal authors. Interestingly, the highest volumes of false-positive citations that were

eliminated were from Saudi Arabia and Kuwait. This is an indication that, in many cases, researchers in these countries occur as secondary and not as primary authors in most published research. This phenomenon is less prominent in Egypt, Tunisia, Pakistan, and Morocco. In the Islamic Republic of Iran, only a minute fraction of false-positive citations were encountered, indicating the dominant role of Iranian researchers in biomedical research publications collected using the inclusion criteria of our study (Table 2).

Our study also suffers from important limitations and its findings should be interpreted in light of these. First, PubMed does not represent all scientific and biomedical journals published. This database consists largely of English-language journals, therefore possibly contributing to selection bias due to language barriers. With respect to the EMR, WHO has its own Index Medicus for the Eastern Mediterranean Region (IMEMR), which includes some 600 journals produced in the Region, some of which, but not all, are included in PubMed. Subsequent similar studies should include such important database (20,21).

Second, we limited the present research to reviews, original journal articles, and case reports published by principal investigators affiliated to institutions located in the EMR. Papers with main authors being from EMR institutions reflect a prominent role in the design or execution of the reported health research, provides a fair representation of health research directions in the region as reflected by research cited in PubMed, and ascertains that each citation is assigned to a unique country. This latter reason would better serve better our future analytical purposes and help avoiding overlapping results.

Additionally, the change in the NLM’s policy from indexing the affiliation of the first author only and to include affiliations of all authors in every citation in the PubMed database for

citations indexed after October 2013, was a major reason to limit our analysis to the period up to year 2013. This change required the implementation of manual checking procedures to remove false-positive citations with address affiliations referring to countries of the EMR, but not belonging to first-authors. In several instances, this also revealed the presence of false positives in citations published during the years 2012, 2011, and, to a lesser extent, during year 2010.

Despite the above-mentioned limitations, the comprehensiveness and breadth of PubMed databases are enough reasons for us to believe that the results presented in this study are a bona fide representation of the overall biomedical and health research outputs

from the EMR. Additionally, the application of appropriate metrics on the extracted data would certainly help in the formulation of invaluable indicators. This could be used to assess various aspects of research systems in the EMR, and to assist decision-makers in designing policies to improve research activities and to align them with health priorities in the region.

The refined EMR search strategy allows the task of citation data collection to be automated and may be used as on-the-spot monitoring systems that are used for the forecasting of biomedical research activities in the region. With the combination of diverse and versatile bibliometric indicators, scholars in the field could analyze research systems and could advise policymakers on designing

policies to improve research productivity, adjust research objectives according to the time- or location-specific health priority requirements, and consequently rationally use often scarce resources in most EMR nations, allocated to scientific research in general, health and biomedical research in specific.

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Short communication

Awareness, attitudes and knowledge about evidence-based medicine among doctors in Gaza: a cross-sectional survey

Loai Albarqouni^{1,2} and Khamis Elessi²

الوعي والاتجاهات والمعلومات بشأن الطب المُسند بالبيّنات في صفوف الأطباء في قطاع غزة لؤي البرقوني، خميس العليسي

الخلاصة: ظهر الطب المُسند بالبيّنات كاستراتيجية لدمج البيّنات البحثية في إطار صنع القرار السريري. وقد عمدنا إلى استكشاف مستوى الوعي والمعلومات والاتجاهات عن الطب المُسند بالبيّنات في صفوف الأطباء في قطاع غزة. فأجرينا دراسة مقطعية في عام 2014 بين الأطباء العاملين في المراكز الصحية في قطاع غزة، باستخدام استبيان من 20 بنداً مدار ذاتياً وقائم على شبكة الإنترنت. ورحب حوالي ثلثا المستجيبين بالطب المُسند بالبيّنات من حيث المبدأ وأعربوا عن اعتقادهم بأن من شأنه تحسين رعاية المرضى. إلا أنهم سجلوا مستوى منخفضاً نسبياً من المعرفة عن الطب المُسند بالبيّنات. وتمثلت العوائق الرئيسية التي ذكرها المستجيبون بشأن الطب المُسند بالبيّنات في نقص المعرفة اللازمة لممارسته [حجم العينة = 47، (35%)]; والمواقف السلبية تجاهه بين زملاءه القدامى [حجم العينة = 34، (25%)]; ونقص الموارد اللازمة [حجم العينة = 31، (23%)]; وزيادة عبء العمل [حجم العينة = 27، (20%)]; والافتقار إلى الدعم المؤسسي [حجم العينة = 248، (18%)]. وعلى الرغم من وجود عوائق شخصية وتنظيمية تحول دون ممارسته وينبغي التصدي لها.

ABSTRACT Evidence-based medicine (EBM) has emerged as a strategy to integrate research evidence within clinical decision-making. We have explored awareness, knowledge and attitudes about EBM among doctors in the Gaza Strip. In 2014, we conducted a cross-sectional survey among doctors working in health centres in Gaza, using a 20 item, web-based self-administered questionnaire. Approximately two thirds of the respondents welcomed EBM in principle, and believed that it could improve patient care. However, they had a relatively low level of knowledge about EBM. The main barriers to EBM mentioned by respondents were lack of knowledge needed to practise EBM [$n = 47$ (35%)]; negative attitude among senior colleagues [$n = 34$ (25%)]; lack of relevant resources [$n = 31$ (23%)]; work overload [$n = 27$ (20%)]; and lack of institutional support [$n = 248$ (18%)]. Thus, there are personal and organisational barriers to its practice that need to be addressed.

Prise de conscience, attitudes et connaissances des médecins dans la Bande de Gaza au sujet de la médecine factuelle

RÉSUMÉ La médecine factuelle a émergé comme stratégie visant à intégrer les données issues de la recherche dans la prise de décision clinique. Nous avons étudié la prise de conscience, les attitudes et les connaissances des médecins dans la Bande de Gaza concernant la médecine factuelle. En 2014, nous avons conduit une enquête transversale auprès des médecins travaillant dans des centres de santé à Gaza, au moyen de questionnaires auto-administrés en ligne composés de 20 items. Près des deux tiers des répondants accueillaient, en principe, favorablement la médecine factuelle et pensaient qu'elle peut améliorer les soins dispensés aux patients. Toutefois, leurs connaissances concernant la médecine factuelle étaient faibles. Les principaux obstacles à la médecine factuelle mentionnés par les répondants étaient l'absence des connaissances concernant la pratique de la médecine factuelle [$n = 47$ (35 %)]; l'attitude négative chez les collègues de rang plus élevé [$n = 34$ (25 %)]; le manque de ressources adaptées [$n = 31$ (23 %)]; la surcharge de travail [$n = 27$ (20 %)]; et l'absence de soutien institutionnel [$n = 248$ (18 %)]. Il existe donc des obstacles personnels et organisationnels concernant la pratique de ce type de médecine qui devraient être pris en compte.

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Introduction

Evidence-based medicine (EBM) is the integration of clinical expertise with the best available evidence and patients' values and preferences in making clinical decisions (1,2). It is now widely regarded as a core competency for effective health care (3). EBM is based on 5 main steps ("the 5As"). 1) Ask: translate an uncertainty into an answerable clinical question, 2) Acquire: find the best available relevant evidence, 3) Appraise: critically appraise the evidence, 4) Apply: apply the appraised evidence to clinical practice, and 5) Assess: evaluate the performance of this process (1).

The desperate health situations in resource-limited countries (among which Palestine is one) tend to trivialize EBM as just another Western innovation of little value and high cost (4). However, it is exactly in these situations, in which health problems are severe and resources are scarce, that the need for EBM is especially important (5). About 1.9 million people live in the Gaza Strip, two thirds of whom are refugees, and the population increases by 4% a year (6). The quality of primary and secondary medical care is variable, and tertiary care is often rudimentary (7). The practice of EBM in such situations could ensure that limited resources are not wasted by ordering unnecessary tests or prescribing inappropriate treatments. Good use of resources will be enhanced by making evidence-based decisions that improve patients' quality of life and lifespan.

A systematic review of self-reported appreciation of EBM, which included 31 studies, found that many health professionals worldwide welcomed EBM, however, the actual implementation of EBM in clinical practice was still deficient (8). In addition, a systematic review of 106 studies investigating barriers to the implementation of EBM identified lack of knowledge, resources, time and skill as the main barriers (9).

In February 2011, an Evidence-Based Medicine Unit was established in Gaza with the endorsement of the deans of both local medical schools at the time. The EBM Unit's broad mission was to promote EBM among health professionals through various activities, including lectures, workshops, conferences and training courses for both undergraduates and postgraduates (10). The main objective of this study was to explore awareness, attitudes and knowledge about the principles of EBM among doctors in Gaza.

Methods

Study design and sample

A cross-sectional survey was conducted – using a convenience sampling technique – among medical doctors in Gaza between August and November 2014. Practising doctors working in health centres affiliated with the Ministry of Health, The United Nations Relief and Works Agency (UNRWA), and academic and private sectors in Gaza, were eligible for inclusion. Questionnaires were sent by email to 250 doctors who had participated in recent medical conferences. The survey questionnaire was also posted on the most popular social media used by professionals, which included about 1 250 doctors.

Questionnaire

A 20-item, self-administered, web-based questionnaire was used to assess doctors' awareness, attitudes and knowledge about EBM. Our questionnaire was based on one used by McColl et al, (11), which had been tested and used in similar regional and international studies (12–14). An Arabic translation of the main questions was added to the questionnaire, which was reviewed and tested by a sample of doctors (questionnaire available on request from the authors). Google Form® was used to create the online questionnaire.

The questionnaire had 3 sections: 1) personal and professional

characteristics; 2) attitudes towards EBM and the use of research findings in clinical practice; and 3) knowledge about the potential resources for EBM and understanding of EBM technical terms. The majority of the items were scored using a 5-point Likert scale (ranging from 1 = strongly agree to 5 = strongly disagree) and were dichotomized for analysis with a cut-off value ≤ 3 indicating agree, similar to that used in previous studies (15,16). Internal consistency of the questionnaire was evaluated using Cronbach alpha (Cronbach alpha coefficient = 0.78).

Analysis

Frequencies and percentages were used to describe categorical data and the chi-squared test was used to test statistical significance between groups. A *P*-value < 0.05 was considered statistically significant.

There was no a priori sample size calculation. However, a post-hoc statistical power calculation showed that a study with a sample size of 135 participants had a confidence level of 95% to detect a difference with an 8% margin of error.

Results

The total number of doctors in Gaza in 2014 was 3 809 (6). We estimated that we approached about 1 500 (39%) of these using email lists and social networks. Although the questionnaire was viewed 964 times, it was completed by only 135 (9%) doctors of the estimated 1 500 approached.

Characteristics of the participants

Of the 135 respondents, 116 (86%) were men, 104 (77%) were younger than 30 years, 61 (45%) held a postgraduate degree or higher qualification, 102 (76%) worked in a governmental health care setting or UNRWA, and 117 (87%) were residents-in-training

or non-specialist medical practitioners (Table 1). Compared with the best estimates of the characteristics of the general population of doctors in Gaza (6,17,18, personal communication, Dr Khamis ElEssi, 2016), more doctors in our sample were under 30 years (77% versus 25%), were non-specialists/residents-in-training (87% versus 65%), were working in UNRWA (26% versus 6%) and had graduated from universities in Palestine or other Arab countries (92% versus 45%).

Awareness of and attitudes towards EBM

Table 2 shows the attitude of the participating doctors to EBM overall and by age group: < 30 and ≥ 30 years.

Most of the 135 respondents (73%) welcomed the current promotion of EBM, and 67% believed that their colleagues welcomed it too. The majority (77%) thought that EBM was useful in their daily practice, and 81% believed it improved patient care. Most respondents (62%) claimed that more than half of their clinical practice was evidence-based. However, 67% thought that practising EBM placed demands on already overloaded doctors. Significantly more doctors younger than 30 years reported that EBM placed demands on their already overloaded schedules compared with doctors 30 years and older ($P = 0.0176$). Otherwise, there were no statistically significant differences between the 2 age groups.

Knowledge about EBM and understanding of EBM technical terms

Figure 1 shows that more than half of the respondent doctors reported that they understood most of the EBM technical terms. The terms “odds ratio” and “heterogeneity” were the least understood, whereas “systematic review” was best understood. The majority of the respondents who did not understand a term expressed their desire to understand it. Between 9%

and 24% of the respondents felt able to explain these terms to others.

Practice of EBM

About half (66; 49%) of the respondents doctors reported having searched one of the medical databases (e.g. PubMed) every week during the past year. Most of them (105; 78%) had access to these databases at their workplace, but only 43 (32%) had access to them at home. Only 36 (27%) had received formal training in EBM; of these, 23 (64%) had been trained through the EBM Unit in Gaza.

Barriers to EBM

Table 2 shows the perceived barriers to EBM overall and by age group: < 30 and ≥ 30 years.

The main perceived barriers to practising EBM among the whole sample were

insufficient knowledge and skills (35%), negative attitudes to EBM among some colleagues, especially the most senior colleagues (25%), limited resources, such as free access to databases or libraries (23%), work overload (20%) and lack of managerial and institutional support (18%). There were no significant differences noted between the 2 age groups (< 30 versus ≥ 30 years).

Discussion

Our study is the first to explore awareness, attitudes and knowledge about the principles of EBM among doctors in Gaza. Compared with doctors in Gaza in general, the respondents in our survey were younger, more junior and more likely to have graduated in Palestine or another Arab country.

Table 1 Characteristics of the participating doctors working in health care centres in Gaza compared with the total population of doctors in Gaza in 2014

Characteristic	Study participants No. (%)	Source population N ¹ (%)
Total	135	3809
Sex		
Male	116 (86)	3390 (89)
Female	19 (14)	419 (11)
Age (years)		
< 30	104 (77)	938 (25)
≥ 30	31 (23)	2871 (75)
Country of the last qualification		
Palestine	88 (65)	1715 (45)
Other Arab countries	36 (27)	
Europe, North America and Russia	11 (8)	2094 (55)
Specialization		
General medical practitioners	117 (87)	2481 (65)
Specialists	18 (13)	1328 (35)
Work place		
Governmental hospitals	69 (51)	2496 (66)
UNRWA	35 (26)	243 (6)
NGOs and private sector	32 (24)	1069 (28)
Highest level of qualification		
Bachelor degree	74 (55)	
Postgraduate degree (MSc or diploma)	37 (27)	
Board/Fellowship or PhD	24 (18)	

¹This is the best possible estimation that we could achieve based on several sources (6,17,18, personal communication, Dr Khamis ElEssi, 2016).

UNRWA = United Nations Relief and Works Agency; NGO = nongovernmental organization.

Table 2 Attitude of participating doctors towards evidence-based medicine (EBM) and the perceived barriers to EBM by age group: < 30 and ≥ 30 years

Attitude	Total (n = 135)	< 30 years (n = 104)	≥ 30 years (n = 31)
	No. (%)	No. (%)	No. (%)
Attitude towards EBM			
Welcome the current promotion of EBM	99 (73)	80 (77)	19 (61)
Colleagues have positive attitudes to EBM	90 (67)	74 (71)	16 (52)
Research findings are useful in daily practice	104 (77)	83 (80)	21 (68)
EBM improves patient care	109 (81)	87 (84)	22 (71)
EBM places demand on overloaded doctors (1)	90 (67)	75 (72)	15 (48)
EBM is of limited value	28 (21)	18 (17)	10 (32)
> 50% of practice is evidence-based	84 (62)	63 (61)	21 (68)
Barriers to practising EBM			
Lack of EBM knowledge and skills	47 (35)	40 (38)	7 (23)
Limited resources and lack of access to databases/libraries	31 (23)	22 (21)	9 (29)
Lack of time and work overload	27 (20)	22 (21)	5 (16)
Lack of organizational/ institutional support	24 (18)	19 (18)	5 (16)
Negative attitude to EBM among seniors	34 (25)	29 (28)	6 (19)

¹Statistically significant difference between the 2 groups (chi-squared test $P = 0.0176$).

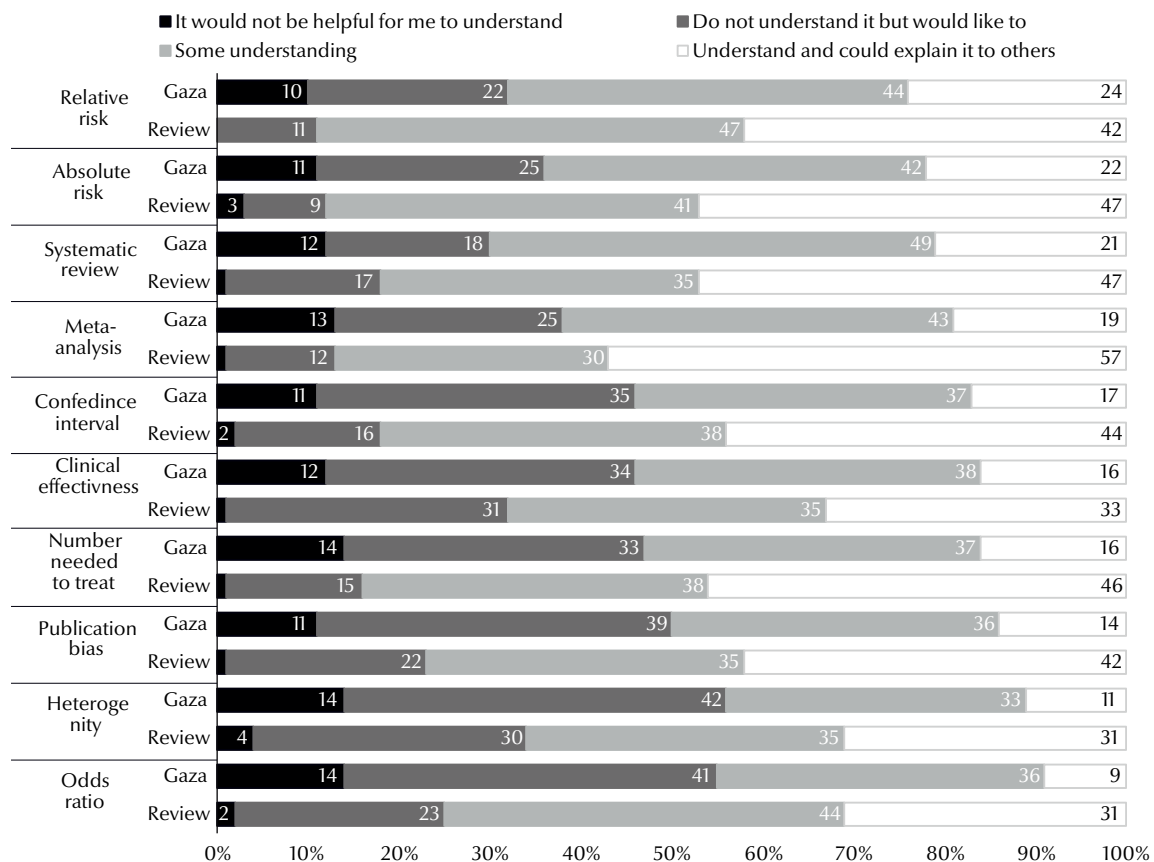


Figure 1 Doctors' knowledge and level of understanding of the common evidence-based medicine terms in our study (Gaza) and in a systematic review by Ubbink, Guyatt and Vermeulen (8)

Among this self-selected population, we found a positive attitude to EBM, and this finding concurs with those of a recent systematic review of self-reported appreciation of EBM. This systematic review also found that the general attitude towards EBM was welcoming in 15 out of 31 studies included in the review (8). Despite the positive attitudes to EBM among our respondents, their knowledge about common EBM terms was substantially lower than the average level among doctors who had participated in the studies included in the systematic review (Figure 1), and there appears to be limited application of EBM principles in clinical practice in Gaza.

The barriers faced by doctors in Gaza (lack of knowledge, skills, access, and professional and organizational support) were similar to those reported in another systematic review which included 106 studies investigating barriers to EBM among health professionals (9). This found that lack of EBM knowledge, skills, resources, time and access were the most common barriers to EBM. In addition, electricity and access to the Internet is intermittent and uncertain in Gaza because of the ongoing blockade of the territory.

The main strength of our study is our use of a robust, validated and reliable questionnaire (11), enabling us to compare our results with those obtained elsewhere. The main limitation is that our sample of respondents is not representative of all doctors in Gaza. Those who did respond were probably more likely than average to be interested

in EBM and more likely to have overestimated their knowledge and skills in EBM (19). Because of these differences, we cannot generalize our findings to all doctors in Gaza. In addition, we were unable to accurately calculate the response rate as we recruited our participants by a convenience sample involving their professional social networks. We estimated the participation rate in our survey using methods recommended by the Checklist for Reporting Results of Internet E-Surveys (20). However, it is worth noting that a systematic review did not find any association between response rates in included studies and attitudes and knowledge about EBM (8). The correlation between the response rate and response bias is imperfect, especially in Internet surveys, which are expected to achieve lower response rates than paper-based surveys (21).

Although our survey findings are based on a limited number of admittedly unrepresentative respondents, we suggest that they provide pointers to ways in which EBM could be embedded more firmly in teaching curricula and clinical practice in Gaza.

1. EBM needs to be championed by senior doctors and academics and integrated throughout the undergraduate and postgraduate medical curricula.
2. The Palestinian Medical Council should incorporate EBM in all specialty training programmes for medical residents.
3. Education about EBM and training courses in critical appraisal should be

used to improve the EBM knowledge and skills of clinicians.

4. Hospital libraries and medical librarians should provide access to evidence databases (e.g. Cochrane Library) and other resources.
5. The EBM Unit in Gaza should include all health care disciplines (e.g. nursing, physiotherapy, pharmacy and librarians) in its work, thereby promoting an improved environment for multidisciplinary teams working collaboratively to apply EBM principles in health centres.

Conclusion

Despite the welcoming and supportive attitudes to EBM reported by Gaza doctors who participated in our survey, personal and organizational barriers operate against the practice of EBM. Our survey has identified a number of ways in which it may be possible to extend support for teaching and use of EBM in Gaza.

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Short communication

Study of congenital heart diseases in patients with Down syndrome in Algeria

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دراسة أمراض القلب الوراثية في مرضى متلازمة داون في الجزائر

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الخلاصة: هدفت هذه الدراسة إلى وصف وتقييم نوع وتواتر وأنماط أمراض القلب الوراثية في المرضى المصابين بمتلازمة داون في مدينة سطيف بالجزائر. ومتلازمة داون، أو متلازمة تثلث الصبغي 21، هو أكثر الاضطرابات الوراثية شيوعاً في العالم. وقد تم تجميع البيانات ومتابعتها من يناير/ كانون الثاني 2009 إلى ديسمبر/ كانون الأول 2013. وأجري تحليل نسب لتوثيق درجة القرابة الأبوية، وتحليل للخلايا الصبغية، وفحص سريري لجميع الحالات. وأظهرت النتائج أن 22 حالة ($15.4 \pm 0.06\%$) من مجموع حالات متلازمة داون المعروفة والبالغ عددها 143 حالة في مراكز علاج متلازمة داون يعانون من اضطرابات وراثية في القلب، وأن 88 حالة ($10.6 \pm 2.2\%$) من إجمالي 770 مريضاً مصاباً باضطرابات وراثية في القلب جمعت بياناتهم من الأقسام العامة في المستشفيات التعليمية لصحة الأم والطفل، بمدينة سطيف، يعانون من متلازمة داون. ومن بين 110 حالة، يعاني 75 مريضاً (68%) من تشوهات قلبية أحادية و35 حالة (32%) من تشوهات قلبية متعددة. وتمثلت أكثر اضطرابات القلب الوراثية شيوعاً في اعتلال الحاجز البطيني. وختاماً، من شأن هذه الدراسة توضيح الوضع الهمي لمتلازمة داون وتحديد توزع اضطرابات القلب الوراثية في مرضى متلازمة داون في مدينة سطيف بالجزائر لإجراء مزيد من الدراسة بشأنها.

ABSTRACT This study aimed to describe and evaluate the type, frequency and patterns of congenital heart diseases (CHDs) in patients with Down Syndrome (DS) in Sétif, Algeria. Down Syndrome, or trisomy 21, is the most common genetic disorder in the world. Data were collected and followed from January 2009 to December 2013. Parental consanguinity documenting pedigree analyzing, chromosome analysis and clinical examination were carried out for all cases. Results have shown that 22 ($15.4\% \pm 0.06$) of the total 143 known cases of DS from DS centres have CHDs and 88 ($10.6\% \pm 2.2$) of the total 770 patients with CHDs collected from public departments at the child and maternity teaching hospital, Sétif, have DS. Among the 110 cases, 75 (68%) have single cardiac abnormalities and 35 (32%) have multiple cardiac abnormalities. The most frequent CHDs were Atrioventricular Septal Defect (AVSD). In conclusion, our study will be helpful to demonstrate the current status of DS and to identify the distribution of CHD in patients with DS in Sétif, Algeria, for further study.

Étude des cardiopathies congénitales chez des patients atteints du syndrome de Down en Algérie

RÉSUMÉ La présente étude avait pour objectif de décrire et d'évaluer le type, la fréquence et les caractéristiques des cardiopathies congénitales chez des patients atteints du syndrome de Down à Sétif (Algérie). Le syndrome de Down, ou la trisomie 21, est le trouble génétique le plus courant au monde. Des données ont été collectées et suivies entre janvier 2009 et décembre 2013. L'étude de la consanguinité des parents incluant l'analyse de l'arbre généalogique, une analyse chromosomique et un examen clinique, a été réalisée pour tous les cas. Les résultats ont montré que sur 143 cas connus de syndrome de Down provenant de centres spécialisés dans la prise en charge de ces patients, 22 ($15,4\% \pm 0,06$) souffraient d'une cardiopathie congénitale et que sur 770 patients atteints d'une cardiopathie congénitale venant des départements publics des hôpitaux universitaires de soins maternels et infantiles à Sétif, 88 ($10,6\% \pm 2,2$) étaient atteints du syndrome de Down. Parmi ces 110 cas, 75 (68 %) souffraient d'une seule anomalie cardiaque tandis que 35 (32 %) avaient plusieurs anomalies cardiaques. La cardiopathie congénitale la plus courante était la communication auriculo-ventriculaire. Pour conclure, notre étude sera utile pour mettre en évidence la situation actuelle du syndrome de Down ainsi que pour identifier la répartition des cardiopathies congénitales à Sétif (Algérie) en vue d'études ultérieures sur le sujet.

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Introduction

Congenital heart diseases (CHDs) are a leading cause of birth defects (1,2). Down syndrome, or trisomy 21, is a chromosomal disorder which is often associated with morphological and structural defects. People with Down syndrome are clinically diagnosed by the presence of a characteristic phenotype. The clinical diagnosis is confirmed by chromosome analysis (3). The risk of Down syndrome increases with increasing age of the mother (4).

Among all cases of CHDs, 4–10% have Down syndrome and 40–50% of people with Down syndrome have CHDs (5). They are the most common cause of death in people with Down syndrome in the first 2 years of life (6–8). Therefore, echocardiography is recommended for early detection of CHDs, which may help to prevent many complications. Single heart defects are usually found in people with Down syndrome but multiple defects are also found. In the United States of America and Europe, atrioventricular septal defect is reportedly the most common CHD associated with Down syndrome (9–13). In Asian communities, ventricular septal defect is the most common defect (14,15) whereas in Latin America, atrial septal defect is reportedly the most common defect (11,16).

In recent decades, there has been a substantial increase in the life expectancy of children with Down syndrome in general (17). This increase in life expectancy is mainly due to the successful early surgical treatment of CHD in children with Down syndrome (9,17–20).

There have been no previous studies about CHDs in patients with Down syndrome in Algeria. The aim of this study, therefore, was to determine the type and distribution of CHDs in young patients with Down syndrome in Sétif, eastern Algeria.

Methods

Study design, setting and participants

This case series study examined the type, frequency and patterns of CHDs in young people (< 21 years) with Down syndrome in Sétif. General health care in the area is provided by the Central University Hospital, 12 hospitals, 70 health centres and 320 primary health care centres. There are 6 centres for children and young people (5–20 years) with Down syndrome and other conditions with intellectual disability.

Our study population consisted of all Down syndrome patients with CHDs in Sétif. Patients were drawn from the 6 Down syndrome centres and the university hospital. Primary care physicians in the other hospitals, health centres and primary health care centres have not been trained to treat Down syndrome patients with CHDs so these patients are all referred to these 2 places.

The recruitment period spanned 18 months (January 2009 to June 2010) in order to have a large representative sample. Patients were followed until December 2013. Eligible patients were Sétif residents aged < 21 years, and both sexes were included. Patients with other genetic disorders and Down syndrome without CHDs were excluded.

All Down syndrome patients < 21 years in the 6 Down syndrome centres ($n = 143$) were examined to determine if they had CHDs. In addition, all patients with CHDs < 21 years at the paediatric department of the university hospital of Sétif ($n = 770$) were examined to determine if they had Down syndrome. For comparison, we also included Down syndrome patients without CHDs from the 6 centres who agreed to participate.

Data collection

All potential cases underwent full clinical assessment including phenotypic features that suggested Down syndrome, such as hypotonia, brachycephaly,

small low-set ears, upslanting creases and a gap between the first and second toes. Those with Down syndrome and CHDs, and the Down syndrome patients without CHDs from the centres who agreed to participate had a detailed medical history taken of age, sex, consanguinity and family history with special emphasis on maternal and paternal ages. The diagnosis of Down syndrome was confirmed by chromosome analysis and all patients were examined by plain chest X-ray, electrocardiogram and ultrasound of the heart (2-D echocardiography). The echocardiography examination was performed at the cardiology department using a GE Vivid 3 ultrasound machine.

Statistical analysis

SPSS, version 16 was used for analysis. Descriptive statistics were done and data are presented as means and standard deviations (SD) or proportions.

Ethical considerations

This study was approved by the University Hospital and the Faculty of Medicine of Sétif University. Informed consent was given by the guardians of all the participants; none declined.

Results

Among 143 patients with Down syndrome < 21 years at the 6 centres, 22 (15.4%) had CHDs. Of 770 patients with CHDs < 21 years at the paediatric department of the university hospital, 88 (11.4%) had Down syndrome. Thus, a total of 110 people < 21 years with Down syndrome and CHDs were included in the study. In addition, 66 Down syndrome patients without CHDs agreed to participate for comparison.

Table 1 shows the demographic characteristic of the patients: their ages ranged from 3 months to 20 years, with a mean age of 4.3 (SD 0.5) years, 60

Table 1 Demographic characteristics of Down syndrome patients with congenital heart diseases

Demographic characteristic	No. (n = 110)	%
Age groups (years)		
< 2	40	36
2–4	37	34
5–14	27	24
15–20	6	5
Mean (SD) (years)	4.3 (0.5)	
Sex		
Female	50	45
Male	60	55
Consanguinity		
Yes	13	12
No	97	88

(55%) were male and 13 (12%) had consanguineous parents.

The mean ages of the mothers and fathers of the patients were 36.6 and 43.2 years respectively.

Table 2 compares maternal age and parental consanguinity of Down syndrome patients with and without CHDs. Maternal age 40–49 years was significantly associated with CHDs in Down syndrome patients ($P=0.03$) but first and second degree consanguinity was not ($P=0.12$ and 0.1 respectively).

Table 3 show the types of CHD among the Down syndrome patients

with CHDs. Of the 110 patients, 75 (68%) had a single cardiac abnormality, while 35 (32%) had multiple cardiac abnormalities. The most common CHDs were atrioventricular septal defect isolated (30%) or combined with other cardiac abnormalities (44%), ventricular septal defect (17%), atrial septal defect (7%) and patent ductus arteriosus (6%).

Table 4 shows the distribution of atrioventricular septal defect and ventricular septal defect in the Down syndrome patients by sex. No significant difference by sex was found for either

atrioventricular septal defect or ventricular septal defect ($P>0.05$).

Discussion

Our study confirms some data reported by other studies on CHDs in people with Down syndrome (13,21). The frequency and distribution of CHDs in Down syndrome varies with geographical region (1). Ours is the first study of CHDs in patients with Down syndrome in a state of Algeria. In our study, the prevalence of CHDs was 15.4% among the Down syndrome patients aged between 5 and 20 years at the Down syndrome centres. This may be because more deaths occurred in patients with Down syndrome and CHDs in the absence of early surgery. The frequency of CHDs in Down syndrome patients observed in our study is less than that reported in Korea (57%), Sudan (43%) and Oman (57%) (16,22,23). However, these studies included infants with a mean age of 3 months versus 52 months in our study. In the hospital sample, among 770 patients with CHDs aged between 3 and 48 months, 11.4% had Down syndrome, which is similar to the prevalence reported in previous studies (4–10%) (1,5,21).

Table 2 Maternal age and parental consanguinity among Down syndrome (DS) patients with and without congenital heart diseases (CHDs)

Variable	DS patients with CHDs (n = 110) No. (%)	P-value	DS patients without CHDs (n = 66) No. (%)	P-value
Maternal age group (years)				
19–24	10 (9)		9 (14)	
25–29	10 (9)	0.19	4 (6)	0.25
30–34	19 (17)	0.25	7 (11)	0.12
35–39	22 (20)	0.07	17 (26)	0.21
40–49	49 (44)	0.03	29 (44)	0.10
Consanguinity degree				
First degree	8 (7)	0.12	6 (9)	0.25
Second degree	5 (5)	0.10	6 (9)	0.24
None	97 (88)		54 (82)	

Statistical significance at $P < 0.05$.

Table 3 Types of congenital heart diseases in patients with Down syndrome

Type of congenital heart disease	No. (n = 110)	%
Single heart defect	75	68
AVSD	33	30
VSD	19	17
ASD	8	7
PDA	7	6
TOF	4	4
CoA	1	1
MR	3	3
Combined heart defects	35	32
AVSD + PDA	10	9
AVSD + PS	4	4
AVSD + TOF	1	1
AVSD + VPR	1	1
VSD + ASD	4	4
VSD + ASD + PDA	1	1
VSD + PDA	6	5
VSD + PS	1	1
ASD + PDA	6	5
ASD + PS	1	1

ASD = atrial septal defect, AVSD = atrioventricular septal defect, CoA = coarctation of the aorta, PDA = patent ductus arteriosus, MR = mitral regurgitation, PS = pulmonary stenosis, TOF = tetralogy of Fallot, VPR = venous pulmonary return, VSD = ventricular septal defect.

Table 4 Distribution of atrioventricular septal defect and ventricular septal defect in the Down syndrome patients by sex

Congenital heart disease	No.	%	P-value
Atrioventricular septal defect			
Male	26	53	0.21
Female	23	47	0.10
Total	49	100	
Ventricular septal defect			
Male	18	58	0.09
Female	13	42	0.15
Total	31	100	

Consanguineous marriage is common in the Middle East and Arab countries, especially in small and rural areas. In the current study, the consanguinity rate among the parents of the Down syndrome patients with CHDs was 12%. This differs from the rate reported

in Saudi Arabia (57.8%) (24) and other countries. (25–29).

We found a statistically significant relationship between maternal age 40–49 years and Down syndrome with CHDs; however there was no significant difference with mothers \leq 39 years.

Our data differ from those reported in Korean and Lebanese studies; they found that mothers \geq 35 years old were more likely to give birth Down syndrome child with a CHD than infants with Down syndrome born to mothers who were $<$ 35 years of age (15,16).

The most common CHDs in our study were atrioventricular septal defect isolated or combined with other cardiac abnormalities, ventricular septal defect, atrial septal defect and patent ductus arteriosus. This is similar to findings of studies in Europe and the United States of America (12,13). However, atrial septal defect was the most common defect reported as in a Korean study (30.5%) (16). In Saudi Arabia, ventricular septal defect was the most common defect (14), while in Singapore patent foramen ovale predominated (30).

In the absence of newborn screening in Algeria, we could only draw patients from Down syndrome centres and the department of paediatrics of the university hospital. So our patients may not be representative of all Down syndrome patients and the prevalence found is only therefore an approximate figure.

Conclusion

This is the first study to document the types, distribution and frequency of CHDs in Algerian patients with Down syndrome. The most frequent CHD diagnosed was atrioventricular septal defect. High maternal age appears to be a risk factor for CHDs in Down syndrome patients in the Algeria population. The characteristics of CHDs in Down syndrome patients from Sétif are similar to those reported worldwide.

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Short communication

Evaluation of biomedical waste management in primary health care centres in Saudi Arabia: a knowledge, attitudes and practices study

L. Kalyan V. Reddy¹ and Fares Al Shammari¹

تقييم إدارة النفايات الطبية الحيوية في مراكز الرعاية الصحية الأولية في المملكة العربية السعودية: دراسة المعرفة والمواقف والممارسات

كابيلان فيسواناث ريدي، فارس الشمري

الخلاصة: يكتسي الوعي والمعرفة بممارسات التخلص من النفايات الطبية أهمية بالغة في أي سياق للرعاية الصحية. وتمثل الهدف من هذه الدراسة في الوقوف على معلومات واتجاهات وممارسات أصحاب المهن الصحية فيما يتصل بالنفايات الطبية في مراكز الرعاية الصحية الأولية في حائل بالمملكة العربية السعودية. وشملت الدراسة 135 من أصل 155 مهنيًا يتعاملون مع النفايات الطبية في 16 من أصل 26 مركزاً من مراكز الرعاية الصحية الأولية. وُجمعت البيانات باستخدام استبيان مهيكّل. وبوجه عام، سجل 54.8% و 48.9% و 49.6% من المشاركين درجات جيدة على مستوى المعلومات والاتجاهات والممارسات على التوالي. وظهر ارتباط ذو دلالة إحصائية بين المهنة والتعليم والعمر وبين مستوى المعلومات والاتجاهات والممارسات ($p < 0.01$): وسجل الأطباء، الحاصلون منهم على درجة علمية والمستجيبون الأكبر سناً، درجات أفضل على المقياس. وسُجل ارتباط قوي بين المعلومات والاتجاهات، والمعلومات والممارسات، والاتجاهات والممارسات ($p < 0.05$). ويوصى بالتدريب لتحسين معلومات المهنيين الذين يتعاملون مع النفايات الطبية الحيوية في مراكز الرعاية الصحية الأولية.

ABSTRACT Awareness and knowledge of biomedical waste practices is very important for any health care setting. This study aimed to determine the knowledge, attitudes and practices (KAP) about biomedical waste among health professionals in primary health care centres in Hail City, Saudi Arabia. The study included 135 of 155 professionals who dealt with biomedical waste from 16 out of 26 primary health care centres. Data were collected using a structured questionnaire. Overall 54.8%, 48.9% and 49.6% of the participants had good knowledge, attitudes and practices scores respectively. Profession, education and age were significantly associated with KAP level ($P < 0.01$): doctors, those with a degree and older respondents had better KAP scores. There was a strong correlation between knowledge and attitudes, knowledge and practices, and attitudes and practices ($P < 0.05$). Training is recommended to enhance the knowledge of the professionals dealing with biomedical waste in the primary health care centres.

Évaluation de la gestion des déchets biomédicaux dans les centres de soins de santé primaires en Arabie saoudite : étude sur les connaissances, attitudes et pratiques

RÉSUMÉ la prise de conscience et la connaissance des pratiques concernant les déchets biomédicaux sont très importantes pour tous les milieux de soins. La présente étude avait pour objectif de déterminer les connaissances, attitudes et pratiques concernant les déchets biomédicaux parmi les professionnels de la santé dans les centres de soins de santé primaires à Hail (Arabie saoudite). L'étude incluait 135 des 155 professionnels de la santé qui prenaient en charge des déchets biomédicaux dans 16 centres de soins de santé primaires sur 26. Les données ont été collectées au moyen d'un questionnaire structuré. Au total, 54,8 %, 48,9 % et 49,6 % des participants avaient des bons scores pour les connaissances, attitudes et pratiques respectivement. L'occupation, l'éducation et l'âge étaient significativement associés au niveau des connaissances, attitudes et pratiques ($p < 0,01$) : les médecins, les personnes diplômées et les répondants âgés avaient des meilleurs scores pour les connaissances, attitudes et pratiques. Il y avait une forte corrélation entre les connaissances et les attitudes, entre les connaissances et les pratiques ainsi qu'entre les attitudes et les pratiques ($p < 0,05$). Une formation est recommandée afin de promouvoir les connaissances des professionnels qui prennent en charge des déchets biomédicaux dans les centres de soins de santé primaires.

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Introduction

Biomedical waste poses a high risk not only to doctors, nurses, technicians and ancillary staff working in hospitals and health centres but also to patients, visitors, the community and the environment because of arbitrary management of such waste (1). A study conducted in a tertiary care hospital in Rajkot, India concluded that the lack of proper and complete knowledge about biomedical waste management affected practices of appropriate waste disposal (2). Another study concluded that there was a need to improve the knowledge, skills and competency of hospital staff by providing advanced facilities and on-job training in order to develop standard operating procedures for biomedical waste management (3). The lack of knowledge among nurses and multipurpose workers regarding segregation and colour coding of waste was highlighted in other research (4).

A lack of good knowledge, attitudes and practices (KAP) regarding safe segregation, collection, storage, treatment, transport and disposal of biomedical waste is one of the main reasons for the poor management of biomedical waste. In this context, we sought to evaluate the awareness of biomedical waste management among health professionals working in primary health care (PHC) centres in Hail City, Saudi Arabia. The specific objective of the study was to assess the KAP of the doctors, nurses and other professions (laboratory technicians and PHC managers) who dealt with biomedical waste and its management in the PHC centres.

Methods

This study was conducted from June to December 2015. A non-probability purposive sampling method was used to select professionals working in PHC centres in Hail City who dealt with biomedical waste and its management.

There are 26 PHCs in Hail City, of which 16 were selected based on simple random sampling. Of the 155 professionals working with biomedical waste and its management in the 16 PHCs, 135 agreed to participate (87% response rate).

Data were collected using a structured self-completed questionnaire developed by the investigators. Information was collected on: sociodemographic characteristics of the respondents; their KAP of biomedical waste; and suggested ways to improve biomedical waste practices in their PHC centre. The questionnaire was in both English and Arabic. Cronbach alpha was used to assess reliability (0.620).

For each KAP component, there were 10 items; if the respondent's score was 6 or more, he/she was categorized as having good knowledge, attitudes or practices and if the respondent's score was less than 6, he/she was categorized as having poor knowledge, attitudes or practices.

The data were coded and entered in SPSS, version 21.0 for analysis. The chi-squared test was used for to evaluate differences according to the variables of interest (sex, age, education and profession).

Approval to conduct the study was obtained from the Ministry of Health, Saudi Arabia (Log number 15-471E) and approval to conduct training and data collection was obtained from the Ministry of Health in Hail City. Informed consent was obtained from all the participants.

Results

Socioeconomic characteristics of the respondents: 51.1% of the respondents were women. Out of the 135 respondents, 54.8% were aged 26-35 years, 24.4% were 36-45 years, 17.8% were 46-55 years and 3% were 56 years and over. With regard to educational qualifications, 54.1% were degree holders,

while 45.9% had diploma certificates. With regard to profession, 51.9% were doctors and 48.1% were other health professionals such as nurses, laboratory technicians and PHC managers.

Table 1 shows the level of overall knowledge of the respondents and their knowledge according to demographic characteristic. Overall, 54.8% of the respondents were categorized as having good knowledge about biomedical waste management. The mean (standard deviation) score for overall knowledge was 3.89 (0.50).

There were statistically significant differences between those with good knowledge compared with poor knowledge related to biomedical waste management according to profession, education and age ($P < 0.001$). The results showed that 91.4% of the doctors had good knowledge of biomedical waste management compared with only 15.4% of the other professions (nurses, PHC managers and laboratory technicians); 91.9% of those with a degree had good knowledge compared with only 4.8% of those with a diploma; and over 90% of professionals aged 46 years and older had good knowledge compared with less than 52% of those under 46 years. There was no statistically significant difference in good knowledge according to sex.

Table 2 shows the overall attitudes of the respondents and their attitudes according to demographic characteristic. Overall, 48.9% of the respondents were categorized as having good attitudes about biomedical waste management. The mean (standard deviation) score for overall attitude was 3.84 (0.50).

There were statistically significant differences between those with good compared with poor attitudes related to biomedical waste management according to profession, education and age ($P < 0.001$, $P < 0.001$ and $P < 0.004$ respectively). The results showed that 84.3% of the doctors had good attitudes towards biomedical waste management

Table 1 Rating of knowledge according to demographic characteristics of the study sample

Demographic characteristic	Good knowledge ¹		Poor knowledge ¹		P-value
	No.	%	No.	%	
Sex					0.095
Male	41	62.1	25	37.9	
Female	33	47.8	36	52.2	
Age (years)					0.001
26–35	31	41.9	43	58.1	
36–45	17	51.5	16	48.5	
46–55	22	91.7	2	8.3	
≥ 56	4	100.0	0	0	
Education²					0.001
Degree	67	91.9	6	8.1	
Diploma	3	4.8	59	95.2	
Profession					0.001
Doctor	64	91.4	6	8.6	
Other professions ³	10	15.4	55	84.6	
Total	74	54.8	61	45.2	

¹Good knowledge: respondent score ≥ 6 out of 10 questions; poor knowledge: respondent score < 6 out of 10.

²Degree: respondents working in PHC with 3–4 years of tertiary education; Diploma: respondents working in PHC with 1–2 years post high-school education.

³Other professions were: nurses, laboratory technicians and primary health care (PHC) managers.

compared with only 10.8% of the other professions (nurses, PHC managers and laboratory technicians); 86.3% of those with a degree had good attitudes compared with only 4.8% of those with

a diploma; and over 75% of professionals aged 46 years and older had good attitudes compared with less than 43% of those under 46 years. There was no

statistically significant difference in good attitudes according to sex.

Table 3 shows the overall practices of the respondents and their practices, according to demographic characteristic.

Table 2 Rating of attitudes according to demographic characteristics of the study sample

Demographic characteristic	Good attitudes ¹		Poor attitudes ¹		P-value
	No.	%	No.	%	
Sex					0.550
Male	34	51.5	32	48.5	
Female	32	46.4	37	53.6	
Age (years)					0.004
26–35	30	40.5	44	59.5	
36–45	14	42.4	19	57.6	
46–55	18	75.0	6	25.0	
≥ 56	4	100.0	0	0.0	
Education²					0.001
Degree	63	86.3	10	13.7	
Diploma	3	4.8	59	95.2	
Profession					0.001
Doctor	59	84.3	11	15.7	
Other professions ³	7	10.8	58	89.2	
Total	66	48.9	69	51.1	

¹Good attitudes: respondent score ≥ 6 out of 10 questions; poor attitudes: respondent score < 6 out of 10.

²Degree: respondents working in PHC with 3–4 years of tertiary education; Diploma: respondents working in PHC with 1–2 years post high-school education.

³Other professions were: nurses, laboratory technicians and primary health care (PHC) managers.

Table 3 Rating of practices according to demographic characteristics of the study sample

Demographic characteristic	Good practices ¹		Poor practices ¹		P-value
	No.	%	No.	%	
Sex					0.440
Male	35	53.0	31	47.0	
Female	32	46.4	37	53.6	
Age (years)					0.013
26–35	30	40.5	44	59.5	
36–45	16	48.5	17	51.5	
46–55	17	70.8	7	29.2	
≥ 56	4	100.0	0	0.0	
Education²					0.001
Degree	64	87.7	9	12.3	
Diploma	3	4.8	59	95.2	
Profession					0.001
Doctor	61	87.1	9	12.9	
Other professions ³	6	9.2	59	90.8	
Total	67	49.6	68	50.4	

¹Good practices: respondent score ≥ 6 out of 10; poor practices: respondent score < 6 out of 10.
²Degree: respondents working in PHC with 3–4 years of tertiary education; Diploma: respondents working in PHC with 1–2 years post high-school education.
³Other professions were: nurses, laboratory technicians and primary health care (PHC) managers.

Overall, 49.6% of the respondents were categorized as having good practices about biomedical waste management. The mean (standard deviation) score for overall practice was 3.82 (0.50).

There were statistically significant differences between those with good compared with poor practices related to biomedical waste management according to profession, education and age ($P < 0.001$, < 0.001 and 0.013 respectively). The results showed that 87.1% of the doctors had good attitudes towards biomedical waste management compared with only 9.2% of the other professions (nurses, PHC managers and laboratory technicians); 87.7% of those with a degree had good practices compared with only 4.8% of those with a diploma; and over 70% of professionals aged 46 years and older had good practices compared with less than 50% of those under 46 years. There was no statistically significant difference in good practices, according to sex.

There was a strong correlation between knowledge and attitudes, knowledge and practices, and attitudes and practices ($r = 0.769$, 0.723 and 0.837 respectively, $P < 0.05$).

Discussion

The results of our study show that there were highly significant differences in overall knowledge, attitudes and practices of the respondents in relation to their educational level and profession. A study conducted in Lucknow in India found that a greater proportion of doctors had high knowledge levels and positive attitudes towards biomedical waste management than nurses (5). A study in Nainital, India concluded that for effective implementation of biomedical waste management practices every hospital needed mandatory periodic sensitization and continuous training programmes, especially focusing

on the paramedical staff (6). A study undertaken using the Kayakalp assessment tool found that poor knowledge on segregation and collection of waste put at risk all health professionals as well as the patients visiting the hospital for treatment. This study concluded that unsafe disposal or improper disposal could adversely affect the community and environment (7).

We found that there was a positive correlation between knowledge and attitudes, knowledge and practices, and attitudes and practices. Training plays important role in enhancing knowledge of professionals dealing with biomedical and this will help to improve attitudes towards biomedical waste and in turn will result the best biomedical waste practices in the PHCs.

Although this study had a limited sample size, we believe it provides useful information on the KAP regarding biomedical waste practices among professionals in PHCs in Hail City. Our results suggest that there is a need for training for all PHC staff on biomedical waste not just the people who are dealing with biomedical; waste.

Conclusion

There is a need for frequent training programmes in all PHCs for all staff about biomedical waste management. The Saudi Arabian Ministry of Health should develop a separate biomedical waste manual exclusively for the country which includes biomedical waste policies and procedures for hospitals and PHCs. **Funding:** This study was funded by King Abdulaziz City for Science and Technology (KACST), Kingdom of Saudi Arabia (Grant number: LGP-35-93). **Competing interests:** None declared.

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WHO events addressing public health priorities

Good governance for medicines for Phase II countries in the Eastern Mediterranean Region¹

The WHO Good Governance for Medicines (GGM) programme was launched in 2004 and extends to 16 countries from the WHO Eastern Mediterranean Region (1). The overall objectives of the programme are to improve good governance, prevent corruption in the pharmaceutical sector and contribute to health systems strengthening in countries. This is facilitated by focusing on the formulation and implementation of appropriate policies and procedures that ensure the effective, efficient, ethical, transparent and accountable management of pharmaceutical systems (2).

The GGM programme is implemented through a model three-step process, starting with a national transparency assessment that identifies vulnerabilities to corruption. The second phase includes a nationwide consultation on outcomes of assessment and generation of a framework that sets out the vision for good governance in the country's pharmaceutical sector. The final phase is the implementation of the framework with a long-term action plan that addresses the eight elements of good governance (2).

To support this aim, an intercountry meeting on the GGM programme for Phase II countries² in the Eastern Mediterranean Region was hosted by the WHO Regional Office for the Eastern Mediterranean (WHO/EMRO) from 25 to 27 October 2016 in Cairo, Egypt. The meeting was attended by 37 participants from eight countries of the Region, namely Afghanistan, Egypt, Islamic Republic of Iran, Oman, Pakistan, Palestine, Sudan and Tunisia, along with regional and international experts, and staff from WHO/EMRO, WHO country offices and WHO headquarters (3).

The objectives of the meeting were to:

- share progress made in development of the national framework for GGM within countries of the Region;
- develop an understanding of common gaps in governance;
- exchange experience in establishment of national frameworks; and
- develop a GGM plan of action up to 31 December.

Conclusions

The meeting was participatory in nature to allow for maximum interaction between country groups. The overall purpose was to facilitate cross-country learning and share country experiences in developing national GGM frameworks. Country progress reports on the development of national frameworks for GGM included:

- creation of GGM task forces or committees;
- delivery of workshops to disseminate assessment findings and raise awareness of good governance in the pharmaceutical sector;
- increased political will to implement GGM programmes;
- collaboration between various stakeholders, such as ministries of health, national anti-corruption commissions, non-governmental organizations, and the private sector;
- implementation of assessment recommendations;
- increased promotion of individual and institutional integrity in the pharmaceutical sector; and
- increased transparency and accountability in medicine regulatory and supply systems.

Outcomes of national assessments from participating countries showed significant similarities in strengths and weaknesses in their pharmaceutical systems. The main challenges faced in implementation of the GGM programmes included: scarcity of financial and human resources, high turnover of officials, and weak civil society engagement. Some of the countries also face political instability.

Throughout the workshop, the need was highlighted for effective anti-corruption legislations, a whistle-blowing mechanism, a conflict of interest policy, transparent and accountable regulations and administrative procedures, collaboration with anticorruption and transparency initiatives, engagement of civil societies and promotion of moral leadership. Participants defined those activities required to manage conflicts of interest, including:

¹ This report is extracted from the Summary report on the Intercountry Meeting on Good Governance for Medicines for Phase II Countries in the Eastern Mediterranean Region, Cairo, Egypt, 27–25 October 2016 (<http://apps.who.int/medicinedocs/documents/s22282en/s22282en.pdf>, accessed 13 August 2017).

² Phase II countries are: Afghanistan, Egypt, Islamic Republic of Iran, Kuwait, Pakistan, Palestine, Sudan and Tunisia.

- development and disclosure of a conflict of interest policy;
- development of regulations for conflict of interest management to enable sanctions and enforcement;
- creation of an independent committee for handling conflicts of interest;
- declaration of the composition of technical committees;
- selection of members on merit and expertise;
- preparation of terms of reference for each committee, including time-limited services, training of committee members in the code of conduct and conflict of interest policy; and
- establishment of a regular monitoring process to ensure implementation of the conflict of interest policy.

In addition, it was agreed that the application of the GGM framework should be closely monitored and assessed regularly to ensure its proper implementation.

Recommendations

1. Member States should develop their own clear GGM vision and ensure that this vision is linked to wider governmental action and to maximum engagement with other partners.
2. Member States should carry out a sustainability assessment for their national GGM programme.
3. Member States should share with WHO the technical support they need to accelerate the signing-off by ministers of health for assessment reports and GGM frameworks, and for the development, endorsement and implementation of those frameworks.
4. GGM taskforces or committees should obtain rapid approval for reports and action plans.

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