

Bloodborne infections among student voluntary blood donors in Mansoura University, Egypt

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العدوى المنقولة بالدم لدى الطلاب المتبرعين بالدم في جامعة المنصورة، بمصر
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الخلاصة: أُجريت هذه الدراسة الاستيعادية على الطلاب المتبرعين بالدم في جامعة المنصورة، بمصر. وقد تم في إطارها اختبار عينات من المصل لتحريّ المستضدات السطحية لالتهاب الكبد "بي"، وأضداد فيروس الإيدز من النمط الأول ومن النمط الثاني، والزهري. وبيّنت الدراسة أن 7% من الطلاب كانوا مصابين بمرض واحد على الأقل من الأمراض التي تم تحريّها. وبلغ معدل انتشار المستضدات السطحية لالتهاب الكبد "بي" 4.3%، وأضداد فيروس التهاب الكبد "سي" 2.7%، وأضداد فيروس الإيدز من النمط الأول صفر.، وأضداد فيروس الإيدز من النمط الثاني 0.05%. وكان عدد الذكور الإيجابيين للمستضدات السطحية لالتهاب الكبد "بي" أكبر بدرجة مهمة إحصائياً من عدد الإناث. وكانت أضداد فيروس التهاب الكبد "سي" أعلى بدرجة يُعتدُّ بها إحصائياً بين الطلاب الريفيين بالمقارنة مع الحضريين. وخلصت الدراسة إلى أن المتبرعين طوعية بالدم يشكّلون مصدراً جيداً للدم المأمون. ويمكن بالانتقاء السليم للمتبرعين تقليل عدد وحدات الدم التي يتم التخلص منها إلى أقل حد ممكن.

ABSTRACT We carried out a retrospective study on student voluntary blood donors in Mansoura University, Egypt. Serum samples were tested for HBsAg, anti-HCV, anti-HIV-1 and anti-HIV-2 as well as syphilis. About 7% of students had ≥ 1 of the diseases tested for. Prevalence of HBsAg, anti-HCV, anti-HIV-1 and anti-HIV-2, and syphilis were 4.3%, 2.7%, 0.0% and 0.05% respectively. Significantly more males than females tested positive for HBsAg. Anti-HCV was significantly higher among rural than urban students. Volunteer student donors are a good source of safe blood. With proper selection of donors, the number of blood units discarded can be minimized.

Les infections transmises par le sang chez des étudiants donneurs de sang volontaires à l'Université de Mansoura (Égypte)

RÉSUMÉ Nous avons réalisé une étude rétrospective chez des étudiants donneurs de sang volontaires à l'Université de Mansoura (Égypte). Les échantillons de sérum ont été testés à la recherche de l'Ag HBs, d'anticorps anti-VHC, anti-VIH 1 et anti-VIH 2 ainsi que pour la syphilis. Environ 7 % des étudiants ont été testés pour une ou plusieurs de ces infections. La prévalence de l'Ag HBs, des anticorps anti-VHC, anti-VIH 1 et anti-VIH 2 et de la syphilis s'élevait à 4,3 %, 2,7 %, 0,0 % and 0,05 % respectivement. Un nombre significativement plus important d'hommes que de femmes a eu un test positif pour l'Ag HBs. Les anticorps anti-VHC étaient significativement plus élevés chez les étudiants ruraux que chez les étudiants urbains. Les étudiants donneurs volontaires constituent une bonne source de sang sain. Une sélection appropriée des donneurs permet de minimiser le nombre d'unités de sang éliminées.

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Introduction

Previously, blood banking services in Egypt were hospital-based and most hospitals derived blood from relatives and friends of patients (replacement donors), and rather infrequently from volunteer donors. Nowadays, however, Egypt has a network of regional blood centres, including one in Mansoura, coordinated by a national centre in Cairo run by the Ministry of Health and Population. Blood donation drives are frequently conducted in educational institutions, especially universities.

A volunteer donor pool has been found to be the safest source of blood worldwide, and this is endorsed by the World Health Organization [1,2]. In recent years there have been increased public health concerns regarding the safety of blood transfusion with respect to transfusion-associated infections, mainly hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). The battery of screening tests conducted on donor blood has substantially reduced the risk of transfusion-transmitted diseases, although it has increased the cost of providing safe blood [3].

HBV and HCV are bloodborne hepatotropic viruses and are the major causes of chronic liver disease worldwide, particularly cirrhosis and hepatocellular carcinoma [4]. HIV-1 is the most prevalent HIV type throughout the world. HIV-2 has been found primarily in West Africa [5].

Few reports have been published on the prevalence of HBV, HCV, HIV and syphilis infection among students who are voluntary blood donors in Egypt. The aim of our study was to determine the current prevalence of these bloodborne infections among student donors. They represent the younger, educated generation and would be expected to have lower prevalence of such infections than older members of the population.

Methods

Blood donation campaigns are carried out annually among university students. We carried out a retrospective, record-based study during the academic year 2002–03 among students at Mansoura University, Egypt. Age range was 17–24 years. Students were briefed about the benefits of blood donation as well as eligibility to donate blood. Criteria for exclusion of donors were: age < 17 years; history of jaundice, recent fever or chronic disease; anaemia; weight < 50 kg; engagement in high-risk behaviour (e.g. homosexuality, intravenous drug abuse); being immunocompromised; and blood donation within the past 6 months.

Volunteer blood donors were carefully selected after complete history taking and physical examination to assess eligibility and to ensure that the donor would not be negatively affected, e.g. become anaemic. The donated units of blood were screened and were discarded if positive for any test.

Serum samples were tested for viral markers using commercially-available enzyme-linked immunosorbent assays for hepatitis-B surface antigen (HBsAg), anti-HCV, anti-HIV-1 and anti-HIV-2 (Abbott Inc., North Chicago), and also for syphilis by the Wasserman test. Serologic tests were performed in the laboratory of the Regional Blood Bank in Mansoura according to the manufacturers' instructions.

The following data were abstracted from the donors' records: age, sex, residence, blood group and Rh type, and the results of the serologic screening tests. Apart from 8, all students were first time donors. No data were available regarding their hepatitis B vaccination status.

Data were analysed using *SPSS*, version 10. Chi-squared and Fisher exact tests were used for comparison between groups

as appropriate; $P \leq 0.05$ was considered statistically significant.

Results

Of the 2157 student blood donors whose records were examined, 149 (6.9%) had ≥ 1 bloodborne infection (Table 1); 3 tested positive for both hepatitis B and hepatitis C infections.

Frequency of HBsAg was significantly greater among males than females ($P = 0.018$). There was no significant difference with regard to residence, blood group or Rh type. Frequency of anti-HCV was significantly greater among rural than urban students ($P = 0.001$) and among Rh positive than Rh negative students ($P = 0.047$), but there was no significant variation with sex or blood group (Table 2).

Discussion

Blood transfusion has life-saving benefits, but also carries risks. Currently, prevention of transfusion-associated infection depends upon proper, pre-donation selection

of donors, followed by serologic testing for infectious pathogens, including HBV, HCV and HIV.

This study was carried out on volunteer university student blood donors. Application of eligibility criteria excluded those belonging to high-risk groups and those with chronic diseases. Thus, our findings are peculiar to low-risk, healthy students and cannot be generalized, either to other groups of blood donors or to the general community.

HBsAg is the oldest marker for viral hepatitis. The prevalence of HBsAg in this study was 4.3%. This group of students was most probably not vaccinated against hepatitis B virus; at the time of their birth, the vaccine was not included in the Expanded Programme of Immunization in Egypt. Much lower rates (0.4% and 1.2%) have previously been reported among Egyptian blood donors [4,6]. In Saudi Arabian studies, the rate ranged from 1.4% to 3.27% [4,7,8]. A much higher rate, 9.8%, has been reported in Yemeni blood donors [9].

The higher prevalence of HBsAg in males than females could possibly be a result of greater exposure to infection, e.g. through the common use of razors and toothbrushes and shaving at barber shops.

HCV is transmitted primarily through transfusion of blood or blood products, intravenous drug abuse and needle sharing. Other routes of HCV transmission have also been implicated (sexual, vertical and household contacts) which may account for a proportion of the sporadic cases associated with this agent [10]. It is not as infectious as HBV, but up to 80% of infected individuals can become chronically infected and risk serious long-term sequelae, including cirrhosis, liver failure and hepatocellular carcinoma [11].

We found that 2.7% of the blood donors whose records we studied were positive for

Table 1 Overall prevalence of bloodborne infections among student blood donors ($n = 2157$)

Test	Positive	
	No.	%
HBsAg	93	4.31
Anti-HCV	58	2.69
Wasserman test	1	0.05
Anti-HIV 1 & 2	0	–
Total ^a	149	6.91

^a3 students were positive for both HBsAg and anti-HCV.

HBsAg = hepatitis B surface antigen.

HCV = hepatitis C virus.

HIV = human immunodeficiency virus.

Table 2 Variation of HBsAg and anti-HCV among student blood donors (*n* = 2157)

Characteristic	Total		HBsAg		Test of significance	Anti-HCV		Test of significance
	No.	%	No.	%		No.	%	
<i>Residence</i>								
Urban	1362	63.1	52	3.8	$\chi^2 = 2.18$ <i>P</i> = 0.14	25	1.8	$\chi^2 = 10.3$ <i>P</i> = 0.001
Rural	795	36.9	41	5.2		33	4.2	
<i>Sex</i>								
Male	1350	62.6	69	5.1	$\chi^2 = 5.6$ <i>P</i> = 0.018	38	2.8	$\chi^2 = 0.22$ <i>P</i> = 0.6
Female	807	37.4	24	3.0		20	2.5	
<i>Blood group</i>								
A	790	36.6	27	3.4	$\chi^2 = 4.4$ <i>P</i> = 0.22	23	2.9	$\chi^2 = 1.6$ <i>P</i> = 0.65
B	494	22.9	19	3.8		16	3.2	
AB	204	9.5	12	5.9		4	2.0	
O	669	31.0	35	5.2		15	2.2	
<i>Rh type</i>								
Rh positive	2027	94.0	89	4.4	$\chi^2 = 0.5$ <i>P</i> = 0.48	58	2.9	<i>P</i> = 0.047 ^a
Rh negative	130	6.0	4	3.1		0	0.0	
<i>Total</i>	2157	100.0	93	4.3		58	2.7	

HBsAg = hepatitis B surface antigen.

HCV = hepatitis C virus.

^aFisher exact test.

anti-HCV. Much higher rates have been reported in Egyptian blood donors, ranging from 8.1% up to 27% [4,6,12,13]. The low prevalence in this selected group of students may be attributed to their young age. They may also have had greater awareness of the potential modes of transmission of HCV.

In some other countries, however, much lower rates have been reported among blood donors: 0%–2% in Saudi Arabia [4,7–9,14], 1.2% in the Libyan Arab Jamahiriya [15], 2% in Sudanese and Syrian nationals working in Saudi Arabia [14], 2% in Yemen [9], 0.9% in Namibia [16] and < 1% in the United States of America (USA) and Europe [17,18].

Anti-HCV was more prevalent in rural than urban students. A similar finding has been reported previously [12].

In the USA and in Europe, anti-HCV has been detected in 1%–2% of the general population [17–19]. In Egypt, prevalence of

anti-HCV in the general population is high, ranging from 10% to 33% [13,20–23], a phenomenon that may be attributed to the endemicity of schistosomiasis. In the most highly endemic areas of the world, e.g. Egypt, HCV infection is prevalent among persons older than 40 years and lower among those younger than 20 years [12,20,23,24]. This cohort effect suggests a time-restricted exposure, which in many instances appears to have been related to a medical procedure, parenteral antischistosomal therapy, which was widely practised in Egypt during the 1960s [25].

Traditional practices such as tattooing and acupuncture with non-sterilized needles were also identified as likely modes of transmission [25].

Only 1 donor was positive for syphilis by the Wasserman test. None of the donors was positive for HIV-1 and HIV-2. Similar findings were reported in Saudi

Arabia [4,7,26,27]. In an Islamic country like Egypt, religion, culture and tradition prohibit certain risky behaviours such as extra-marital sexual activities and drug abuse. Additionally, students belonging to high-risk groups are more likely to abstain from blood donation because of the eligibility criteria applied. The national AIDS programme of Egypt reports that at the end of December 2003, 1838 cases of HIV/AIDS had been reported to the Ministry of Health and Population [28]. This figure differs somewhat from the estimate of 8000 HIV-positive individuals by the Joint United Nations Programme on HIV and AIDS (UNAIDS) at the end of 2001 [28].

HIV infection is a major public health problem in sub-Saharan Africa where prevalence of HIV among blood donors ranges between 2% and 20% in Kenya [29] and is 5.9% in Ethiopia [30]. Unlike in sub-Saharan Africa, HIV/AIDS is still uncommon in Egypt: the World Health

Organization estimates a rate of 0.15% among the total population. It is still seen as a "foreign disease" brought to Egypt by tourists. Egypt is not at present considered at risk because of the conservative attitudes towards sex among Muslims and Coptic Christians [31,32]. Only 0.04% of 16 559 voluntarily-tested Egyptians were positive for HIV during the year 2000, and most of them were linked to tourism [33]. About a quarter of reported HIV cases in Egypt, however, were infected in a hospital setting, especially in haemodialysis centres [34].

In conclusion, this study revealed that the overall prevalence of HBsAg, anti-HCV, anti-HIV and syphilis in university student blood donors is low compared to the national figures. With proper selection of donors, university students can be an important source of blood to replenish blood banks with safe blood. Blood donation campaigns should be more actively promoted among these students.

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World Blood Donor Day 2006

As every year, World Blood Donor Day was commemorated on 14 June 2006 in a global celebration of the millions of people throughout the world who give their blood on a voluntary, unpaid basis to save the lives of those in need. World Blood Donor Day aims to raise awareness of the need for safe blood, to thank and honour those blood donors who make transfusion possible and to encourage regular blood donation by suitable donors. Further information on blood transfusion safety can be found at: <http://www.who.int/bloodsafety/en/>

