

Prevalence of hepatitis B and C among students of health colleges in Saudi Arabia

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معدل انتشار الالتهاب الكبدي «بي» و«سي» بين طلبة الكليات الصحية في المملكة العربية السعودية عبد الرحمن بن صالح العجلان

الخلاصة: قامت هذه الدراسة بتحديد معدل انتشار المستضد السطحي لفيروس الالتهاب الكبدي «بي»، وأضداد فيروس الالتهاب الكبدي «سي» بين طلبة الكليات الصحية في المملكة العربية السعودية من عام 2000 حتى عام 2007. وُجِّعَت المعطيات من سجلات الطلبة. وأدرج في الدراسة إجمالاً 16570 من الطلاب (9852 طالباً و6718 طالبة)، بلغ متوسط أعمارهم 21 سنة، وجرى تقسيمهم إلى مجموعتين عمريتين هما 18-21 سنة و22-30 سنة. وجرى تسجيل محل الإقامة (في الحضر أو الريف). وقد كان معدل انتشار المستضد السطحي لفيروس الالتهاب الكبدي «بي» بين الطلاب 0.17% وبين الطالبات 0.78% في الفئة العمرية 18-21 سنة، في حين بلغ 0.39% بين الطلاب و0.90% بين الطالبات في الفئة العمرية 22-30 سنة. وكان معدل انتشار أضداد فيروس الالتهاب الكبدي «سي» 0.03% بين الطلاب و0.07% بين الطالبات في الفئة العمرية 18-21 سنة، وكان 0.31% بين الطلاب و0.40% بين الطالبات في الفئة العمرية 22-30 سنة. وكانت هناك علاقة يُعَدُّها إحصائياً بين العمر وبين الخلفية الريفية أو الحضرية وبين إيجابية المستضد السطحي لفيروس الالتهاب الكبدي «بي» وأضداد فيروس الالتهاب الكبدي «سي» ($P > 0.005$).

ABSTRACT This study determined the prevalence of hepatitis B surface antigen (HBsAg) and antibody to hepatitis C virus (anti-HCV) among students at health colleges in Saudi Arabia from 2000 to 2007. Data were obtained from student records. A total of 16 570 (9852 male and 6718 female) students were included. Their mean age was 21 years and they were divided in 2 age groups of 18–21 and 22–30 years. Residence (rural or urban) was recorded. The prevalence of HBsAg for males and females was 0.17% and 0.78% respectively in the 18–21-year-olds and 0.39% and 0.90% in the 22–30-year-olds. The prevalence of anti-HCV for males and females was 0.03% and 0.07% respectively in the 18–21-year-olds and 0.31% and 0.40% in the 22–30-year-olds. There was a statistically significant relationship between age and rural/urban background and HBsAg and anti-HCV positivity ($P < 0.005$).

Prévalence de l'hépatite B et C chez des étudiants en faculté de santé en Arabie saoudite

RÉSUMÉ La présente étude a déterminé la prévalence de l'antigène de surface de l'hépatite B (HBsAg) et des anticorps du virus de l'hépatite C chez des étudiants en faculté de santé en Arabie saoudite entre 2000 et 2007. Les données ont été collectées à partir des dossiers des étudiants. Au total, 16 570 étudiants (9852 hommes et 6718 femmes) ont participé à l'étude. Leur âge moyen était de 21 ans et ils ont été répartis dans deux groupes d'âge de 18 à 21 ans et de 22 à 30 ans. Le lieu de résidence, rural ou urbain, a été noté. La prévalence de l'antigène de surface de l'hépatite B chez les hommes et les femmes était de 0,17 % et 0,78 % respectivement dans la tranche d'âge de 18 à 21 ans et de 0,39 % et 0,90 % dans la tranche d'âge de 22 à 30 ans. La prévalence des anticorps du virus de l'hépatite C chez les hommes et les femmes était de 0,03 % et 0,07 % respectivement dans la tranche d'âge de 18 à 21 ans et de 0,31 % et 0,40 % dans la tranche d'âge de 22 à 30 ans. Un lien statistiquement significatif a été établi entre l'âge, l'origine rurale ou urbaine, et la positivité de l'antigène de surface de l'hépatite B ou des anticorps du virus de l'hépatite C ($P < 0,005$).

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Introduction

Approximately 350 million people are infected by Hepatitis B virus (HBV) globally. A large number become positive for hepatitis B surface antigen (HB_sAg) but they remain asymptomatic. They are known as silent carriers of HBV [1] and may act as a source of transmission of hepatitis B. In high and moderate prevalence zones of HBV, like South Asia and the Middle East, many silent carriers are young people [2,3].

The prevalence of HBV has declined considerably in Saudi Arabia since the introduction of immunization in 1989. According to one study, it fell from 7% in 1989 to 0.3% in 1997 [4]. A study 8 years after the introduction of hepatitis B vaccination reported seroconversion of 77% in children vaccinated at birth and 71% in those vaccinated at school entry [5]. Jaber reported in 2006 [6] that 98% of schoolchildren in Jeddah, Saudi Arabia were covered by HBV vaccination; however 14% of students tested negative for anti-HB_s antibodies, suggesting that the efficacy of HBV vaccination is diminishing with increasing age [6]. It has been reported that the prevalence of HBV among blood donors in Saudi Arabia decreased from 2.7% in 1993 to 0.28% in 2003 [4,7,8].

Hepatitis C virus (HCV) infection affects around 170 million people worldwide [3,4,9]. The prevalence of hepatitis C is lower than hepatitis B but in certain regions, for example Egypt, the prevalence of hepatitis C is much higher than hepatitis B [10–12]. Carriers of hepatitis C have antibodies to the virus (anti-HCV). Although the number of HCV carriers is small compared to the total number of people infected with HCV, they can still transmit the virus [11,12].

The prevalence of HBV varies significantly across the world, being the lowest in Western European countries and the United States with a range of 0.1%–2.4% and highest in Africa with a range of 2.2%–22.6% [13–21]. It has

been observed that hepatitis B is more prevalent among the young population compared to hepatitis C [22].

Many studies have been carried out in Saudi Arabia on the prevalence of hepatitis B among children in the age group 1–10 years, and hepatitis B and C among the general population and healthy blood donors [4,5,11,12,23–28], but none has targeted college and university students. However, the prevalence of HBV and HCV in college students may give an indication of the effectiveness of the measures and the prophylactic programmes applied to younger age groups. Therefore, this study concentrated on the determining the prevalence of hepatitis B and C among students admitted to the health colleges of Saudi Arabia.

Methods

Data were collected from the files of newly admitted students (freshmen) from the colleges and health institutes located in different regions of Saudi Arabia. Thus 9852 male and 6718 female students (total 16 570) admitted to 12 male and 17 female health colleges and institutes from 2000 to 2007 were included in the study. Data on students' age, place of birth, rural or urban background, and the results of serological testing done for hepatic B and C at the time of admission were retrieved from the files of students at the colleges. As a policy in Saudi Arabia all new students admitted to health colleges have undergo a thorough medical check-up and serological testing for HB_sAg, anti-HCV and anti-HIV. All the serological tests for HB_sAg and anti-HCV tests are done with second and third generation ELISA kits (Roche laboratories).

Students who test positive for either hepatitis B or C are admitted only onto courses, such as administration or pharmacy, where they will not come in direct contact with patients.

Ethical issues

Each student was given a leaflet explaining the purpose of the research and stating that all the names and personal data would be decoded and participation was voluntary. Written consent was obtained from every student; 11 students declined to participate.

Statistical analysis

Regression analysis was carried out, with age group/residential background (urban/rural) as independent variables and HB_sAg/Anti-HCV status as dependent variables. The regression coefficient and 95% confidence intervals are presented. The *z* test was applied to compare the sex ratio of male and female positive cases for HB_sAg and anti-HCV.

Results

The total number male and female students admitted during the period was 9852 and 6718 respectively, in spite of the fact more female colleges (17) were included than male colleges (12).

The mean age of male students was 21.1 years and of females was 21.3 years. The students were divided into 2 age groups: 18–21 years and 22–30 years. There were 6268 (63.6%) male and 4486 (66.8%) female students in the 18–21-year-old age group, and 3584 (36.4%) male and 2232 (33.2%) female students in the 22–30-year-old age group.

Table 1 shows the distribution of the HBV- and HCV-positive students by sex and age group. There were significantly higher proportions of HB_sAg-positive and anti-HCV-positive cases in the 22–30-year-old age group than the younger age group for both males and females ($P < 0.005$).

Furthermore, a significantly greater proportion of female students were positive in both age groups and for both markers of HB_sAg and anti-HCV compared to males ($P < 0.001$) (Table 1).

Regression analysis demonstrated a declining trend of HB_sAg carrier state in

Table 1 Distribution of HB_sAg and Anti-HCV positive cases by age group and sex

Hepatitis marker	Age group (years)							
	18-21				22-30			
	Males (n = 6268)		Females (n = 4486)		Males (n = 3584)		Females (n = 2232)	
	No.	%	No.	%	No.	%	No.	%
HB _s Ag	11	0.17	35	0.78	14	0.39	20	0.90
Anti-HCV	2	0.03	3	0.07	11	0.31	9	0.40

HB_sAg = hepatitis B surface antigen.

HCV = hepatitis C virus.

the younger age group. Among males and females, 0.17% and 0.78% respectively were HB_sAg-positive in the 18–21-year-old age groups, while 0.39% and 0.90% respectively were HB_sAg-positive in the 22–30 year-old age group. The proportion of anti-HCV positive cases was higher in the older age group of 22–30 years. There was no significant difference in the proportion of anti-HCV positive cases between males and females.

Table 2 shows the distribution of hepatitis B and C positive cases by sex and urban or rural background. Data were missing for 3 males and 5 females positive for HB_sAg and 1 female anti-HCV positive about their place of origin. The proportion of cases positive for hepatitis B and C among males was significantly higher in students from rural background compared to urban ($P < 0.001$). The proportion of female students positive for hepatitis B did not differ significantly by background ($P < 0.004$), but the proportion of hepatitis C-positive females students from rural background (58.3%) was almost double that of hepatitis C-positive females students from urban areas (33.3%) ($P < 0.001$).

Discussion

The present study was carried out with the same method as the previous ones from Saudi Arabia, Italy, Taiwan, Poland and Egypt [4,13–16,20,21]. The mean age for males and females was almost the same (about 21 years) so we divided the students in two study groups of 18–21 years and 22–30 years. The percentage of male students in the older age group of 22–30 years was higher than female students, possibly because women are married at a much younger age in Saudi Arabia and only a few join college at a later age.

The present study shows that the prevalence of hepatitis B and C markers in both sexes among the students admitted in the health colleges and institutes in Saudi Arabia is lower than the general population (1.4% for hepatitis B and over 1.5% for hepatitis C) [28].

The correlation with age and positivity for HB_sAg and anti-HCV in our study is similar to other studies carried out in different parts of the world [13,15,16]. Although the vaccination programme against hepatitis B in Saudi Arabia is quite comprehensive, it has been observed that seronegativity for anti-HB_s

increases with age. The higher number of HB_sAg-positive cases in the older age group (22–30 years) in the present study suggests that the older students entered school before 1990, when the hepatitis B immunization was first introduced at the school entry level, and they were not covered under the Expanded Programme on Immunization (EPI). A study carried out by Al Faleh et al. [5] assessed the efficacy of hepatitis B vaccination 8 years after EPI was launched but the test for anti-HB_s and its titre was not included in the panel of screening tests for the newly admitted students or for the general population. No records were available in the college files about the vaccination status of the students and results of anti-HB_s so the efficacy of hepatitis B vaccination in the student population could not be assessed.

The higher prevalence of hepatitis B carrier state in the female students compared to the male students in our study is in contrast to the findings of Su et al. [15]. Due to some sociocultural factors of Saudi society, the girls may not have benefited properly from the anti-hepatitis B vaccination programme.

Saudi Arabia is considerate to have a moderate to low prevalence of hepatitis

Table 2 Distribution of HB_sAg and Anti-HCV positive students by place of origin and sex

Hepatitis marker	Urban				Rural			
	Males		Females		Males		Females	
	No.	%	No.	%	No.	%	No.	%
HB _s Ag (M = 25, F = 55)	8	32.0	26	47.3	14	56.0	24	43.6
Anti-HCV (M = 13, F = 12)	5	38.5	4	33.3	7	53.8	7	58.3

Data on place of origin were missing for 3 males and 5 females positive for HB_sAg and 1 female anti-HCV positive.

M = male; F = female; HB_sAg = hepatitis B surface antigen; HCV = hepatitis C virus.

B and C [27,28]. The present study corresponds well with all the previous studies, which show that the prevalence of hepatitis C increases with the advancing age [13,14,27].

The declining trend of hepatitis B in the Saudi population is attributed to the growing literacy rate, improving housing and hygienic conditions.

In contrast to previous reports from Saudi Arabia [5], the relationship

shown for place of origin (rural or urban) with HBV and HCV infection is quite strong in the present study. More HBsAg-positive cases were from rural areas suggesting of poorer vaccination coverage of the rural population. The higher prevalence of anti-HCV in students from a rural background is similar to the findings of El-Gilany et al. from Egypt [21], the country that reports the highest prevalence of hepatitis C in the world [27].

The present study shows very low prevalence of hepatitis B and C carrier state among the students of health colleges and institutes in Saudi Arabia. It is recommended that screening of anti-hepatitis B core antigen (HB_c) be included in the screening profile of newly admitted students in order to detect occult cases of HBV that show negative HBsAg and anti-HB_s and to assess immunization status and the efficacy of the vaccination against hepatitis B.

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