



Medical students' awareness of and compliance with the hepatitis B vaccine in a tertiary care academic hospital: An epidemiological study

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KEYWORDS

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Summary

Background: The hepatitis B virus (HBV) poses a health risk to healthcare workers who are in close proximity to infected individuals. Medical students are a particularly high-risk group due to the lack of an obligatory vaccination program and a post-vaccination screening program to determine immunity status, which results in a lack of awareness of and compliance with the HBV vaccine.

Methods: This cross-sectional survey was conducted in King Khalid University Hospital (KKUH), a tertiary care academic hospital in Riyadh, Saudi Arabia, from November 2013 to March 2014. Medical students in their second to fifth years ($n = 444$; 213 men and 231 women) completed a self-administered questionnaire regarding awareness of HBV and compliance with the HBV vaccination program in KKUH.

Results: Medium to low knowledge levels were present in 53.5% of the participants, and 44.3% reported that they were not compliant with the vaccination program provided by KKUH. While 93.9% received the HBV vaccine upon entry to medical school, only 59.5% received all 3 doses, citing forgetfulness and a busy schedule as common reasons for the low compliance. There was no association between the knowledge and awareness of the participants and their compliance ($p = 0.988$).

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Conclusion: Medical students had a low level of compliance with the HBV vaccination program, regardless of their knowledge and awareness of the disease and vaccination. We recommend that programs and campaigns be developed to increase the overall awareness of this disease. We also suggest that a mandatory HBV vaccination program should be implemented to improve the compliance rate among medical students.

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Introduction

Hepatitis B virus (HBV) is a virulent pathogen from the family hepadnaviridae, which includes hepatitis B surface antigen (HBsAg), HB core antigen (HBcAg), and HB-e antigen (HBeAg) [1,2]. HBV infection is a well-known cause of acute and chronic hepatitis, which can progress to liver cirrhosis or hepatocellular carcinomas. In the Middle East and South Asia, 2–5% of the entire population is chronically affected, and more than 240 million people have chronic liver disease globally, with an average 600,000 subsequent annual deaths as of July 2013 [3].

HBV infection poses a health risk to healthcare workers who are in close proximity to infected individuals and their bodily fluids. Medical students in tertiary-care academic hospitals are a particularly high-risk and overlooked group in the current literature. Given the high rates of HBV-associated mortality, it is important to study HBV infection in these students.

The Kingdom of Saudi Arabia (KSA) was an HBV-endemic nation until the HBV vaccine was introduced in 1989, following which there was a significant decrease in HBV sero-prevalence, from 7% before the vaccination program to 0.3% in 1997 [4]. Despite this milestone, several Saudi sub-populations, including pregnant women, students in health programs, and health care workers, remain at risk [5,6]. Recent local and regional studies also provide evidence regarding decreased awareness of HBV among several groups in the Saudi community including military personnel [7], primary health-care physicians [8], and medical students [9,10]; this evidence suggests that compliance with vaccination programs might be significantly related with one's perceptions and misconceptions about HBV and other chronic infectious diseases. A study conducted in King Abdulaziz University in Jeddah, which has a high-risk group who have contact with blood and fluids during dental procedures, reported an 80.5% compliance rate for HBV vaccination; however, more than half (57.5%) of those vaccinated were not screened for HBV antibodies [11]. In this

cross-sectional study, we aimed to determine medical students' knowledge of HBV and vaccination as well as their compliance with the vaccination program at King Khalid University Hospital (KKUH), Riyadh, KSA. In addition, we aimed to ascertain the relationships between awareness and preventive behaviors and compliance with vaccine in the medical students.

Methods

Subjects

This cross-sectional study was conducted at the College of Medicine, KKUH, King Saud University (KSU), Riyadh, KSA between October 2013 and March 2014. Random stratified sampling was used to acquire a cohort of 480 medical students (240 men and 240 women), based on a sample size calculation for proportions in a single population using information from a pilot study conducted with 14 medical students in the same college, during which 35.7% of the participants complied with the vaccine program, and 64.3% did not ($p = 0.357$). The calculated sample size was 353, but a sample size of 480 was used for better representation of the population. All second- to fifth-year students were eligible; first-year students were excluded to ensure that all subjects had the chance to undergo the full vaccination program. The institutional review board approved the study design, and each participant provided written consent. All of the participant information was kept confidential, and no incentives were provided for participation.

Data collection and questionnaire

A self-administered questionnaire was distributed to all participants, which included questions regarding the compliance rate and level of awareness of HBV and the vaccination program within two sections. The first section consisted of 12 questions to assess knowledge regarding the disease itself

Table 1 Medical students' knowledge and awareness of the hepatitis B virus (HBV) and HBV-related information.

Knowledge about		<i>n</i> (%)	Points
HBV	Virus	427 (96)	1
	Infectious	343 (77.1)	1
	Acute and chronic	223 (50.1)	2
Transmission	Acute or chronic	77 (17.3)	1
	Perinatal	254 (57.1)	1
	Blood-borne	355 (79.8)	1
	Sexual	293 (65.8)	1
Prevention and risk	Bodily fluids of an infected person	187 (42.0)	1
	Vaccination	360 (80.9)	1
Complications	Hazardous	428 (96.2)	1
	Hepatocellular carcinoma	298 (67.0)	1
HBV vaccine	Hepatic cirrhosis	377 (84.7)	1
	Vaccine availability	444 (99.8)	1
When should the vaccine be administered?	3 doses	380 (85.4)	1
	Intramuscular	370 (83.1)	1
	Surface antigen recombinant	182 (40.9)	1
	Subunit	88 (19.8)	1
	Before enrolling into medical college	217 (48.8)	No points given
1st year of college	145 (32.6)		
Before starting clinical rotations	30 (6.7)		
Does not matter	45 (10.1)		

(type of pathogen, course of the disease, routes of transmission, preventive measures, complications) and the level of awareness to the HBV vaccination program (number of doses, type of vaccine, route of administration), and the score was used to categorize participants into low (<8 points), medium (8–13 points), and high (≥ 14 points) knowledge groups; these cut-offs were determined based on the pilot study (see Table 1 for more information). The second section of the questionnaire consisted of 6 questions regarding the compliance rate with the HBV vaccination program at KKHU, which typically consists of 3 doses of vaccine set on intervals starting from the first day of enrollment to the medical school (1st dose) then given after 1 month (2nd dose) then finally 6 months after the first dose (3rd dose).

Data analysis

Microsoft Excel 2013 was used for data entry, and SPSS version 16.5 (SPSS Inc., Chicago, IL, USA) was used for descriptive analyses. Data are presented as frequencies and percentages (%), and Chi-square tests were used to compare the responses.

Results

Of the 480 questionnaires, 444 (213 men and 231 women) were returned (92.5% response rate). The responses are shown in Table 1.

Regarding knowledge levels of the disease and vaccine, 46.5% ($n=206$), 50.4% ($n=224$), and 3.1% ($n=14$) had high, medium, and low levels of knowledge, respectively. More women had high levels of knowledge of the disease and vaccine (56.5%) than men (43.5%). In addition, more third-year medical students ($n=117$) had high levels of knowledge ($n=73$; 35.3% out of total number of participants), whereas the lowest proportion ($n=31$; 15% of total) was present in second-year students ($n=115$). Only 57.1% ($n=254$) and 65.8% ($n=293$) of the participants knew that the virus can be transmitted perinatally and through sexual intercourse, respectively. Furthermore, 72.4% (321) knew that the HBV vaccine is part of the Extended Program of Immunization (EPI) for children.

Regarding compliance with the vaccination program, 93.9% ($n=417$) received the HBV vaccine upon entry to medical school. Approximately half of the participants (59.5%, $n=248$) received all 3 doses of the vaccine, 15.6% ($n=65$) received 2 doses, and 12.7% ($n=53$) received only 1 dose; 12% ($n=50$) either did not know or were lost to follow up. Interestingly, women reported a higher level of non-compliance (24.7%) than men (19.3%), despite better knowledge and awareness. Moreover, even though second-year medical students had the lowest levels of knowledge, they reported slightly higher levels of compliance (14.9% of the fully compliant participants; $n=66$) compared with fifth-year

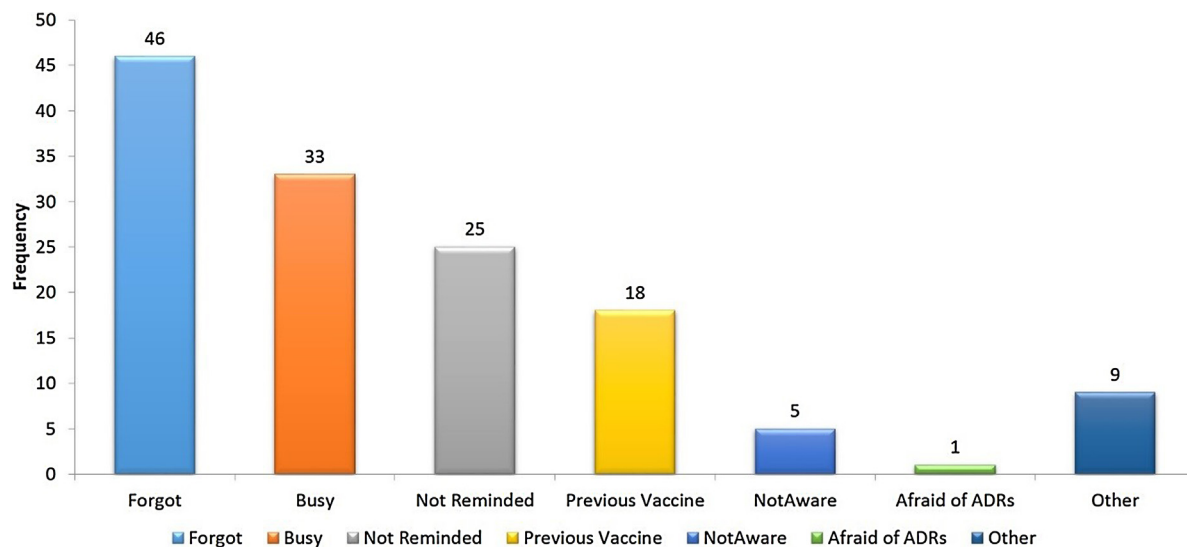


Figure 1 Reasons for HBV program non-compliance.

medical students (13.5% of the fully compliant participants; $n=60$). Different reasons were reported for non-compliance, with forgetfulness being the most commonly reported reason (Fig. 1).

Only 28.5% ($n=127$) of the participants reported that they still had a vaccination certificate, 28.8% ($n=128$) did not have one, 15.5% ($n=69$) had not received a certificate, 23.4% ($n=104$) were unaware if they had received one, and 13.6% ($n=16$) did not respond. Regarding immunity status, 42.8% ($n=190$) had a blood test to check for immunity against HBV. Of these participants, 91.6% ($n=174$) knew the result of their tests; 95.4% ($n=166$) were immune, and 4.59% ($n=8$) were not immune. Of those who were immune, 62.64% ($n=109$) were compliant with the vaccination program, and 32.75% ($n=57$) were not compliant; of those who were not immune, 5 were compliant, and only 3 were not compliant. The association between the participant's awareness and his/her compliance was not statistically significant ($p=0.988$).

Discussion

The awareness and knowledge of HBV and vaccination of medical students in a Saudi tertiary hospital in the present study were modest, at best. There were differences between the school years, with the highest number of participants scoring high levels of knowledge in the third-year class. Furthermore, there was an almost equal distribution of knowledge levels in the fourth- and fifth-year medical students, who were undergoing clinical placements, and these levels were constantly lower

than those of the third-year medical students. This represents a paradox because students in their fourth and fifth years have received more instruction and gained more experience through clinical placements. Therefore, further investigation is warranted to determine the underlying reasons for these differences. Nevertheless, we observed the following during the present study: because third-year students had finished a community medicine course prior to participating in this study, they had more recent knowledge acquisition of the disease and the vaccine; the third year of medicine is the introductory year for the subsequent clinical years, which might explain a better awareness of potential nosocomial infections; and second-year students are relatively new to the field of medicine and might have insufficient information regarding the disease and vaccine, which would explain their consistently lower scores.

Furthermore, the results indicate that high levels of knowledge among medical students are not an indicator of acceptable levels of compliance with the vaccination. Similar studies conducted among Arab medical students showed lower HBV awareness in countries such as Syria [12] and similar levels of awareness in dental students in Iran [13]. In developing countries such as Laos, the low awareness and knowledge of HBV among students and health professionals are the main reasons for lack of vaccination coverage [14]. However, good knowledge of HBV coupled with poor vaccination compliance also increases the risk of acquiring HBV; a study conducted with medical students in Cameroon showed a high rate of accidental exposure with very low HBV vaccination uptake [15].

Despite the availability of an HBV vaccine, only 56% of the participants in the present study completed the recommended doses, and more than half of those who were less compliant either forgot to complete their dose or were too busy, highlighting the lack of priority in adhering to the HBV vaccination program at KCUH.

Completion of multi-dose vaccinations such as the HBV vaccine is a constant challenge for the medical community. Developed countries such as the UK and Australia offer modest financial incentives to its target population, which has significantly increased adherence with the HBV vaccine doses, leading to full completion [16,17]. However, financial incentives to increase compliance may not be needed for medical students, because HBV vaccination is already part of the universal safety precautions among medical workers, which should be enough of an incentive. Medical students in the KSA have similar poor compliance as medical students in Italy (47%), but with a good seroconversion rate (93.1%) [18]; however, this was assessed primarily by recall in the present study.

The concept of booster doses is also important. Alfaleh and colleagues observed excellent long-term protection with the HBV vaccine among 1355 Saudi students at 18 years post-vaccination [19], suggesting that booster doses for the adult population, such as the present medical students, might not be necessary. However, a more recent study by Al Ghamdi and colleagues supports sex differences in long-term HBV protection, with women more likely to maintain long-term efficacy from the HBV vaccine than men [20]. Regardless of the duration of HBV vaccine protection, medical students should continue to be vigilant in their protection against HBV by refreshing their knowledge and awareness of and increasing their compliance with the multi-dose requirements for full HBV protection because they remain a high-risk population.

There are several limitations in the present study. The cross-sectional nature limits the determination of any causal relationships. Further investigations should include detection of relevant markers (HBV antibodies) to provide better evidence for seroconversion in this population. Rates of accidental exposure and potential HBV risk should also be determined, which might increase compliance among medical students who are not fully aware of their risk for HBV exposure. Nevertheless, to the best of our knowledge, the present study is the first to investigate the knowledge and awareness of HBV in medical students in the capital Riyadh and highlights the importance of further investigation of HBV vaccine programs in KSA.

In conclusion, almost half of the study participants had medium to low knowledge levels of HBV, and almost half of the participants were non-compliant with the vaccination program provided by the KCUH. Awareness programs and campaigns should be developed to increase the overall awareness and prevention of this disease. In addition, we recommend the implementation of administrative policies, which will guarantee that all students are covered by the vaccination program. Further studies should be conducted to determine the real association between immunity levels and vaccine compliance and whether the current vaccination programs are, in fact, effective.

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Competing interests

None declared.

Ethical approval

Not required.

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