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Occupational risk of hepatitis B and C infections in Saudi medical staff

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Summary: The prevalence of markers for hepatitis B virus (HBV) and hepatitis C virus (HCV) was studied among final year medical students and the medical staff at two university teaching hospitals in Saudi Arabia. At King Khalid University Hospital (KKUH) in Riyadh, evidence of exposure to HBV in the male medical staff (42·9%) was significantly greater than among medical students (25·3% males, 19·3% females; $P=0·0041$) or the controls (28·6% males, 17·1% females; $P=0·0095$). At King Fahad University Hospital (KFUH) in Al-Khobar, although the prevalence of exposure in the medical staff (28·3%) was higher than that in the controls (18·5%) the difference was not statistically significant ($P>0·05$) and this could be due to the small numbers tested (46 physicians, 54 controls). Regarding exposure to HCV there was no significant difference in markers of the virus among the three categories investigated (1·7% in the controls, 2·6% in medical students and 1·9% in the medical staff). The low risk of transmission in the medical staff could be due to the small amount of the virus in the blood of HCV carriers. It can be concluded from the study that, in contrast to HCV, the occupational risk of HBV infection is high among Saudi physicians and hence HBV vaccination to unexposed medical staff is the only way for effective prevention of infection.

Keywords: Hepatitis B virus markers; hepatitis C virus markers; medical students; medical staff; Saudi Arabia.

Introduction

Viral hepatitis is an occupational hazard among hospital staff. The development of sensitive serological tests over the past two decades has revealed that the main risk of hepatitis among hospital staff is from infection with hepatitis B virus (HBV).[1–5] These tests also clarified the existence of a non-A, non-B hepatitis (NANBH) that may account for some of the other cases of hepatitis acquired by needle-stick injury.[5] The recent cloning

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of the genome of hepatitis C virus (HCV), the main aetiological agent of NANBH, has led to the development of an assay to detect specific antibodies to HCV (anti-HCV),[7,8] and most cases of NANBH can now be diagnosed serologically. Recent reports have revealed a high prevalence of anti-HCV in persons at high risk of exposure to blood, namely intravenous drug abusers, haemophiliacs and patients on haemodialysis.[9–10] For health care workers, however, the prevalence of anti-HCV has been found to be low.[11,12] In the light of our recent reports on the endemicity of HVB[13] and HCV[14] in the Saudi population, it was of interest to study the prevalence of markers of infection with HBV and HCV among Saudi physicians and try to assess the rate of transmission of the two viruses in this potentially high risk group.

Subjects and methods

Study population

The study consisted of two surveys; one of Saudi medical students in their final year at the College of Medicine, King Saud University, Riyadh, and of Saudi medical staff at King Khalid University Hospital (KKUH), Riyadh (Central Province), and the other of the Saudi medical staff in King Fahad University Hospital (KFUH) in Al-Khobar (Eastern Province).

KKUH survey

Final year medical students and medical staff were encouraged to be screened for HBV markers before receiving HBV vaccine in an effort to protect them against HBV infection. Participants who were already vaccinated against HBV were excluded from the study. During 1992–1994, 142 males and 83 female medical students (age range 23–25 years) and 63 male and 42 female medical staff (mean years of age 36·2, range 26–50, for males; 28·3 and 24–36, for females) submitted blood for investigation of HBV markers. Each sample 10 mL of venous blood drawn in plain vacutainers) was allowed to clot at 37°C for 1 h before being centrifuged and the supernatant was stored at −30°C until tested for HBV markers. The controls were 210 Saudi males and 82 Saudi females (age range 20–50 years) selected at random from blood donors at KKUH blood bank and who had not previously been screened for evidence of blood-borne infections. Sera were tested for HBV markers (HBsAg, anti-HBc and anti-HBs) by commercially available immunosorbent assays (ELISA) (Organon Teknika, BV, The Netherlands). Also, all submitted samples were tested for anti-HCV by UBI HCV EIA (Hauppauge, NY, USA). All anti-HCV-positive samples were confirmed by either RIBA (OrthoDiagnostics) or LiaTek HCV III (Organon, Teknika).

Table 1. *Prevalence of hepatitis B virus (HBV) markers (HBsAg, anti-HBc, anti-HBs) and hepatitis C virus (HCV) markers (anti-HCV) among Saudi medical students in their final year and Saudi physicians at two university hospitals*

Location and category of subjects tested	Sex	No. tested	HBV markers		HCV marker
			HBsAg no. positive (%)	Anti-HBc and/or anti-HBs no. positive (%)	Anti-HCV no. positive (%)
KKUH, Riyadh					
Final year medical students	M	142	7 (4·9)	36 (25·3)	4 (2·8)
	F	83	3 (3·6)	16 (19·3)	2 (2·4)
Practising physicians	M	63	4 (6·3)	27 (42·9)	2 (3·2)
	F	42	2 (4·8)	12 (28·6)	0 (0)
Controls	M	210	12 (5·7)	60 (28·6)	4 (1·9)
	F	82	3 (3·6)	14 (17·1)	1 (1·2)
KFUH, Al-Khobar					
Practising physicians	M	46	3 (8·7)	13 (28·3)	ND
Controls	M	54	4 (7·4)	10 (18·5)	ND

KKUH, King Khalid University Hospital; KFUH, King Fahad University Hospital; ND, not done.

KFUH survey

Saudi medical staff who were not vaccinated against HVB vaccine were requested by the administration to be screened for HBV markers. In the event, 46 male (age range 23–54 years) physicians participated. The controls (54 males) were selected from blood donors at KFUH blood bank and were matched for age. Submitted blood samples were tested for HBsAg and anti-HBc by solid phase radioimmunoassay (RIA) technique (AUSRIA and CORAB, Abbott Laboratories, Chicago, IL, USA).

Data analysis

The *t*-statistic was used to compare proportions (percentages) drawn from two different samples and from one sample.

Results

The prevalence of HBV and HCV markers is shown in Table 1. The carrier rates of HBsAg in physicians at KKUH (6·3% males, 4·8 females) were not significantly different from those in the medical students (4·9% males, 3·6% females) or the controls (5·7% males, 3·6% females). However, the exposure rate to HBV in male Saudi physicians (42·9%) was significantly higher than that in medical students ($P=0·0041$) and controls ($P=0·0095$). At KFUH, Al-Khobar, the exposure rate to HBV was higher in the physicians than in the controls but the difference was not statistically significant [28·3% in physicians vs. 18·5% in the controls ($P>0·05$)]. At KKUH, Riyadh, anti-HCV-positivity rate varied from 1·7% in the controls

to 2·6% in medical student and 1·9% in practising physicians. Anti-HCV antibodies were not measured on the participants in KFUH at Al-Khobar.

Discussion

The results of this study show that HBV infection is common among Saudi physicians. At KKUH, Riyadh, the higher prevalence of HBV markers in the practising physicians compared to the final year medical students indicates that HBV infection can be mainly attributed to occupational exposure and is directly related to the duration of medical practice.[15] Our findings are consistent with those of other investigations[4,5,16,17] in which HBV infection was found to be an occupational hazard of hospital personnel and in particular of those with direct contact with body fluids and infected patients. In this study, male practising physicians had higher prevalence of HBV infections than their female counterparts. This, however, could be due to the age differences as the males were older suggesting longer occupational exposure.[16]

At KFUH, Al-Khobar, the exposure rate to HBV in the medical staff was higher than that in the control (28·3 vs. 18·5%) but this difference was not significant ($P>0·05$). The lack of significant difference in exposure to HBV between the two groups could be due to the small numbers investigated (46 physicians, 54 controls). The carrier rate between the two groups was similar to the one reported by Fathalla *et al.* testing 4712 subjects from the Eastern province of Saudi Arabia.[18]

In contrast to the situation with HBV infection, a low prevalence of HCV infection was found among our Saudi physicians (2·4%) and final year medical students (2·7%) which was not significantly higher than that in the controls (1·7%). This was surprising as the majority of our physicians admitted needle-stick injuries and direct contact with body fluids on numerous occasions. Recently, a low prevalence of HCV infection was also reported among hospital staff and acupuncturists in Kyushu, Japan.[19] One possible explanation could be that the amount of virus in the blood of HCV carriers is small[19] and hence the risk of transmitting HCV infection by close contact or by needle-sticks may not be high.

It can be concluded from our study that, in contrast to HCV, the occupational risk of HBV infection to Saudi physicians is quite common. It is crucial, therefore, that vaccination against HBV be administered to all Saudi physicians with no previous exposure to HBV, preferably in the training period, in addition to emphasizing the risks of handling infectious materials. The recent implementation by the Ministry of Health of vaccination of all newborns against HBV will no doubt ultimately change the epidemiology of the disease in Saudi Arabia.[20]

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