Original article

Seroprevalence of Hepatitis B and C among health care workers in Omdurman, Sudan

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ABSTRACT

Background: Health care workers in developing countries including Sudan are at serious risk of infection from blood-borne pathogens particularly HBV and HCV, because of high prevalence of such pathogens in these countries.

Methods: A cross – sectional study was conducted during November 2007 to determine the seroprevalence of hepatitis B virus (HBV) and C (HCV) and their associated risk factors among the health care workers (HCW) of an urban referral hospital in central Sudan .

Enzyme Linked Immunosorbent Assay technique was used to test the blood samples and a questionnaire to collect socio - demographic data of the study participants (n = 211) .

Results: The seroprevalence of HBsAg was 2.4%. None of the study participants had HCV antibodies in their blood samples. Age and past history of jaundice were significantly associated with HBsAg infection. The categories of HCW with higher risk of occupational transmission for HBsAg were nurses and non – professional staff.

Conclusion: The occupation risk of HBV infection among the HCW in this study was high for the nurses and cleaning staff. Effective prevention of HBV infection is mainly by vaccination to unexposed HCW, however acceptance of vaccine should be promoted for such high risk categories.

Keywords: Hepatitis B&C; Health care workers; Sudan.

Approximately three million health care workers (HCW) are exposed to percutaneous blood – borne viruses each year . It is estimated that 66000 hepatitis B virus (HBV) and 16000 hepatitis virus (HCV) are acquired annually[1]. These infections are important risk factors for hepatocellular carcinoma and other liver related morbidity[2]. The HBV carrier rate varies widely from 0.01% to 20% in different geographical regions of the world[3]. The prevalence of HBV in some Middle East countries ranges between 2%to 7% in the general population, while HCV is much lower in these countries[4].

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The HCW including clinicians, nurses, laboratory technicians, other hospital technicians, administration and cleaning staff are exposed to an increased risk of occupational infection with HBV and HCV[5]. In tropical countries the risk of occupational transmission of these viruses is further increased by the excessive handling of needles and lancets to test for common tropical diseases. For example, more than 100 million tests for malaria are performed each year[6].

Data exist concerning the epidemiology of HBV and HCV in several study populations from Sudan[2, 7-14]. However we are unaware of published data on these viruses among HCW in the country. The present study was conducted to determine the seroprevalence of HBV and HCV in a Sudanese population of HCW. We also aimed to assess the risk

factors for the acquisition of these infections in our study population.

Methods

This cross – sectional study was conducted during November 2007 on the HCW of

Tropical Diseases Teaching Hospital (TDTH) in Omdurman city, central Sudan. The TDTH is an urban referral hospital for infectious and endemic diseases. It provides medical care to a large number of patients from all over the country. Informed consent was obtained from the study participants (n = 211). A structured questionnaire was developed at TDTH. It included demographic and socio – economic data as well as risk factors of HBV and HCV transmission. A blood sample (5 ml) was taken from each participant and processed for HBV and HCV serologic markers.

The questionnaire sheet and blood sample for each participant was identified by a randomized code number known only by the individual participant and one author. Sera from blood samples were tested for total anti-HBc and anti-HCV antibodies by using Enzyme Linked Immunosorbent Assay (ELISA) kit (DIMA Gesellschaft fur Diagnostica mbh – Germany). The sera which tested positive for total anti-HBc antibodies were tested further for HBsAg using the same kit.

Statistical analysis of the results was performed by the Statistical Package for Social Sciences (SPSS) version 11. Associations of seropositivity with other independent variables were examined by 95% Confidence Interval (CI). To determine the significant risk factors associated with HBsAg positivity , we performed binomial regression analysis for the following factors : age , gender , marital status , history of jaundice , history of blood transfusion , vaccination against HBV , and history of needle stick injury .

Results

We enrolled 211 (78.2%) of the HCW of TDTH .The non - respondents were 59 (21.8%). Of the study participants, 114 (54%) were females. The age range was 20 years to 70 years with mean age ± standard deviation (SD) of 37.3±9.9 years. Table 1 shows descriptive data of the socio-demographic characteristics of the study participants.

Fifty three (25.1%) were positive for anti-HBc antibodies, 5 (2.4%) were positive for HBsAg, and none of the study participants had anti-HCV antibodies in their blood samples.

Characteristic	n=211(%)
Sex	
Male	097(46)
Female	114(54)
Marital status	
Single	066(31.3)
Married	136(64.4)
Multiple marriage	009(4.3)
location	
Centre Sudan	195(92.4)
West Sudan	011(5.2)
North Sudan	005(2.4)

Table 1: Descriptive data of the socio – demographic characteristics of the study participants

Table 2 shows the distribution of HBV and HCV serology markers according to the occupational categories of the study participants.

Positivity for anti-HBc antibodies, in this study, is shown to be a significant predictor of positivity for HBsAg ($P < 0.05$).

Positivity for HBsAg was more among males, but this was statistically insignificant ($P > 0.05$). There was positive association of HBsAg positivity among the study participants with mean age of 46 years (SD 9.9), but not with duration of hospital work. Table 3 shows binomial regression analysis of the risk factors for HBsAg in the study participants.

Table2: Distribution of anti–HBc, HBsAg, HCV antibodies according to occupational categories of the study participants (n=211)

Occupational category	No.(%)	Positive for anti-HBc	Positive for HBsAg	Positive for HCV Ab
Clinicians	22(10.4)	1	0	0
Nurses	98(46.5)	29	3	0
Laboratory Technicians	16(7.6)	4	0	0
Other Hospital Technicians	16(7.6)	3	0	0
Administration Staff	25(11.9)	4	0	0
Cleaning Staff	34(16)	12	2	0

Table 3: Binomial regression analysis of risk factors for HBs Ag in the study participants (n = 211)

Risk factor	Test Result		*P*-value
	Positive	Negative	
Male	0	008	0.52
Female	5	198	
Age in years Mean (SD)			
46(9.9)	5	000	0.04
37.5(9.9)	0	206	
Marital Status			
Married	5	140	0.12
Single	0	066	
Blood transfusion			
Yes	0	008	0.65
No	5	198	
Hospital work in years Mean(SD)			
11.4(9)	5	000	0.98
11.3(9)	0	206	
History of jaundice			
Yes	3	035	0.01
No	2	171	
History of needle injury			
Yes	1	080	0.39
No	4	126	
HBV vaccination			
Yes	0	007	0.67
No	5	199	

P<0.05 was considered significant. SD = standard deviation.

Discussion

The health and safety of HCW in several developing countries, as regard occupational transmission of HBV and HCV, remain a neglected issue. It is important to define the prevalence of these infections among HCW and to evaluate their associated risk factors so as to adopt effective preventive strategies[15].

In this study, the seroprevalence of HBV among HCW of TDTH in central Sudan was 2.4%. None of the study participants had anti-HCV antibodies in their blood samples, and this finding suggests that the epidemiology of HCV differs from that of HBV in this particular study population .Our result of HBV prevalence is comparable to a study from Pakistan[16]. The positivity of HBsAg, in this study, was more among males than females but this was statistically insignificant ($P > 0.05$). There was no significant difference in HBsAg positivity between the vaccinated and non-vaccinated study participants. This is probably due to non-compliance towards HBV vaccination since pre- employment screening and vaccination are available in Sudan .The occupational risk of HBV infection among the HCW in this study was high for the nurses and cleaning staff. In a study from Belize, Central America, it was also shown that nurses and non-professional staff had higher rates of HBV markers[17]. Effective prevention of HBV infection is mainly by vaccination to unexposed HCW, however acceptance of vaccine should be promoted for such high risk categories[18].

Many studies from different parts of the world highlighted the need to implement effective measures for protection of HCW from hepatotropic viral infections[19-22]. These measures include pre-employment screening and vaccination of the unexposed HCW, strict policy on sharps, health education, clinical advice, and health insurance. In May 1992, the World Health Assembly, the governing body of the World Health Organization, endorsed recommendations that all countries should have HBV vaccine integrated into their national immunization programmes[23]. We assume that strict implementation of such recommendations will contribute to long term protection of future HCW.

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