

Sero-Prevalence of HBV Infection among Health Care Workers at Dialysis Centers in Khartoum State, Sudan

ELTAGI ABDALLA MOHAMMED¹

Department of Epidemiology
University of Khartoum, Sudan

KAMIL MERRGHANI ALI

Department of Community Medicine
University of Khartoum, Sudan

ISAM MOHAMED ELKIDIR

Department of Microbiology
University of Khartoum, Sudan

Abstract:

An observational, a cross-sectional facility based study was conducted with an objective to study the prevalence of HBV infection and to identify the socio-demographic determinants of Health care workers (HCWs) at dialysis centers in Khartoum state. Data were collected from 109 HCWs (65% female and 35% male), using a structured questionnaire and Blood samples were taken from participants (5 ml). Serum samples were tested for HBV markers (Anti-HBc, HBsAg, HBeAg and Anti-HBs) using Enzyme-Linked Immunosorbed Assay (ELISA), the prevalence of these markers was found to be (29.4%, 6.4%, 0.0% and 69.4%,) respectively. Statistical analysis showed that, the long duration of the work, sex, level of education, occupation and unvaccinated against HBV were associated significantly with HBsAg positivity. Also statistical analysis showed very strong association between vaccination and immunity rate (Anti-

¹ Email: eltagimohd@yahoo.com / eamohammed@uofk.edu

HBs) among HCWs, so vaccination against HBV gives good protection against HBV.

Key words: Health care workers, HBV markers, Khartoum state, Sudan

INTRODUCTION:

Hepatitis B virus is a widespread disease of public health importance. Nearly 5% of the world populations are currently infected with HBV (Elmukashfi et al, 2012). Healthcare workers are at high risk of contracting blood borne infections in their daily work through needlestick injuries. Of the 35 million healthcare workers worldwide, 3 million experiences percutaneous exposures to blood pathogens each year: 2 million are exposed to hepatitis B virus (HBV) (Tadesse and Tadesse, 2010). Duration of employment in hospitals, dialysis units, laboratories etc., consider as the risk factors of HBV infection in HCWs (Chiarakul et al, 2007). The World Health Organization (WHO) estimates that about two million HCWs face occupational exposure to HBV each year and that 90% of the infections that result from these exposures are in low-income countries, especially those in sub-Saharan Africa (WHO, 2012). The prevalence of HBsAg among HCWs in developing countries was 9% in Saudi Arabia (El-Hazmi and Al-Majid, 2008). 9.6% in Palestine (Rola *et al*, 2005). 5.6% in Pakistan (Sarwar *et al*, 2008), in Thailand 5.3% (Chiarakul et al, 2007) and in Korea 2.4% (Shin *et al*, 2006). Also is lower than that in Uganda 8.1% (Ziraba *et al*, 2010). Sudan is classified among countries with a high hepatitis B surface antigen (HBsAg), with endemicity of more than 8%. HBV infection ranges as low as 6.8% in central Sudan to as high as 26% in southern Sudan (Mudawi, 2008). In a cross-sectional study conducted in Khartoum in HCWs, the prevalence of HBsAg 6% and anti-HBc 57% (Elmukashfi et al,

2012). In Omdurman area –Khartoum Stae the HBsAg in HCWs was 2.4% (Nail *et al*, 2008). Other study was carried out in Khartoum among HCWs, the prevalence of HBsAg 4.9% (Elduma and Saeed, 2011).

MATERIALS AND METHODS:

Study area: Khartoum State is one of the 16 States of Sudan. Khartoum is the political capital and commercial centre of the Sudan with an area of 28165 Km². It is a located between latitudes 15°- 16° North and longitudes 34° - 31.5° East. Khartoum state can be divided into three geographical areas. The first area: start from Almogran and it lies through between two Nile (Blue and White Nile) until Aljazera state southern, it involve two locality (Khartoum and Jabal Alawlia). The second area: is located in the North side, between Blue Nile and river Nile, it involves North Khartoum locality and East Nile locality. The third area: is located in west White Nile and river Nile and it involve three localities (Omdurman, Umbada and Karari) (MOH, 2008& Elmukashfi et al, 2012)

Methods: Data were collected using a pre-tested, pre-coded questionnaire to collect socio-demographic profile characteristics (age, sex, education, marital status, occupation and duration of the work). And also laboratory investigation.

Laboratory investigation: Under sterilized condition about (5 ml) of venous blood was taken from each subject through venepuncture using a vacutainer device (blood collection containers) (EDTA container), the samples was stored upright in an ice box (vaccine carrier) /refrigerator at a temperature of 2°-8° C and brought to laboratory of Microbiology at Faculty of Medicine, University of Khartoum at the end of the day. Then the sera were separated by centrifugation at 3000 rpm for 5

minutes and stored at -20° centigrade till testing. ELISA was used to screen HBV markers.

All samples were tested for anti-HBc. Samples negative for anti-HBc were then tested for Anti-HBs. Sample positive for anti-HBc were tested for HBsAg and Samples positive for HBsAg then tested for HBeAg.

Data was processed using the statistical package for social sciences (SPSS) for WINDOW version 19. For the analysis, binomial test (Z-test) for single proportion and some non-parametric tests such as Chi-Square and Fisher's exact test were used, P. value of < 0.05 was considered statistically significant. Informed consent from the selected health care workers (HCWs) obtained.

RESULTS:

The prevalence rate of HBV markers (Anti-HBc, HBsAg, HBeAg and anti-HBs) positive according to binomial test, were (29%, 22%, 0.00 and 69%) respectively. The P-value of the binomial test is < 0.005 which means that there is a significant different at 5% as shown in (table 1). Table 2 shows the demographic characteristics associated with HBsAg positivity, the results indicate that the highest infection rate among male 13.2% (5/38). Regarding to the age group the highest prevalence recorded in age group 31-45 years 10.2% (4/38). 7.3% of carrier among unmarried. For the education the highest prevalence among secondary education 33.3%.

Regarding to HCWs occupation the results showed the highest HBsAg positivity among paramedical 40% (2/5), then medical engineers 12.5%. Regarding to the duration of the work the high carrier rate among those works more than five years. The results showed there was statistical association between HBs positivity and occupation and duration of the work P. Value = 0.05 and 0.005 respectively Table3.

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Table (1): distribution of HCWs according to the HBV markers - Khartoum State.

(n= 109)

Marker	Group	Category	Number	Observed Prop.	Expected Prop.	P. Value
Anti-HBc	Group 1	Positive	32	.294	.50	.001 ^a
	Group 2	Negative	77	.706		
	Total		109	1.00		
HBsAg	Group 1	Positive	7	.22	.50	.002 ^a
	Group 2	Negative	25	.78		
	Total		32	1.00		
HBeAg	Group 1	Positive	0.00	0.00	.50	.160 ^a
	Group 2	Negative	7	1.00		
	Total		7	1.00		
Anti-HBs	Group 1	Positive	50	.69	.50	.001 ^a
	Group 2	Negative	22	.31		
	Total		72	1.00		

a. Based on Z Approximation.

Table (2): Demographic characteristics of HCWs according to HBsAg -Khartoum State

(n=109)

Demographic characteristics	HBsAg				Total		P. Value
	Positive		Negative		No	%	
	No	%	No	%			
Sex							0.04*
Male	5	13.2	33	86.8	38	34.9	
Female	2	2.8	69	97.2	71	65.1	
Age group							0.20
15-30	3	4.2	68	95.8	71	65.1	
31-45	4	10.2	34	89.8	38	34.9	
Marital status							0.34
Married	1	3.7	26	96.3	27	24.8	
Un married	6	7.3	76	93.7	82	75.2	
Educational level							0.05*
Secondary	2	33.3	4	66.7	6	5.5	
Graduate	5	5.6	84	94.4	89	81.7	
Postgraduate	00	00	14	100	14	12.8	

* The result significant at P < 0.05

Table (3): Distribution of HBsAg according to HCWs occupation and duration of the work - Khartoum State

(n=109)

Demographic characteristics	HBsAg				Total		P. Value
	Positive		Negative		No	%	
	No	%	No	%			
Occupation							
Medical officer	00	00	12	100	12	11	

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Nurses	3	4.1	70	95.9	73	67	0.05*
Paramedical	2	40	3	60	5	4.6	
Lab. technician	1	9.1	10	90.9	11	10.1	
Medical engineer	1	12.5	7	87.5	8	7.3	
Duration of work							0.005*
< one year	2	10	18	90	20	18.4	
1-5 years	1	1.4	68	98.6	69	63.3	
6-10 years	4	30.8	9	69.2	13	11.9	
> 10 years	0	00	7	100	7	6.4	

* The result significant at $P < 0.05$

Table (4): the relationship between HBV vaccination and HBsAg & anti-HBs among health care workers -Khartoum State. (n=109)

Markers	HBV vaccination				Total		P. Value
	Vaccinated		Not vaccinated		No	%	
	No	%	No	%			
HBsAg							0.003*
Positive	1	14.3	6	85.7	7	06.4	
Negative	20	80	5	20	25	22.9	
Anti-HBs							0.0001*
Positive	48	96	2	4	50	45.9	
Negative	11	40.7	16	59.3	27	24.8	
Total	80	73.4	29	26.6	109	100	

DISCUSSION:

Infection rate (Anti-HBc) among health care workers:

The positivity rate of anti-HBc among HCWs in this study was 29.4% (the percentage of individuals who have evidence of past or ongoing HBV infection. This rate was lower compare with the prevalence of anti-HBc among haemodialysis patients in this study. Also the result was lower than positivity rate of Anti-HBc in HCWs in Sudan 57% (Elmokashfi *et al*, 2012), among Sudanese population ranges from 47% to 78% (Mudawi, 2008), also among HCWs in 76.9% in Korea (Shin *et al*, 2006). Our result was higher compare with the prevalence of anti-HBc among HCWs in Thailand (Bangkok) (Chiarakul *et al*, 2007).

Prevalence of HBsAg (carrier rate) among health care workers: The prevalence of HBsAg among health care

workers (HCWs) in this study was 6.4%. This result was similar compared with prevalence of HBsAg among health care workers in Sudan (Khartoum state) which was found 6% (Elmukashfi *et al*, 2012). Our results was lower compared with the prevalence of HBsAg among Sudanese population (Mudawi, 2008), also the prevalence was lower compare with the prevalence of HBsAg among HCWs in Sudan (Khartoum) which was found 12% (Elduma and Saeed, 2011). The prevalence of HBsAg in this study was higher than that found among HCWs in Sudan (Omdurman) which was found 2.4% (Nail *et al*, 2008). In comparison to the Arab world, the prevalence of HBsAg among HCWs in this study was lower than that found in Saudi Arabia 9% (El-Hamzi and Al-Majid, 2008), in Palestine 9.6% (Rola *et al*, 2005). Also comparison to the other countries, the prevalence of HBsAg among HCWs in this study is higher than that found among HCWs different countries; in Brazil 0.8% (Corilia and Zanetta, 2005), in Pakistan 5.6% (Sarwar *et al*, 2008), in Thailand 5.3% (Supawade *et al*, 2007) and in Korea 2.4% (Shin *et al*, 2006). Also is lower than that in Uganda 8.1% (Ziraba *et al*, 2010).

Regarding to the sex, the results showed there was statistical relationship between the male gender and HBsAg among HCWs ($P. value = 0.04$), this is similar with finding of study carried out in Thailand by (Chiarakul *et al*, 2007) who showed the significant risk factors included not having received the hepatitis B vaccine, male gender, past history of jaundice and duration of employment in a clinical environment exceeding 5 years.

The results showed that was a relationship between the occupation and HBsAg positivity which was found to be statistically significant ($P = 0.05$). This agrees with other findings recorded by (Oh *et al*, 2005) who mentioned that exposure to patients' blood through sharps injuries, including needle stick, is a major occupational hazard for healthcare

workers (HCWs) for the transmission of blood-borne pathogens, such as hepatitis B virus (HBV).

Immunity rate (anti-HBs) among health care workers:

The prevalence of anti-HBs positive among HCWs who were vaccinated or infected with HBV and develop immunity was found 69.4%. This rate was higher compared with the prevalence of anti-HBs in HCWs in Sudan (Khartoum state) (Elmukashfi *et al*, 2012). this may indicate vaccination and/or post infection immunity. However our results showed that, there was strong association between vaccination and high immunity rate (Anti-HBs positive) which was found to be statistically significant (P. value = 0.0001).

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