Original Research Article

Prevalence of Anti-HBcore and HBsAg among health care workers in Public Hospitals, White Nile State, Sudan; 2013

Abstract

Background: HBV infection is an occupational disease where health care workers (HCW) are at high risk. Aim: To measure the sero-prevalence of Anti-HBcore and HBsAg among HCWs in Public Hospitals, White Nile State, Sudan; 2013.

Methods: A cross-sectional, hospital- based study was conducted among health care workers in Public Hospitals in White Nile State, Sudan; 2013. A sample of 385 HCWs was selected using two stage cluster sampling. A pre-tested structured questionnaire was used. The HCWs signed the informed consent to fill the questionnaire and to draw 5 ml venous blood sample for HBV tests. Blood samples were investigated for Anti-HB core. Positive blood specimens for Anti-HB core were further investigated for HBs Ag. Data was processed using statistical package for social sciences (SPSS), version 16. Descriptive statistics and non-parametric Z test for single proportion was used at 95% CL.

Result: Out of 385 HCWs, 230 (60%) were positive for Anti-HBcore. Out of 230 HCWs, 62 (27%) were positive for HBsAg. Prevalence for Anti-HBcore and HBsAg is significantly different from the expected values, *P*=0.001

Conclusion: Sero-prevalence of Anti-HBcore and HBsAg was high among HCWs in Public Hospitals in White Nile State, Sudan.

Key words: Anti-HBcore; HBsAg; HCWs; Public Hospitals, White Nile State, Sudan.

1. Introduction

Hepatitis B virus (HBV) is a major cause of cirrhosis of the liver and hepatocellular carcinoma (HCC). About half of hepatocellular carcinoma cases and one third of liver cirrhosis were due to chronic HBV infection. Yearly, about 500000 – 700000 deaths were estimated to be due to HBV infection. Across the world, two billion individuals were infected with HBV; among whom 360 million were chronically infected [1, 2]

There is a variation in the prevalence of HBV infection worldwide; regarding different areas and population in the same area. The world is divided into: (i) Hyper-endemic area with a prevalence of 70% - 90% of Anti-HBcore and 8% of HBsAg; where 45% of the population lives (South-Eastern Asia and sub-Saharan Africa). (ii) Moderate endemic area with a prevalence of 2% – 7% of HBsAg (Southern countries of Central and Eastern Europe, Mediterranean basin, the Amazon's sink, Middle East, and Northern

Africa) (iii) Low endemic area with a prevalence less than 2% of HBsAg (North-Western Europe and North America) [3, 4].

A study was carried in Tamil Nadu, Southern State of India, it showed HBV carrier rate of 5.7% (CI 4.6-6.8) among 1981 respondents [5].

Sudan belongs to Sub-Saharan countries with high HBV sero-prevalence. Infection rate (positive Anti-HBcore) varied from 47% to78%, while carrier rate (positive HBsAg) prevalence ranged from 6.8% in Central Sudan to 26% in Southern Sudan [6, 7]

The spectrum of clinical manifestations of HBV infection varies in both acute and chronic status of the disease. During the acute phase, manifestations range from subclinical or anicteric hepatitis to icteric hepatitis and, in some cases, fulminant hepatitis. During the chronic phase, manifestations range from an asymptomatic carrier state to chronic hepatitis, cirrhosis, and hepatocellular carcinoma. Extra hepatic manifestations can occur with both acute and chronic infection [8]

HCWs are more prone to acquire blood-borne diseases as occupational hazard and the degree of their exposure determines the rate of HBV infection [9, 3]

A sero-epidemiologic survey of HBV markers among health care workers in Public Teaching Hospitals in Khartoum State, Sudan; showed that HBVs infection and carrier rates were 57% ($CI_{95\%}$: 53%–60%) and 6.0% ($CI_{95\%}$: 4.0%–8.0%) respectively, P <0.05 [10].

HBV infection is defined as the presence of Anti-HBcore in the serum of an individual whether he/she is HBsAg negative or positive. So, he/she may or may not be shedding virus to others. **Carrier states:** it is the presence of HBsAg in the serum of an individual, whether he/she has symptoms and signs of HBV infection or not. So, he/she is shedding virus to others. [11]

Aim of the study: To measure the prevalence of Anti-HBcore (infection rate) and HBsAg (carrier rate) among health care workers in Public Hospitals in White Nile State, Sudan; 2013

Methods:

Study design: this is a cross-sectional, hospital- based study.

Study area: White Nile State lies south to Khartoum City and it is traversed by White Nile River and composed of eight localities with seventeen public hospitals.

Study population: HCWs that working in the Public Hospitals in White Nile State for more than 45 days. The total number was 1808 health care workers

Sample size and selection procedure: The overall sample size was determined by the formula:

$$n = \frac{Z^2 PQ}{d^2}$$

n = the desired sample size.

z = confidence coefficient = 1.96

p = prevalence rate. p = 50% or 0.5

q = 1-p = 1-0.5=0.5 , d = the degree of accuracy, was set at 0, 05

Accordingly $n = \frac{1.96 \times 1.96 \times 0.5 \times 0.5}{0.05 \times 0.05} = 384.6 = 385$

A cluster sampling was used. The hospitals were divided into groups according to the number of specialties in them. It was selected proportionally; every hospital was given a proportion of the sample HCWs according to the total number of health workers. The target sample size was 385; it was distributed as follow:

Group A: Hospitals with all specialties; with 1182 heath care workers (sample size = 252).

Group B: Hospitals with one specialty; with 157 heath care workers (sample size = 33)

Group C: hospital with no specialty; with 469 heath care workers (sample size = 100)

Data collection, analysis and processing: Data was collected using pre-tested structured questionnaire. Five ml venous blood was drawn after the signature of the informed consent and before filling the questionnaire. Blood sera was separated and stored at −20 ° C , until testing. Using ELISA tests with 99.64% sensitivity and 99.64% specificity; all specimens were tested for anti-HBcore; positive specimens for anti-HBcore were tested for HBsAg.

Data was processed using statistical package for social sciences (SPSS), version 16. Descriptive statistics and non parametric Z-test for single proportion was used. The *P*-value ≤ 0.05 was considered statistically significant for the results.

Ethical issue: The study was approved by the ethical committee of Sudan Medical Specialization Board.

3. Result and discussion

3.1. Distribution of the sample of Health Care Workers among localities:

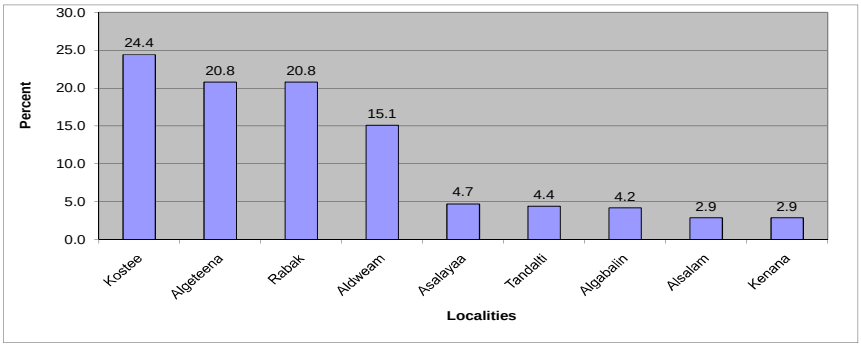

Figure (1): Distribution of the sample of Health Care Workers for the survey of Anti-HBcore and HBsAg, by localities in Public Hospitals, White Nile State, Sudan, 2013; (n = 385)

Figure (1) indicates that the most representative localities in the study were Kostee, with 94 HCWs (24.4%) followed by Algeteena and Rabak, with 80 HCWs (20.8%) and the least localities were Alsalam and Kenanna with 11 HCWs (2.9%) for each.

3.2. Socio-demographic characteristics of the respondents: The sample composed of 154 males (40%) and 231 females (60%). Most of them were in the age group 27-36 years (30.9%), followed by 47- 56 (20.0%) and the least one was the age group of 57+ (13.2%).

For marital status, 215 HCWs (55.8%) were married, 150 HCWs (39%) were single, and 11 HCWs (2.9%) were widowed, while 9 HCWs (2.3%) were divorced.

The level of education was as follows: 149 HCWs, (38.8 %) were university, 95 HCWs (24.7 %.) were high secondary and 6 HCWs (1.6%) were Quranic school.

Regarding occupation of the sample population; 121 (31.4%) were labour, 107 (27.8%) were nurses, 60 (15.6%) were doctors, 49 (12.7%) were technicians in labs and blood banks, 15 (3.9%) were nurse midwives, 12 (3.1%) were pharmacists, 11 (2.9%) were theatre attendants and 10 (2.6%) were Village midwives.

Table (1): Testing the prevalence of infection rate of HBV (Anti-HBcore) against the values of test probability of 0.5, among Health Care Workers in Public Hospitals, White Nile State, Sudan, 2013; (n = 385)

Markers*	Category	N	Observed Prob.	Test Prob.	*P*-value	Conclusion
Anti-HBcore	+ ve	230	0.60	0.5	0.001	Significant difference
	- ve	155	0.40			
	Total	385	1.00			

*Test used was Z test for single proportion

As Table (1) shows, 230 (60%) of the tested HCWs showed positive Anti-Bcore marker, while 155 (40%) were negative for Anti-HBcore marker. The *P*-value of the Z- test was 0.001, which indicates a significant statistical difference between the prevalence of 60% and the tested rate of 50% (i.e. 0.5). So, there is a high infection rate of HBV (measured by Anti-HBcore) among HCWs in Public Hospitals, White Nile State, Sudan. The outcome of the test was that the prevalence of past or current infection with HBV among HCWs in Public Hospitals, White Nile State, Sudan, was 60%. The lower and the upper bound of Anti-Bcore prevalence at 95% confidence level was 56% and 62% respectively, *P*-value = 0.001.

Table (2): Testing the prevalence of carrier of HBV (HBsAg) against values of test probability of 0.5 among Health Care Workers in Public Hospitals, White Nile State, Sudan, 2013; (n = 230)

Markers*	Category	N	Observed Prob.	Test Prob.	*P*-value	Conclusion
HBsAg	+ ve	62	0.27	0.5	0.001	Significant difference
	- ve	168	0.73			
	Total	230	1.00			

*Test used was Z test for single proportion

As Table (2) shows, 62 (27%) of the tested HCWs showed positive HBsAg, while 168 (73%) were negative for HBsAg marker. The *P*-value of Z- test was 0.001, which indicates a significant statistical difference between the prevalence of 27% and the tested rate of 50% (i.e. 0.5). So, there is a high carrier rate of HBV (measured by HBsAg) among HCWs in Public Hospitals, White Nile State, Sudan. The outcome of the test was that the carrier rate (measured by HBsAg) among the respondents was 27%. The lower and upper bounds of the prevalence of HBsAg was 26% and 31%, respectively; *P*-value = 0.001.

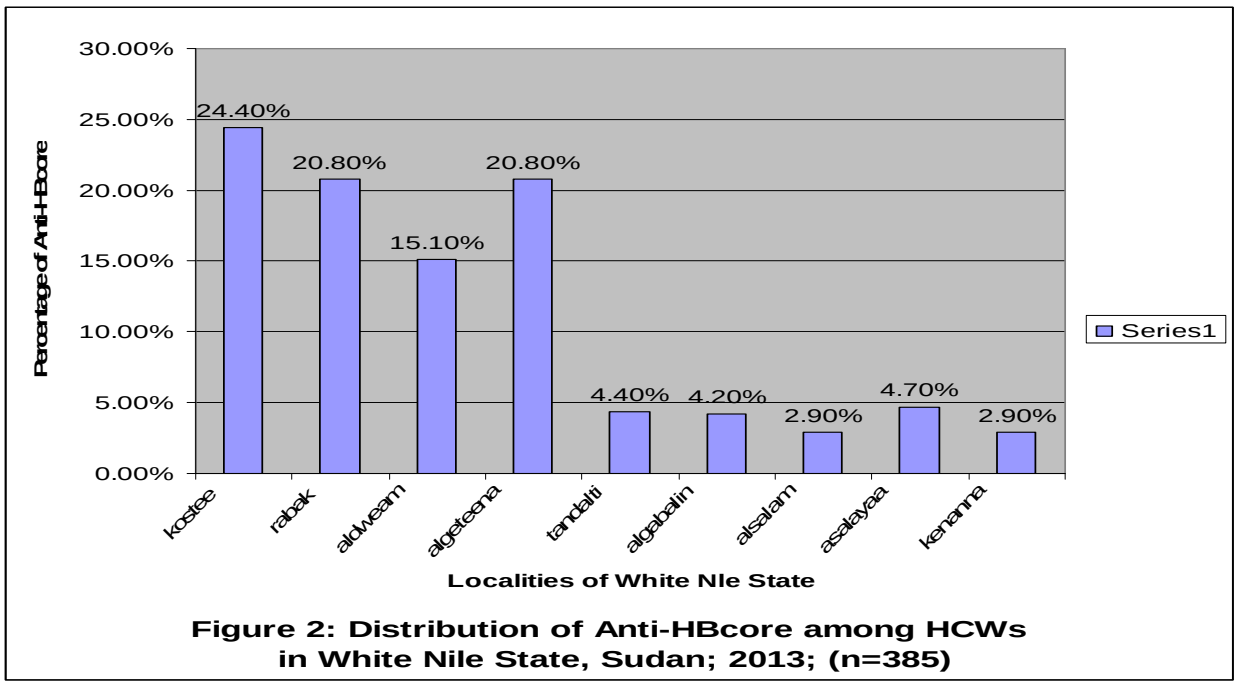

Figure 2: Distribution of Anti-HBcore among HCWs in White Nile State, Sudan; 2013; (n=385)

From Figure 2 we noticed that the highest percentage of HBV infection (24.4%) was among HCWs in Kostee locality; the least one (2.9%) were in Alsalam and Kenana localities.

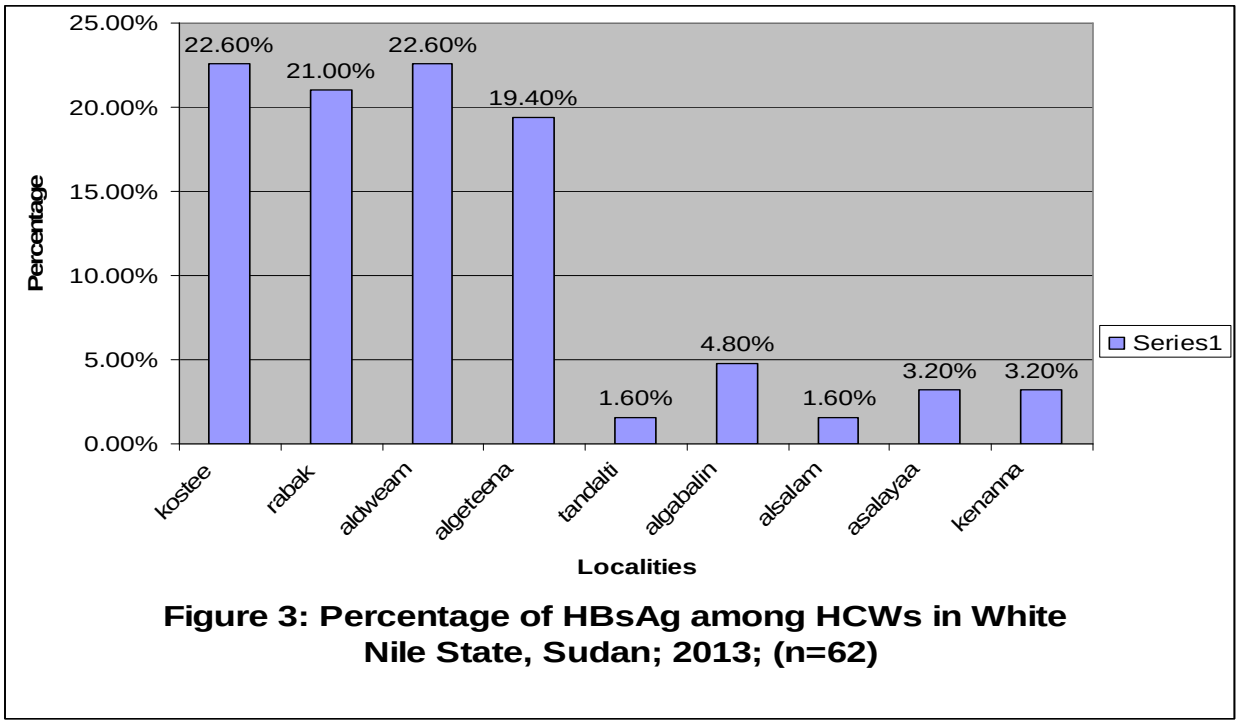

Figure 3: Percentage of HBsAg among HCWs in White Nile State, Sudan; 2013; (n=62)

Looking at Figure 3, Kostee and Aldweam localities have the highest percentage of carrier rate; while Tandalti and Alsalam localities have the least.

Table (3): Relation between sero-positivity of (Anti-HBcore and HBsAg) and the various demographic factors among HCWs in Public Hospitals in White Nile State, Sudan; 2014; (n= 385)

Demographic factors	Test	*P- value*	Conclusion
Localities	Anti-HBcore	.228	
	HBsAg	.569	
Gender	Anti-HBcore	.832	
	HBsAg	.390	
Education level	Anti-HBcore	.279	
	HBsAg	.193	Insignificant
Marital status	Anti-HBcore	.092	
	HBsAg	.174	
Occupation	Anti-HBcore	.373	

Looking at Table (3) there is no statistical association between the various demographic factors and the prevalence of Anti-HBcore and HBsAg among HCWs in Public Hospitals in White Nile State; Sudan.

Discussion

The study was an observational hospital base study. Three hundred and eighty five HCWs in Public Hospitals, White Nile State, Sudan, were enrolled. As shown by Z-test for single proportion there was a statistical difference between the expected (50%) and actual (60%) prevalence, p-value = 0.001, indicating that the difference was statistically significant. Sudan is one of the high endemic countries with HBV. [12 - 15]. There is a high rate of HBV infection among HCWs in Kostee and Aldweam localities in comparison to other localities; while carrier rate measured by HBsAg is high among HCWs in Kostee locality. These are the heavily populated localities in White Nile State and they have the more established hospitals in this State with regard to other localities. So, the high prevalence of both Anti-HBcore and HBsAg among HCWs may be due to their exposure to blood and body fluids of patients in this high endemic area. The result was consistent with many national studies as reported in Public Teaching Hospitals in Khartoum State, Sudan [11,16, 17]; the Gezira State of Central Sudan [18]; and international studies as that of Hepatitis B and E viral infections among Nigerian healthcare workers [6, 11, 15, 19, 20, 21]; and Southern State of India [5]

Conclusion and recommendation

The outcome of this study concluded that the infection and carrier rates of HBV were high among HCWs in Public Hospitals, White Nile State, Sudan. Vaccination and health education at the level of the community and health institutions were highly recommended.

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