

## **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) 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 pretested structures 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 of 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 areas 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 of < 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% to 78%, 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 also 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<sub>95%</sub>: 53%–60%) and 6.0% (CI<sub>95%</sub>: 4.0%–8.0%) respectively,  $P < 0.05$  [10].

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 health care workers (sample size = 252).

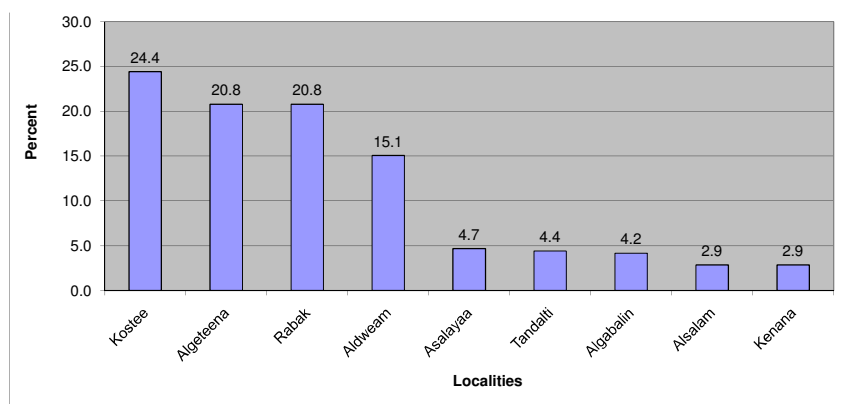
Group B: Hospitals with one specialty; with 157 health care workers (sample size = 33)

Group C: hospital with no specialty; with 469 health 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  $-20^{\circ}\text{C}$ , until testing. Using ELISA, all specimens were tested for anti- HB core; positive specimens for anti HB core were tested 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. The  $P$ -value  $\leq 0.05$  was considered statistically significant for the results.

## Result and discussion



**Figure (1): Distribution of the sample of Health Care Workers for the survey of Anti-HB-core 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 Kosteel, 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.

The sample composed of 154 males (40%) and 231 females (60%). Most of the HCWs 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 having university degree of education, 95 HCWs (24.7 %) were having high secondary certificates and 6 HCWs (1.6%) were having Quranic school education.

Regarding types of occupation position 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 HBV markers (Anti-HBcore, HBsAg) among Health Care Workers in Public Hospitals against the values of test probability of 0.5, White Nile State, Sudan, 2013; (n = 385)**

Markers*	Category	N	Observed Prob.	Test Prob.	P-value	Conclusion
Anti-HBC	+ ve	230	0.60	0.5	0.001	Significant difference
	- ve	155	0.40			
	Total	385	1.00			
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 (1) shows, 230 (60%) of the tested HCWs showed positive anti-B core marker, while 155 (40%) were negative for anti-HBcore marker. The *P*-value of the Z- test was 0.001, which indicates a significant 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:

**1. Anti-HBc:** 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-HBcore prevalence at 95% confidence level was 56% and 62% respectively,  $P$ -value = 0.001.

**2. HBsAg:** The carrier rate (measured by HBsAg) among the respondents was 27%. The lower and upper bound of the prevalence of HBsAg was 26% and 31%, respectively;  $P$ -value = 0.001.

## Discussion

The study was an observational hospital based study. Three hundred and eighty five HCWs in Public Hospitals, White Nile State, Sudan, were enrolled in this study. As shown by Z-test for single proportion there was a 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. [11, 12, 13, 14]. So, the high prevalence of both Anti-HBcore (indicating past or ongoing HBV infection) and HBsAg (which is a marker of chronic HBV infection) 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 [15, 16, 10]; the Gezira State of Central Sudan [17]; and international studies as that of Hepatitis B and E viral infections among Nigerian healthcare workers [18, 6, 119, 20, 10]; 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.

## References:

1. World Health Organization: Geographic Prevalence of Hepatitis B Prevalence, Fact sheet N°204 available from Available: from [surveillance/graphics/htmls/hepbprev.htm](http://surveillance/graphics/htmls/hepbprev.htm), Updated July 2013
2. Health on the net: Foundation of Hepatitis B; Version 4.1 Virology and Immunology Available from <http://www.hon.ch/Library/Theme/HepB/virology.html>
3. G Singh, MP Singh, I Walia, C Sarin, RK Ratho, Screening for hepatitis B and C viral markers among nursing students in a tertiary care hospital; Indian Journal of Medical Microbiology, 2010; volume 28; issue 1; page (78-79)
4. Rehman et al. Seroprevalence of HBV infection and viral loads in outpatients attending a district hospital located in Mardan, Pakistan. International Journal of Biosciences | IJB | Vol. 4, No. 5, p. 28-34, 2014

5. Kurien T, Thyagarajan SP, Jeyaseelan L, Peedicayil A, Rajendran P, Sivaram S, Hansdak SG, Renu G, Krishnamurthy P, Sudhakar K, Varghese JC; STD Study Group. Community prevalence of hepatitis B infection and modes of transmission in Tamil Nadu, India. *Indian J Med Res.* 2005 May; 121(5):670-5.
6. Mudawi HM. Epidemiology of viral hepatitis in Sudan. *Clinical and Experimental Gastroenterology J*, 2008; 1: 9–13.
7. Hunt, Richard (2007-11-21). "Hepatitis viruses". University of Southern California, Department of Pathology and Microbiology. available from <http://pathmicro.med.sc.edu/virol/hepatitis-virus.htm>
8. CDC, MMWR (morbidity and mortality weekly report). Comprehensive Immunization Strategy to Eliminate Transmission of Hepatitis B Virus Infection in the U.S.: Recommendations of the ACIP, Part 1: Immunization of Infants, Children and Adolescents, MMWR, Dec. 23, 2005, Vol. 54(RR-16)
9. Lavanchy."Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures: a review." *Journal of Viral Hepatitis*.2004; Vol. 11, No. 7, P: 97–107.
- 10.T A Elmukashfi, IM Elkhidir, OA Ibrahim, AA Bashir, MAA Elkarim, Occupational Hazards and HBV infection among health care workers in Public Teaching Hospitals in Khartoum State, Sudan: A multiple Discriminant Analysis: *Sudan Journal of Medical Sciences JMS*; Vol. 7, No.1. Mar 2012, Pages (1-7).
11. Health on the net: Foundation of Hepatitis B; Version 4.1Virology and Immunology Available from <http://www.hon.ch/Library/Theme/HepB/virology.html>
12. Simonsen L et al. Unsafe injections in the developing world and transmission of blood borne pathogens: a review. *Bulletin of the World Health Organization*, 1999, **77**: 789-800
13. Rasha M Elsheikh, Ahmed A Daak, Mohamed A Elsheikh, Mubarak S Karsany and Ishag Adam: Hepatitis B virus and hepatitis C virus in pregnant Sudanese women, *Virology Journal*: 2007, 4:104
14. Ola SO, Odaibo GN, Olaleye OD, Ayoola EA. Department of Medicine, College of Medicine, University of Ibadan, University College Hospital, Ibadan, Nigeria. Hepatitis B and E viral infections among Nigerian healthcare workers; *African Journal of Medicine and Medical Sciences* [2012, 41(4):387-391]
15. T A Elmukashfi, IM Elkhidir, OA Ibrahim, AA Bashir, MAA Elkarim, Hepatitis B virus infection among health care workers, in Public Teaching Hospitals in Khartoum State, Sudan; *Safety Science*, Volume 50, Issue 5, June 2012, Pages 1215-1217
16. T A Elmukashfi, IM Elkhidir, OA Ibrahim, AA Bashir, MAA Elkarim, Socio-Demographic Characteristics of Health Care Workers and Hepatitis B Virus (HBV) Infection in Public Teaching Hospitals in Khartoum State, Sudan; *Global Journal of Health Science*; Vol. 4, No. 4; May 2012 (37-41)
17. H. M. Y. Mudawi, H. M. Smith, S. A. Rahoud, I. A. Fletcher, O. K. Saeed, S. S. Fedial; Prevalence of Hepatitis B Virus infection in the Gezira State of Central Sudan; *The Saudi journal of gastroenterology*, April 2007; 13(2): 81-83

18. Fattovich G. Natural history of hepatitis B. J Hepatol, 2003; 39: S50-8
19. McCarthy MC, et al. hepatitis B and C in Joba, Southern Sudan, Tropical Medicine and Hygiene Journal, Volume 88, Issue 5, Pages 534-536 (September 1994)
20. A Nail, S Eltiganni, A Imam; Seroprevalence of Hepatitis B and C among health care workers in Omdurman, Sudan, Journal of Medical Sciences Vol. 3 (3) 2008: pp. 201-206