

Analysis of Hazards for Hepatitis B Virus, Across Departments and Occupations, Among Health Care Workers in Public Hospitals in White Nile State, Sudan, 2013

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Abstract: Background: Hepatitis B virus infection is a recognized occupational hazard for health care service providers. Aim: To determine hazard of HBV markers across department and occupation, among HCWs in public hospitals, White Nile State, Sudan. Methods: It was a cross sectional study, where 385 HCWs were selected randomly. Close ended questionnaire was used. From each respondent five ml venous blood was obtained, sera was separated and stored at -20° centigrade. Cross tabulation was performed together with Chi-square test. P value ≤ 0.05 was considered statistically significant. Result: Anti-HBcore: department of others (medicine, pediatrics, psychiatry, and ophthalmology) had got highest percentage (68.7%), followed by obs. (17.4%); the least was dentist (1.3%). Regarding occupation nurse got highest percentage (31.7%), followed by labor (27.8%); the least was pharmacist (2.6%). For HBsAg: department of others had got highest percentage of carrier rate (74.2%); followed by obs. (17.7%); the least was pharmacy (1.6%). For occupation, labor got highest percentage (27.4%), followed by nurse (25.8%); the least was pharmacist, nurse and midwife not nurse (1.6%). HBeAg: department of others had got highest percentage (72.4%); followed by obs. (20.7%); the least was surgery (6.9%). For occupation labor got highest percentage (34.5%), followed by doctor and Lab. technician (24.1%); the least was nurse-midwife, and operation assistant (3.5%). P value = 0.001. Conclusion: Statistically there was association between HBV infection and type of department and occupation. The most hazardous department was other (medicine, pediatrics, psychiatry, and ophthalmology). HBsAg and HBeAg were high among laborers as occupation.

Keywords: Hazard of HBV Markers, HCWs, Public Hospitals, White Nile State, Sudan

1. Introduction

1.1. Background Information

The major cause of morbidity and mortality, globally, is Hepatitis B virus together with hepatitis C virus infection. HBV is endemic in Sub-Saharan Africa. HCWs are more vulnerable group for contracting HBV infection. In a study

done in Indira Gandhi Medical College, Shimla, 5% of HCWs show positivity of HBsAg; 40% of this is among the laboratory technicians [1, 2]. Chronic HBV infection is common among Tanzanian HCWs [2]. The overall HBV infection rate among Nigerian healthcare workers (HCWs) is 65.9%; the highest portion of which is among the

Gynecologists and Obstetricians (80%) [3]. Infection and carrier rates among Iranian HCWs are 6.1% and 0.75% respectively and exposure to HBV and occupation is statistically associated among them [4]. In a study done among HCWs in Tanzania, 7.0% of them are chronically infected by HBV [5]. Reactive for HBeAg indicate high replication and accordingly high infectivity of the persons; they have 108 to 109 HBV particles per ml of blood [6]. Globally; transmission of HBV from patients to HCWs is more than to patients from HCWs; where surgery, gynaecology, and orthopaedic are leading departments in this hazard [7]. The overall carrier rate of HBV among HCWs in Najran region, Saudi Arabia is 8.7% [8]. Positive HbsAg among Northern Indian blood donors is 2.45% [9]. In a study done among HCWs in Public Hospitals, Khartoum State, Sudan; level of HBV markers is reported as: Anti-HBcore (57%), HBsAg (6%), and HBeAg (9%) [10]. InUm Zukra village in Gezira State of Central Sudan; Anti-HBcore and HBsAg is 47.5% and 6.9% respectively [11]. Hazards of HBV infection among Health Care Workers in Public Teaching Hospitals in Khartoum State, Sudan, reported significant statistical association with department and occupation; led by department of surgery and occupation of nurses [12].

1.2. Problem Statement and Justification

Due to high endemecity of HBV in the Sudan and scarce resources allocated for health section; we planned, by the year 2013, to study the hazard of HBV infection across the different departments and occupations among HCWs in Public Hospitals, White Nile State, Sudan; in order to provide base line data to be utilized by the health planners.

1.3. Objectives

- To determine the level of HBV markers (Anti-HBcore, HBsAg, &HBeAg) among HCWs in Public Hospitals, White Nile State, Sudan; 2013
- To measure the prevalence of HBV markers across departments and occupations in Public Hospitals, White Nile State, Sudan; 2013

2. Materials and Methods

2.1. Study Design

Cross sectional survey.

2.2. Study Area

Public Hospitals in White Nile State; Sudan; which are twenty three.

2.3. Study Population

They are 1808 heal care service providers working for more than 45 days in these hospitals.

2.4. Sample

Sample frame and sampling method:

It is composed of 1808 personnel working in 23 public hospitals in White Nile State. Using probability proportion to size; 13 hospitals were selected.

The sample size was calculated using the formula:

$$n = z^2 pq(1)$$

$$d^2$$

n= sample size

z=confidence coefficient=2.

p= prevalence rate= 50%.

q = (1-p) = 50%,

d (desired margin of error) = 0.05.

$$\text{So, } n = 2 \times 2 \times 0.5 \times 0.5 = 384.6 = 385$$

$$0.05 \times 0.05$$

Proportional to the number of HCWs, sample size was divided across departments.

Selection of sample and data collection:

Randomly the respondents were selected. Informed consent was obtained. For the socio-demographic information we used close end questionnaire. Five ml of venous blood were taken; sera was separated and stored at -20° centigrade. All respondents serum was tested for the presence of anti-HB core total; using ELISA. Reactive specimen was tested for HBsAg. Reactive specimen for HBsAg was tested for HBeAg.

2.5. Analysis

SPSS was used. Frequency of the different HBV markers was obtained. Cross-tabulation and Chi-square test were done; P value ≤ 0.05 was considered statistically significant.

3. Results

A total of three hundred and eighty five participants were surveyed. Two hundred and thirty one were female (60%). Age composition was: 30.9%, 20.0% and 13.2% in the age group (27-36 years), (47-56) and 57+ respectively. Marital status was: 60%, 39%, 3%, and 2% were married, single, widowed, and divorced respectively. About occupation 31.4%, 27.8%, 15.6%, 12.7%, 3.9%, 3.1%, 2.9%, and 2.6% were labour, nurses, doctors, technicians in labs and blood banks, nurse midwives, pharmacists, theatre attendants and Village midwives respectively. These ro-prevalence of Anti-HBcore Total, HBsAg and HBeAg was 59.7%, 27%, and 46.6%; respectively.

Table 1. Distribution of Anti-HBc across departments and occupations of HCWs.

Department	HCWs occupation								Total
	doctor	pharmacist	Nurse	Nurse-midwife	Midwife not nurse	Lab. Tech.	labour	Operation ass.	
Surgery	5 (20.8%)	0 (0.0%)	12 (50.0%)	1 (4.2%)	0 (0.0%)	0 (0.0%)	3 (12.5%)	3 (12.5%)	024 (10.4%)
Obs.	16 (40.0%)	0 (0.0%)	7 (17.5%)	5 (12.5%)	7 (17.5%)	0 (0.0%)	5 (12.5%)	0 (0.0%)	040 (17.4%)
Dentist	2 (66.7%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (33.3%)	0 (0.0%)	003 (1.3%)
Pharmacy	0 (0.0%)	4 (80.0%)	1 (20.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	005 (2.2%)
Other	15 (9.5%)	2 (1.3%)	53 (33.5%)	2 (1.3%)	0 (0.0%)	27 (17.1%)	55 (34.8%)	4 (2.5%)	158 (68.7%)
Total	38 (16.5%)	6 (2.6%)	73 (31.7%)	8 (3.5%)	7 (3.1%)	27 (11.7%)	64 (27.8%)	7 (3.1%)	230

* Results are significant at 5% according to Chi-square test (P=0.001).

Looking at Table 1, department of others had got the highest percentage of infection rate (68.7%), measured by Anti-Hcore; followed by obs. (17.4%); the least one was the dentist (1.3%). Regarding occupation nurse got the highest percentage (31.7%), followed by labour (27.8%); the least one was the pharmacist (2.6%).

Table 2. Distribution of HBsAg across departments and occupations of HCWs.

Department	HCWs occupation								Total
	doctor	pharmacist	nurse	Nurse-midwife	Midwife not nurse	Lab. Tech.	labour	Operation ass.	
Surgery	1 (25.0%)	0 (0.0%)	3 (75.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	04 (6.5%)
Obs.	8 (72.7%)	0 (0.0%)	0 (0.0%)	1 (9.1%)	1 (9.1%)	0 (0.0%)	1 (9.1%)	0 (0.0%)	11 (17.7%)
Dentist									
Pharmacy	0 (0.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	01 (1.6%)
Other	4 (8.7%)	0 (0.0%)	13 (28.3%)	0 (0.0%)	0 (0.0%)	11 (23.9%)	16 (34.8%)	2 (4.3%)	46 (74.2%)
Total	13 (21.0%)	1 (1.6%)	16 (25.8%)	1 (1.6%)	1 (1.6%)	11 (17.8%)	17 (27.4%)	2 (3.2%)	62 (100%)

* Results are significant at 5% according to Chi-square test (P=0.001).

Table 2, indicated that department of others had got the highest percentage of carrier rate (74.2%), measured by +veHBsAg; followed by obs. (17.7%); the least one was pharmacy (1.6%). For occupation laour got the highest percentage (27.4%), followed by nurse (25.8%); the least one was the pharmacist, nurse and midwife not nurse (1.6%).

Table 3. Distribution of HBeAg across departments and occupations of HCWs.

Department	HCWs occupation								Total
	Doctor	Pharmacist	nurse	Nurse-midwife	Midwife not nurse	Lab. Tech.	labour	Operation ass.	
Surgery	1 (50.0%)		1 (50.0%)	0 (0.0%)		0 (0.0%)	0 (0.0%)	0 (0.0%)	02 (6.9%)
Obs.	5 (83.3%)		0 (0.0%)	1 (16.7%)		0 (0.0%)	0 (0.0%)	0 (0.0%)	06 (20.7%)
Dentist									
Pharmacy									
Other	1 (4.8%)		2 (9.5%)	0 (0.0%)		7 (33.3%)	10 (47.6%)	1 (4.8%)	21 (72.4%)
Total	7 (24.1%)		3 (10.3%)	1 (3.5%)		7 (24.1%)	10 (34.5%)	1 (3.5%)	29 (100%)

* Results are significant at 5% according to Chi-square test (P=0.001).

Table 3, showed that department of others had got the highest percentage of high profile infectivity rate (72.4%), measured by +veHBeAg; followed by obs. (20.7%); the least one was surgery (6.9%). For occupation labour got the highest percentage (34.5%), followed by doctor and Lab. technician (24.1%); the least one was the nurse-midwife, and operation assistant (3.5%)

4. Discussion

Due to the high endemicity of HBV infection in this area [1], the department of others (medicine, pediatrics, ophthalmology and psychiatry) which are not at high level of exposure, had got the highest percentage of infection rate (68.7%), measured by Anti-Hcore. This is similar to the finding to the overall HBV infection among Nigerian healthcare workers (HCWs) which is 65.9% [3]. It was

deferred in that the highest infection rate is among the Gynecologists and Obstetricians (80%) [3]. Here, in our study, obs. was the second one (17.4%); the least was dentist (1.3%). It is near to level of HBV infection among HCWs in Khartoum State; Sudan [10].

Regarding occupation, nurses got the highest percentage (31.7%), followed by labour (27.8%); the least one was the pharmacist (2.6%). This is consistent with national study among HCWs in Khartoum State; Sudan; where nurses have got the highest level of HBV infection [12]. Regarding carrier rate (+veHBsAg) department of others (medicine, pediatrics, ophthalmology and psychiatry) had got the highest percentage of carrier rate (74.2%); followed by obs. (17.7%); the least one was pharmacy (1.6%). This is a very high hazardous level for spreading of HBV infection. It is similar to what is reported in a case control study for the relation of HBV with hepatocellular carcinoma, in Khartoum, where

67% of patients have +veHBsAg [13]. For occupation laour got the highest percentage (27.4%), followed by nurse (25.8%); the least one was the pharmacist, nurse and midwife not nurse (1.6%). This can be due to the fact that HBV infection is endemic in this region and that laborers have a higher exposure to waste products together with low compliance with infection control measures.

As far as a profile of high infectivity (+veHBeAg), department of others (medicine, pediatrics, ophthalmology and psychiatry) had got the highest percentage of high profile infectivity rate (72.4%); followed by obs. (20.7%); the least one was surgery (6.9%). For occupation labour got the highest percentage (34.5%), followed by doctor and Lab. technician (24.1%); the least one was the nurse-midwife, and operation assistant (3.5%). This is a very high and serious level of +veHBeAg. We did not come across this level in research nationally or internationally. To our knowledge the possible explanation is that HBV infection is highly endemic in this region.

5. Conclusion

Statistically there was association between HBV infection and type of department and occupation. The most hazardous department was other (medicine, pediatrics, psychiatry, and ophthalmology). HBsAg and HBeAg were high among laborers as occupation.

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