

## Prevalence and correlates of hepatitis B and C seropositivity among health care workers in a semi urban setting in North Central Nigeria

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### Abstract

**Background:** Health care workers are at risk of acquiring hepatitis B and C infections from patients in the course of providing care to them. The study is thus aimed at determining the prevalence and correlates of hepatitis B and C amongst health care workers of a secondary health care facility in north-central Nigeria as a means of disease prevention.

**Methods:** This was a cross sectional study and recruitment was on the basis of arrival at the study venue, without any random selection. A structured questionnaire was used to determine relevant socio-demographic variables and risk factors for hepatitis B and C. Antibodies to HCV and Hepatitis B surface antigen were detected using enzyme linked immuno-absorbant assay (ELISA).

**Results:** The complete (three doses) hepatitis B vaccine uptake was 21.3%. The seroprevalence of hepatitis B and C were 8.4%

and 6.5% respectively. Co-infection was found in 1.3% of workers. Staff who were married or had ever been married were less likely to have hepatitis B compared to those who were single (OR = 0.07; 95% CI 0.01 – 0.69), and those who did not have a personal clipper for barbing had a fivefold likelihood of being hepatitis B seropositive compared to those who had a clipper (OR = 5.24; 95% CI 1.18 – 23.23).

**Conclusion:** There is a high sero-prevalence of hepatitis B and C and a low prevalence of Co-infection amongst workers.

**Keywords:** Prevalence, Correlates, Hepatitis B, Hepatitis C, Health care workers

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### Introduction

Hepatitis B virus (HBV) is a major cause of chronic hepatitis, cirrhosis and hepatocellular cancer. About 2 billion people worldwide have been infected with HBV, and an estimated 360 million remain chronically infected with almost one million people dying annually of HBV-related liver disease.<sup>1</sup> It is also estimated that about half of the 360 million who are chronically infected acquired their infections either perinatally or in early childhood and the remaining by other means.<sup>1</sup> Globally, an estimated 130 – 170 million persons are living with hepatitis C virus and more than 350 deaths are attributed to HCV each year.<sup>2</sup> Almost one fifth of the world's prevalent cases of hepatitis C virus (HCV) occur in Africa and HBV prevalence across sub-Saharan Africa is estimated at 2–8%.<sup>3</sup> The prevalence of HBV infection in Nigeria is estimated to be 2.4–18.4% while the seroprevalence of anti-HCV is 3.6% to 5%.<sup>4</sup> A systematic review and meta-analysis to determine the prevalence of hepatitis B virus infection in Nigeria gave a pooled

prevalence of 13.6%.<sup>5</sup>

The prevalence of HBV and HCV in a population can be predicted by the risk factors associated with the transmission of the infection such as injections, blood products, transfusion, surgical procedures, body tattooing, work-place injuries, sexual behavior vertical transmission and a history of not being vaccinated against HBV.<sup>4</sup> The burden of exposure to blood-borne pathogens (such as hepatitis B and C viruses) is considerable for health care workers. Hepatitis virus transmission requires a non-immune host, an infectious source, and skin or mucous membrane injury. These three aspects are the main fields for prevention interventions.<sup>6</sup> Despite several efforts to prevent transmission, HBV and HCV infections remain major public health problem to humans and more so to health care workers and their families, due to their regular contact with patients. Health care workers who are infected with HBV and HCV also stand the risk of infecting patients who may in turn infect their families.<sup>6</sup>

This study was set out to determine prevalence of Hepatitis B and C virus infection among health care workers (HCW) in an institution using serological methods. The findings are expected to preempt the review of pre-employment and periodic medical checkups amongst health care workers with respect to routine screening in health institutions in the country as well as policies regarding hepatitis B vaccination for health care workers.

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## Materials and Methods

This was a cross sectional study conducted at Vom Christian Hospital, Jos in January 2015 amongst health care workers. Vom Christian Hospital, situated in Jos South local government area of Plateau state, is a faith based hospital that provides secondary health care services. It is the only secondary level care hospital in Vom and its environs and offers health care services to the surrounding communities. With support from the hospital management, all staff at the time of the study was invited to the study recruitment site within the premises of the hospital, based on the different sections in the hospital over a one week period. All consenting hospital workers were eligible for recruitment and there were no exclusion criteria.

Ethical clearance for the study was obtained from the Research and Ethics Committee of the Jos University Teaching Hospital, Jos. Informed written consent was obtained from the patients after explaining the nature and purpose of the study. Data was obtained using a structured questionnaire where bio-data, risk factors for hepatitis and relevant past medical history was sought. Information obtained included: occupational history, past medical and surgical history, history of exposure to sharp objects, sexual history and vaccination history.

Data was analyzed using Epi info 3.5.3 statistical software (CDC, Atlanta GA) and represented as frequencies and percentages. The Chi square test was used to test association between socio-demographic parameters and high-risk activities and the outcome of interest (hepatitis B and C seropositivity). Logistic regression model that included variables that had  $P \leq 0.25$  on bivariate analysis was used to determine the predictors of HBV and HCV seropositivity. Probability values  $< 0.05$  were considered significant.

## Results

### Description of study population

The study had 155 persons (87%) enrolled into the study out of the 178 hospital workers. Most 90 (58.1%) were female and the mean age was  $42 \pm 11$  years. Majority of the participants 133 (85.8%) were married or had been married before and about half, 79 (51.0%) had a secondary school education or less. The distribution of enrollees based on work cadre was as follows: Health service providers (HSP); doctors, laboratory scientists/technicians, nurses, other clinical staff and pharmacist/pharmacy technicians totaled 63 (40.6%) while health management and support workers; attendants and 'support staff' were 92 (59.4%). Eighty-four participants (54.2%) had practiced for ten years or less and 106 (68.4%) with more than ten year's work experience in the hospital. Participants' characteristics are shown in Table 1.

Table 1: Socio-demographic factors and prevalence of hepatitis B and C in Vom

Variables	Total (%)	HBV +	HCV +
<b>Gender</b>			
Female	90 (58.1)	7 (7.8)	5 (5.6)
Male	65 (41.9)	6 (9.2)	5 (7.7)
<b>Age &gt; 42 years</b>			
Married	75 (48.4)	8 (10.7)	6 (8.0)
<b>Work Cadre</b>			
Attendants	112 (72.3)	4 (3.6)	8 (7.1)
Doctors	47 (30.3)	5 (10.6)	3 (6.4)
Lab	5 (3.2)	1 (20.0)	0 (0.0)
Nurses	10 (6.5)	0 (0.0)	1 (10.0)
Pharmacy	35 (22.6)	4 (11.4)	4 (11.4)
Other clinical staff	7 (4.5)	0 (0.0)	0 (0.0)
Support staff	7 (4.5)	1 (14.3)	0 (0.0)
<b>Educational qualification</b>			
Nil formal education	44 (28.4)	2 (4.5)	2 (4.5)
Primary	7 (4.5)	1 (14.3)	0 (0.0)
Secondary	46 (29.7)	2 (4.3)	3 (6.5)
Tertiary	26 (16.8)	3 (11.5)	1 (3.8)
Years employed in VCH >6	76 (49.0)	7 (9.2)	6 (7.9)
Years employed in health industry > 10	77 (68.4)	7 (9.1)	5 (6.5)
Years employed in health industry > 10	71 (45.8)	7 (9.9)	5 (7.0)

VCH: Vom Christian Hospital

### HBV/HCV seropositivity, bivariate and multivariate analysis

The complete (three doses) hepatitis B vaccine uptake was 21.3%. HBsAg and anti-HCV seropositivity were seen in 13 (8.4%; 95% CI 4.5 to 13.9%) and 10 (6.5%; 95% CI 3.1 to 11.5%) participants respectively. HBV and HCV co-infection occurred in two (1.3%; 95% CI 1.2 to 30.4%). Risk factors for HBV and HCV are as presented in Table 2. Due to the low prevalence of hepatitis B and C co-infection, no further statistical analysis were performed.

Bivariate analysis did not show any significant relationship between the variables of gender, older age, marital status, education, prior surgery, accidental needle stick injuries and hepatitis B or C seropositivity (Table 2). The other known risk factors for HBV and HCV infections were also not associated with seropositivity among the participants. Using variables with a  $p \leq 0.25$  from the bivariate analysis, a multivariate analysis showed that being married or having ever been married (OR= 0.07; 95% CI: 0.01 – 0.69) and not having a personal clipper for barbing (OR= 5.24; 95% CI: 1.18 – 23.23) had a significant relationship with being hepatitis B positive. Multivariate analysis did not show any significant relationship with being hepatitis C positive.

Table 2: Risk factors for hepatitis B and C and bivariate analysis

Variables	No (%)	Hepatitis B			Hepatitis C		
		OR	95% CI	p	OR	95% CI	p
Male	65 (41.9)	1.21	0.39 - 3.77	0.48	1.42	0.39 - 5.11	0.41
Age > 42 years	75 (48.4)	1.79	0.56 - 5.74	0.24	1.65	0.45 - 6.10	0.33
Ever married	133 (85.8)	0.33	0.09 - 1.17	0.09	1.52	0.18 - 12.66	0.57
Health service providers	63 (40.6)	0.78	0.25 - 2.45	0.44	0.67	0.18 - 2.41	0.38
Tertiary Education	76 (49.0)	1.23	0.39 - 3.86	0.47	1.61	0.44 - 5.94	0.35
>6 years working in VCH	77 (49.7)	0.83	0.27 - 2.60	0.49	0.99	0.27 - 3.55	0.61
>10 years in practice	71 (45.8)	0.70	0.23 - 2.20	0.37	0.84	0.23 - 3.01	0.52
Hepatitis B status of partner Reactive	9 (5.8)	0.00	*	0.44	0.00	*	0.54
Household with person with chronic HBV infection	7 (4.5)	1.89	0.21 - 17.01	0.47	2.57	0.28 - 23.74	0.38
Household with person with chronic HCV infection	2 (1.3)	0.00	*	0.84	16.00	0.92 - 277.29	0.13
History of surgical procedure (Yes)	52 (33.5)	0.87	0.25 - 2.97	0.55	0.84	0.21 - 3.39	0.55
History of blood transfusion (Yes)	19 (12.3)	0.78	0.09 - 6.56	0.65	0.78	0.09 - 6.56	0.65
Tattoos/scarification marks (Yes)	4 (2.6)	0.00	*	0.70	5.26	0.49 - 55.78	0.24
Ever been sexually active (Yes)	108 (69.7)	0.67	0.21 - 2.17	0.35	1.80	0.37 - 8.82	0.37
Multiple sexual partners	4 (2.6)	0.00	*	0.70	5.26	0.49 - 55.78	0.24
Do not use condoms	143 (92.3)	2.40	0.47 - 12.35	0.27	0.00	*	0.44
Past history of STD (Yes)	25 (16.1)	0.41	0.05 - 3.30	0.34	1.33	0.26 - 6.65	0.50
Pedicure / Manicure (Yes)	14 (9.0)	0.83	0.09 - 6.88	0.67	1.13	0.13 - 9.62	0.62
Sharing of I.V Drug (Yes)	7 (4.5)	0.00	*	0.53	0.00	*	0.62
No personal clipper for barbing	21 (13.5)	3.27	0.91 - 11.78	0.08	0.69	0.08 - 5.78	0.08
Use of hairstyling pin (Masila) for plaiting (Yes)	51 (32.9)	0.59	0.15 - 2.24	0.33	2.15	0.59 - 7.80	0.19
Accidental NSI (Yes)	61 (39.4)	1.90	0.61 - 5.96	0.20	1.59	0.44 - 5.74	0.35
Shared tooth brush (Yes)	2 (1.3)	0.00	*	0.84	16.00	0.92 - 277.29	0.12
Not been fully vaccinated (HBV)	122 (78.7)	0.65	0.14 - 3.09	0.45	1.64	0.40 - 6.74	0.36

Key: \*: Undefined, NSI – Needle Stick Injury, VCH: Vom Christian Hospital, HBV: Hepatitis B Virus, HCV: Hepatitis C Virus

Table 3: Multivariate logistic regression of risk factors hepatitis B and C

Hepatitis B seropositive			
Variable	OR	95 % CI	P - value
Accidental NSI	2.35	0.65 - 8.40	0.19
Married or ever been married	0.07	0.01 - 0.69	0.02
Age (>42 years)	5.66	0.67 - 47.74	0.11
Do not have a personal clipper for barbing	5.24	1.18 - 23.23	0.03
Hepatitis C seropositive			
Variable	OR	95 % CI	P - value
Household with Chronic hepatitis C	5.27	0.06 - 31.26	0.46
Masila for plaiting	2.03	0.52 - 7.93	0.31
More than one sex partner	1.14	0.02 - 78.49	0.95
Previous history of blood transfusion	0.64	0.06 - 6.65	0.71
Shared tooth brush	8.17	0.08 - 845.57	0.37
Tatoos / Scarification marks	6.86	0.60 - 77.81	0.12

## Discussion

This study reports a sero-positivity rate of 8.4% for HBV, 6.5% for HCV and 1.3% for HBV/HCV co-infection amongst HCW of a semi-urban secondary health care facility located in north central Nigeria. Based on WHO criteria, the study results shows a high prevalence for

hepatitis B and C and a low prevalence for hepatitis B and C co-infection.<sup>7</sup>

The prevalence of HBsAg in the study is lower than that found amongst HCW in an urban community in south – south Nigeria where a prevalence of 17.0% was found.<sup>8</sup> It is also lower than results from a systematic review and meta-analysis to determine the prevalence of hepatitis B virus infection in Nigeria where the pooled prevalence was 13.6% and that amongst subgroups was 14.0% for blood donors; 14.1% for pregnant women attending antenatal care clinics; 11.5% for children; 14.0% among adults; and 16.0% for studies evaluating adults and children.<sup>5</sup> It is however higher than 5.04% found in Calabar, which was however amongst staff who were just being employed and may not have had many years of exposure to the risks associated with being a HCW.<sup>9</sup> The prevalence of HBsAg and anti-HCV antibodies among HCW in a rural community in Cameroon were reported as 6.3% and 1.7% respectively, which is lower than that in our study.<sup>10</sup> The low prevalence seen in Cameroon may be because students constituted about one-sixth of the study population.

The study done in south – south Nigeria was among several hospitals in an urban community.<sup>7</sup> The cadre of



HCW may also have contributed to a higher prevalence in the South – South Nigeria study, since it had more professionals recruited in the study.<sup>7</sup> It is however possible that the study area being an old faith based hospital has had relatively good standard practices and has positive lifestyle practices protecting the staff from contracting the disease.

Several studies in urban settings in various countries reported relatively lower prevalence rates. In Tanzania, a seroprevalence of 7.0% was reported for hepatitis B and 1.2% for HCV respectively<sup>11</sup> while 2.9% and 1.3% respectively in Rwanda<sup>3</sup> and 8.7% and 0.3% respectively in Saudi Arabia.<sup>12</sup> The studies in Rwanda and Saudi Arabia recruited medical and nursing students because they were considered to have regular duties in patient care.

The prevalence of hepatitis B and C amongst health workers of Civil hospital Karachi were 2.4% for HBsAg and 5-6% respectively.<sup>13</sup> The prevalence of hepatitis B and C viruses among medical staff in Ramadi general hospital is 0.94 and 0.71 respectively.<sup>14</sup> These studies did not state what the hepatitis B vaccine uptake rate was so a comparison is difficult.

Multivariate regression revealed that study participants who had ever been married were less likely to have a positive HBV test and those who did not have a personal clipper for barbing were more likely to have a positive HBV test. There was no statistically significant association with being hepatitis C reactive. It is likely that those who are married may have had a pre-marital hepatitis B screen and those who tested negative, had the hepatitis B vaccine. The practice of pre-marital screening for hepatitis B should be encouraged as both partners will benefit from the test irrespective of the outcome of the result. Those who did not have a personal clipper for barbing were more likely to have HBV. Sharing hair clippers is a potential risk for hepatitis as there may be skin abrasions and subsequent transmission of infection from one person to the other. Individuals should be encouraged to possess their personal clippers for barbing. There was a poor completion rate for hepatitis B vaccine with only 33 (21.3%) completing the series. This is much lower than what was found amongst workers in southern Nigeria where 59.4% had completed the vaccination schedule.<sup>15</sup> However, among health workers in Enugu only 3.7% had received a complete dose and the most common reason for non-vaccination was lack of opportunity (43.08%).<sup>16</sup> In a study to determine the prevalence of hepatitis B vaccination among health care workers in Nigeria in 2011 – 12, 185 (36.2%) had full coverage of three doses.<sup>17</sup> In a study done in Rwanda, only 3 participants (0.8%; 3/378) had received the complete recommended three-dose vaccination course.<sup>3</sup> The low hepatitis B vaccine completion rate, 21.3% we found, is likely to be due to poor knowledge about the

benefit of the vaccine in effectively preventing HBV infection<sup>15</sup> and awareness often correlates with behavior.<sup>18</sup> HCW perception of being careful enough when handling patient's samples as reported in a study amongst interns might be responsible.<sup>18</sup> Some studies have shown that self-motivated uptake of a full course of vaccine is better in smaller health centers, 92.0%, compared to district hospitals 44.0%.<sup>19</sup> Our study was conducted in a faith based institution comparable to a district hospital.

Our study had some limitations. Firstly, our sample size is relatively small. Lastly, we were unable to confirm the seropositivity by other methods. However, our study provides data for formulation of health management policies.

In conclusion, we found a high seroprevalence of hepatitis B and C and a low prevalence of Co-infection amongst workers. These findings lend support to the need for a national health policy regarding routine screening of health care workers for hepatitis B and C as an essential step to the prevention of the disease and morbidity. Identified risk factors should also be incorporated into targeted education for healthcare workers serving in hospitals.

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