Sero-prevalence of Hepatitis B Virus among Ambulance Drivers and Mortuary workers in Plateau State

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ABSTRACT

Aims:: To determine the prevalence of Hepatitis B Virus among Ambulance Drivers and Mortuary workers in Plateau State with possible associated risk factors for the infection

Study design: Rapid Immunochromatographic Assay (Strip test) and Indirect Enzyme Linked Immunosorbent Assay (ELISA)

Place and Duration of Study: Various hospitals in plateau state(Jos University Teaching Hospital (JUTH) in Jos, Plateau State Hospital in Jos, Air-Force base Hospital in Jos, Our Lady of Angels Hospital in Jos, MRS Hospital in Bassa Local government and Pankshin General Hospital in Pankshin Local Government in Plateau State) between December 2015 and February 2016.

Methodology: Eighty (80) blood samples were collected from Ambulance Drivers and Mortuary workers from various hospital for the determination of Hepatitis B surface Antigen and Hepatitis B core Immunoglobulin-M Antibody. Rapid Immunochromatographic Assay (Strip test) and Indirect Enzyme Linked Immunosorbent Assay (ELISA) were used in the analyses of the samples.

Results: Out of 80 samples screened, 6 (7.5%) were positive for Hepatitis B surface Antigen and 7(8.8%) were positive for the Hepatitis B core Immunoglobulin-M antibody. Of the 80 samples analyzed, 56 were males of which 2 (3.6%) were positive for Hepatitis B core Immunoglobulin-M antibody and 3(5.4%) were positive for Hepatitis B core Immunoglobulin-M Antibody respectively. In Females, 4 (16.7%) were positive for Hepatitis B surface antigen and 4 (16.7%) tested positive for Hepatitis B surface antigen. The presence of anti-Hepatitis B core Antibody (HBcAb) indicates previous or ongoing infection with Hepatitis B Virus. The 7 positive samples for Hepatitis B Immunoglobulin-M Antibody in this study indicate recent or acute infection with Hepatitis B Virus.

Conclusion: The use of Personal Protective Equipment (PPE), well screened blood, vaccination and having one sexual partner needs to be advocated through public enlightment campaigns or education for proper prevention of Hepatitis B Virus infection among Health care workers.

Keywords: [Hepatitis B, Immunoglobin, antigen, Mortuary, Ambulance}

1. INTRODUCTION

Hepatitis B is an infectious inflammatory disease of the liver which can potentially result in permanent damage of the liver. It is caused by a viral Hepatitis B which has caused epidemic in part of Asia and Africa and it is endemic in China. In the world population, about a third of it has been infected at one point of their lives with Hepatitis B Virus including 350 million that are said to be chronic carrier [1]. HBV is mostly a double-stranded DNA virus of 3,200 nucleotides belonging to the family Hepadnaviridae (from heap, liver and DNA for the type of genome). The DNA strand of negative polarity is transcribed inside the core particles from an encapsulated RNA template [2].

About 75% of the Nigeria population must have been exposed to the virus at one time or the other in their life time. Mozambique is said to be highest ranking in terms of infection in Sub – Saharan African, followed by Nigeria [3] The increase in demand for health services, violent events and blood transfusion increases the possibility of the transmission of HBV (and other blood borne pathogens) through contaminated blood as reported by United Nation System in Nigeria [4]. [5] described five distinct unrelated viruses that causes hepatitis: Hepatitis A virus (HAV), Hepatitis E virus (HEV),

Hepatitis B virus (HBV), Hepatitis C virus (HCV) and Hepatitis D (delta) virus (HDV). Hepatitis A and E virus (HAV and HEV) are the causes of infection or epidemic Hepatitis and are transmitted by the feacal-oral routes [6]. HBV and HCV also known as non-A, non-B are transmitted through blood and blood products and are hyper-endemic in most human populations [7]. HBV and HCV are associated with chronic hepatic disease and also with primary cancer. HDV is known to co- infect patient with Hepatitis B surface antigen (HBsAg) carriers [8].

The diagnosis of HBV infection is generally made on the basis of serology. Virtually all the individual infected with HBV, either acutely or chronically will have detectable serum HBV. The clinical spectrum of HBV infection ranges from sub-clinical to acute symptomatic Hepatitis or rarely fulminant Hepatitis during the acute phase and from inactive HBsAg carrier state, chronic Hepatitis of various degree of histologic severity to cirrhosis [9] . Approximately 15-40% of people who develop chronic Hepatitis B are expected to progress to cirrhosis, an end stage liver disease [10]. In acute infection, HBV is detected several weeks after infection and its appearance coincidence with onset of clinical symptoms [11]. Acute Hepatitis B infection does not usually require treatment because most adults have the infection spontaneously. Early antiviral treatment may only be required in less than one percent of patient, whose infection takes a very aggressive course. On the other hand, treatment of chronic infection may be necessary to reduce the risk of cirrhosis and liver cancer. Currently, there are medications licensed for treatment of HBV in the United States. These include, Lamividine, adefovir, tenofovir, telbivudine and entecavir. The treatment lasts from 6 months to a year, depending on medication in and genotypes [12].

The virus gains entry into the host through a variety of possible portals of entry. Hepatitis B virus primarily interferes with the functions of the liver by replicating in liver cells, known as hepatocytes [13]. Hepatitis B virus itself does not cause cell death. Hepatocytes killing is mediated by cytotoxic T lymphocytes directed against virus infected cells [14]. When the virus attaches itself to a liver cell, the core particle releases its content of DNA and polymerase into the liver cell nucleus. During HBV infection, the host immune response causes both heptocellular damage and viral clearance. Although the innate immune response does not play a significant role in these processes, the adaptive immune response, particularly virus specific cytotoxic T lymphocytes (CTLS), contribute to most of the liver injury associated with HBV infection [13].

Hepatitis B Virus can be spread among health workers. Transmission usually occurs from unsafe practices which often could have been avoided with standard precautions and appropriate aseptic techniques. Transmission is typically associated with unsafe injection practices, as exemplified by several occurrences that occur in ambulatory health care settings [1].This viral DNA has been detected in the tears, saliva and urine of chronic carriers, blood transfusion, dialysis, acupuncture and tattooing [15].

Prevalence of Hepatitis B Virus has considerable economic implication because some of its implication such as cirrhosis and cancer place a great demand on health care system. Chronic Hepatitis B Virus infection and cirrhosis of the liver are well recognized factors for hepatocellular carcinoma (HCC) and liver failure is the main causes of death, currently more than one million people die each year from the consequence of Hepatitis B Virus infection [10].

To prevent transmission of Hepatitis B virus among ambulance drivers, mortuary workers and also other health workers, they must adhere to standard precautions and follow fundamental infection control principles, including safe injection practices, safe wound cleansing and appropriate aseptic techniques [16]. These principles and practices need to be made explicit in institutional policies and reinforced through in-serviced education to all personnel involved in direct patient care including those in ambulatory care settings and post mortem services. The effectiveness of these measures should be monitored as part of the oversight process. In addition, prompt reporting of suspected health care related cases coupled with appropriate investigation and improved monitoring of surveillance data are needed to accurately characterize and prevent healthcare related transmission of viral Hepatitis [16].

Hepatitis B Virus prevalence has been carried out mostly among different population. Based on the level of studies and virulence of Hepatitis B Virus, not much awareness and research has been done on its prevalence among health workers, ambulance drivers and mortuary workers in Plateau State. This study therefore is geared towards determining the prevalence of HBV among Health care such as the Ambulance Drivers and Mortuary workers in Plateau State in relation with their age and sex.

2. METHODOLOGY

2.1 Sample Population

A total number of 80 blood samples were collected from ambulance drivers and mortuary workers between the age of 21 and 80 at various Hospitals in Plateau State for the detection of Hepatitis B Virus. The study included only voluntary mortuary workers and ambulance drivers in Plateau State.

2.2 Sample Collection

Three ml of blood was collected from each of the Ambulance Drivers and Mortuary workers from the anterior cubital vein of the fore arm using a sterile disposable needles and syringes.

The blood sample was dispensed into a plain plastic container and was centrifuged at 3000rpm for 5minutes and the serum was carefully harvested into a dry, clean and well labeled cryovial tubes. Meanwhile, consent of each of the Ambulance drivers and Mortuary workers was duly obtained and questionnaire was given to them all in which was filled before the collection of their blood sample.

2. 3 Sample Analysis

Hepatitis B surface antigen was tested for in the serum sample collected using Hepatitis B virus using the rapid strip (Rapid Immunochromatographic Assay) and Hepatitis B core Antibody (HBcAb) IgM was tested for using Enzyme Linked Immunosurbent Assay method (ELISA).

2.4 TEST PRINCIPLE

2.4.1 HBsAg rapid strip test principle

The HBsAg Hepatitis B surface Antigen test strip (Global® Test strip manufactured by Global Diagnostics, U.S.A) is a qualitative lateral flow immunoassay for the detection of Hepatitis B surface antigen in serum or plasma. The membrane is pre-coated with anti-HBsAg antibodies on the test region of the strip. During testing, the serum or plasma specimen reacts with the particles coated with the ant-HBsAg antibody. The mixture migrates upward on the membrane chromatographically by capillary action to react with anti-HBsAg antibodies on the membrane and generate a colored line. The presence of this colored line in the test region indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a colored line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking as occurred [17].

2.4.2 HBcAb ELISA test principle

The system of the AccuDiag™ HBcAb IgM ELISA test is founded on the solid phase, one-step incubation competitive principle. When anti-HBc is present, it competes with monoclonal anti-HBc conjugated to horseradish peroxidase (HRP-Conjugate) for a fixed amount of purified HBcAg pre-coated in the wells. If no anti-HBc is present, HRP-Conjugate anti-HBc will be bound together with antigens inside the wells. In the course of washing, any unbound HRP-Conjugate is removed. After chromogen solution A and Bare added into the wells and during incubation, a blue-coloured product appears when the colourless chromogens are hydrolyzed by the bound HRP-Conjugate. After the reaction is stopped with sulfuric acid, the blue colour turns yellow. A presence of antibodies to HBcAg IgM in the sample is indicated by low color, or no color present at all [18]

Assay principle scheme; competition ELISA

Ag(p) + Ab(s) + (Ab)ENZ =[Ag(p) - Ab(s)] = No color (+)

Ag(p) + (Ab)ENZ = [Ag(p) - (Ab)ENZ] = Blue + Yellow Color(-)

Incubation immobilized complex coloring result

Ag(p) - pre-coated HBcAg;

Ab(s) - anti-HBc in sample

(Ab)ENZ- HRP conjugated anti-HBc.

2.5 TEST PROCEDURE

2.5.1 HBsAg test procedure (Global® rapid test strip kit)

All samples and test strip kit were brought into room temperature (22°C) and the test strip were removed from the park and placed on surface level. The strips were immersed into the serum following the direction of the arrow, pointing towards the serum. The strips were removed after 10 seconds and laid on a flat, clean, dry, non-absorbent surface. The results were read after 15 minutes.

2. 5.2 HBcAb test procedure (AccuDiag™ ELISA kit)

The reagents and samples were allowed to reach room temperature (18-30°C) for at least 15-30 minutes. The wash buffer concentrate was checked for the presence of salt crystals and no crystal was formed. The stock wash buffer was diluted at 1 to 20 with distilled or deionized water using clean vessel.

The wells were numbered using three negative controls (B1, C1, and D1) and two positive controls (E1, F1) and one blank. (A1)

Positive control (50µl) was added to well E1, F1 and wells 1 to 80. 50µl of negative control was also added to well B1, C1, D1 and wells 1 to 80.50µl of patient serum was added to each wells of 1 to 80. Each samples and conjugate were added using separate disposable pipette to avoid cross contamination. 50µl of HRP-Conjugate was added to each well except for the blank and was mixed by tapping the plate gently.

The plate was covered and incubated for 60minutes at 37°C. At the end of the incubation, the cover was removed and discarded. The plate was washed with the diluted buffer 5times. Each time of washing, the micro well was allowed to soak for 30-60 seconds. After the final washing cycle, he plate was turned down on blotting paper or clean towel and tapped to remove any remaining liquids.

Chromogen (50µl) A and chromogen B (50µl) solution was added to each well including blank and the plate was incubated at 37°C for 15minutes avoiding the light. Thee enzymatic reaction between the chromogen solutions and the HRP-conjugate produced blue color in negative control and anti-HBc negative sample wells.

Using a multichannel micro-pipette, 50µl of stop solution was added into each well and mixed gently. Intensive yellow color developed in Negative control wells and anti-HBc negative sample wells.

The plate reader was calibrated with the blank well and the absorbance was read at 450nm within 5minutes of stopping the reaction.

2.6 INTERPRETATION OF RESULT

2.6.1 Acutely infected

HBsAg = Positive
Total anti-HBc = Positive
IgM anti-HBc = Positive
Anti-HBs negative

2.6.2 Chronically infected

HBsAg = Positive
Total anti-HBc = Positive
IgM anti-HBc = Negative
Anti-HBs = Negative

2.6.3 Interpretation of result for HBsAg using Global® rapid test strip kit.

POSITIVE (+)
Rose to pink bands is visible in both the control region and the appropriate test control. A positive result indicated presence of HBsAg
NEGATIVE (-)
No color appeared in the test region with a Rose to pink band appearing in the control region. A negative result indicated that HBsAg is zero or below detection limit of the test.

2.6.4 Interpretation and quality control of result for AccuDiag™ HBcAb IgM ELISA Kit using ELISA method

Each microplate was considered separately when calculating and interpreting the result of the assay regardless of the number of plates concurrently processed. The results were calculated by relating each samples optical density (OD) value to the cut-off value (C.O) of the plate.
Calculation of the cut-off value (C.O) = mean absorbance value of the 3 negative control (Nc) × 0.5.

Negative results (S/C.>1): Samples giving absorbance greater than the cut-off value are considered negative, which indicates that no antibodies to HBV core antigen have been detected using anti-HBc ELISA kit.

Positive results (S/C.O. < or =1): Samples giving absorbance less than or equals to the cut-off value are initially reactive for this assay, which indicates that antibodies to HBV core antigen have been probably been detected with the anti-HBc ELISA kit.

Borderline (S/CO= 0.9-1.1): Samples with absorbance to cut-off ratio between 0.9 and 1.1 are considered borderline samples and could be considered positive for anti-HBc.

2.6.5 Quality control

The OD value of the blank well, which contains only chromogen and stop solution, is less than 0.080 at 450nm. Also, the OD value of the negative control is equal to or greater than 0.800 at 450nm after blanking and the OD value of the positive control is less than 0.100 at 450nm after blanking.

2.7 DATA ANALYSIS

Data was collected and analyzed using Statistical Package for Social Science (SPSS) version 21.0. A P-value less than or equal to 0.05 ($p \leq 0.05$) was considered as statistically significant.

3. RESULTS AND DISCUSSION

3.1 PREVALENCE OF HEPATITIS B VIRUS ANTIGEN AMONG ABULANCE DRIVERS AND MORTUARY WORKERS IN RELATION TO SEX

A total number of 7 patients (8.8%) tested positive for Hepatitis B Virus using HBcAb IgM ELISA out of which 6 (7.5%) patients were positive for the HBsAg .Table 1 shows the prevalence of Hepatitis B Virus surface antigen and its

core IgM antibody among Ambulance Drivers and Mortuary workers in relation to sex. A total number of 56 male samples were tested with 3 (5.4%) tested positive for Hepatitis B virus using HBcAb ELISA kit and HBsAg Global® rapid test strip. Among females, a total number of 24 female samples were collected with 4 (16.7%) positive to Hepatitis B Virus using HBcAb IgM ELISA kit and HBsAg Global® rapid test strip. (P>0.05), which shows the relationship is not statistically significant.

Table 1: Prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State in relation to Sex.

Sex	Number Tested	Number Positive	Percentage Positive
Male	56	3	5.4
Female	24	4	16.7
Total	80	7	8.8

P VALUE = 0.101 $X^2 = 2.69$

3.2 PREVALENCE OF HEPATITIS B VIRUS ANTIGEN AMONG ABULANCE DRIVERS AND MORTUARY WORKERS IN RELATION TO AGE

Table 2 shows the prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in relation to Age. A total of 80 respondents were grouped into age group of 21-30, 31-40, 41-50, 51-60, 61-70 and 71-80 years. Nine (9) respondent fell into age range 21-30 in which 1 (11.1%) was positive. In age the range of 31-43, 1(6.3%) was positive out of the total of 16. In the age range of 41-50, 3 (7.3%) were positive out of the total of 40. A total number of 13 respondents fall in the age range of 51-60 with only 1(7.7%) positive sample detected. The age the range of 61-70years includes only 1 respondent which was not positive to Hepatitis B Virus. One (1) respondents fall in the age range of 51-60 which was positive to Hepatitis B Virus. (P>0.05) which shows relationship is statistically insignificant.

Table 2: Prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance drivers and Mortuary workers in Plateau State in relation to Age.

Age group	Number Tested	Number Positive	Percentage Positive
21-30	9	1	11.1
31-40	16	1	6.3

41-50	40	3	7.3
51-60	13	1	7.7
61-70	1	0	0
71-80	1	1	100
Total	**80**	**7**	**8.8**

P- VALUE = 0.880 $X^2 = 0.255$

3.3 PREVALENCE OF HEPATITIS B VIRUS ANTIGEN AMONG ABULANCE DRIVERS AND MORTUARY WORKERS IN PLATEAU STATE IN RELATION TO THE STATE OF ORIGIN

Table 3 shows the prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State to State of origin. A total number of the 80 respondent fell into Plateau State, Nassarawa State, Bauchi State and Port Harcourt State. A total number of 72 respondents are from Plateau state by birth in which 7 (9.7%) were positive, 3 respondents are from Nassarawa, 4 respondents from Bauchi and 1 respondent from Port Harcourt by birth in which one of them tested positive for both HBsAg and HBcAb IgM. (P>0.05), which shows relationship is not statistically significant.

Table 3: Prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State in relation to State of Origin.

State of Origin	Number Tested	Number Positive	Percentage Positive
Plateau	72	7	9.7
Bauchi	4	0	0
Nasarawa	3	0	0
Port Harcourt	1	0	0
Total	80	7	8.8

P-VALUE = 0.837 $X^2 = 0.852$

3.4 PREVALENCE OF HEPATITIS B VIRUS ANTIGEN AMONG ABULANCE DRIVERS AND MORTUARY WORKERS IN RELATION TO THE NUMBERS OF SEX PARTNER

Table 4 shows the prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau state in relation to the numbers of sex partners. A total number of 80 respondents were grouped into one and more than one based on their numbers of sex partners. Respondents with one sex partners were 60 in which 2 (3.3%) were positive. Respondents with more than one sex partners were 20 with only 5 (25.0%) testing positive. The relationship is statistically significant as ($P<0.05$).

Table 4: Prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State in relation to the number of Sex Partners.

Number of Sex Partners	Number Tested	Number Positive	Percentage Positive
One (1)	60	2	3.3
Two (2) or more	20	5	25
Total	80	7	8.8

P VALUE = 0.003 $X^2 = 8.819$

3.5 PREVALENCE OF HEPATITIS B VIRUS ANTIGEN AMONG ABULANCE DRIVERS AND MORTUARY WORKERS IN RELATION TO THE USE OF PERSONAL PROTECTIVE EQUIPMENT

Table 5A- 5c shows the Prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State in relation to the use of Personal Protective Equipment, history of blood transfusion and specialized area of work.

Table 5A shows the Prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State in relation to the use of Personal Protective Equipment. Among the total of 80, 75 do not adhere to use of personal protective in which 7 (9.3%) among them were positive, the remaining five (5) of the respondents for the study adhere to the use of personal protective equipment in which none was positive. ($P<0.05$) which shows statistically significant relationship.

Table 5A: Prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State in relation to the use of Personal Protective Equipment.

Use of PPE	Number Tested	Number Positive	Percentage Positive
Yes	5	0	0
No	75	7	9.3
Total	80	7	8.8

P VALUE= 0.405 $X^2 = 0.511$

Table 5B shows the prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State in relation to History of Blood transfusion. Among the total of 80 respondents, a total of 6 respondents for the study had transfusion prior to the study in which 3(50%) were positive. A total number of 74 never had any form of blood transfusion before the study among which 4 (5.4%) were positive. ($P<0.5$) which shows relationship is statistically significant.

Table 5B: Prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State in relation to history of blood transfusion.

History of Blood transfusion	Number Tested	Number Positive	Percentage Positive
Yes	6	3	50
No	74	4	5.4
Total	80	7	8.8
P VALUE= 0.010			$X^2 = 13.823$

Table 5C shows the prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among ambulance drivers and mortuary workers in relation to specialized area of work is shown. Among the total number of 80 respondents, 17 were ambulance drivers in which 2 (11.8%) were positive, 63 were mortuary workers in which 5 (7.9%) were positive. (P>0.05) which shows relationship is statistically insignificant.

Table 5C: Prevalence of Hepatitis B Virus surface antigen and its core IgM antibody among Ambulance Drivers and Mortuary workers in Plateau State in relation to specialized area of work.

Specific area of Assignment	Number Tested	Number Positive	Percentage Positive
Ambulance Drivers	17	2	11.8
Mortuary workers	63	5	7.9
Total	80	7	8.8
P VALUE = 0.620			$X^2 = 0.246$

4. DISCUSSION

In 2010, the World Health Assembly adopted resolution to recognize viral Hepatitis as a global health problem [19]. Ever since, various measures have been taken to reduce the level of Hepatitis B virus in Nigeria [20]. Although there is no documentation on the prevalence of Hepatitis B Virus antibody on Ambulance Drivers and Mortuary workers in Plateau State, nonetheless, Hepatitis B virus has been circulating in Nigeria and so therefore Ambulance drivers and mortuary workers face a great risk of exposure. In this study, 7(8.8%) out of the 80 respondents for the study were positive for Hepatitis B Virus Infection, and the likely risk factors for the acquisition of Hepatitis B Virus in this study were the use of Personal Protective Equipment, History of Blood transfusion, number of sex partners.

This study on the prevalence of Hepatitis B virus on mortuary workers and ambulance drivers showed that 6 (7.5%) respondents out of the total 80 respondents in the study were positive for both HBsAg using the Global® Diagnostic Test strip and HBcAb IgM using the AccuDiag™ ELISA kit, however, 1(one) out of the 80 samples tested positive for HBcAb IgM using the AccuDiag™ ELISA kit and negative for HBsAg using the Global® Diagnostic Test strip. The 6 samples positive for both HBsAg and the HBcAb IgM indicates previous and ongoing infection with Hepatitis B Virus in an undefined time frame. In the study, the only 1(one) out of the 80 samples which was positive to HBcAb and negative to HBsAg may be likely because the respondent has a resolved Hepatitis B Virus infection or low level chronic infection or false positive anti-HBc and its susceptible to the infection.

From previous research on Hepatitis B in Nigeria, statistic shows that about 14% of Nigerians are affected and this places Nigeria as one of the most affected country in Africa [19]. As a result of various risk factors attached to their job, there is more tendency of acquiring this Hepatitis B Virus. Although they are health workers, during the study, it was noticed that many of them are not aware of Hepatitis B Virus, so therefore may have little or no knowledge about how Hepatitis B Virus may be acquired and so may careless in taking adequate measures in adhering to the ethical code of the Ambulance Drivers and the Mortuary workers. Several measures have been taken and has been included in the ethical code of the mortuary workers and ambulance drivers which if adhered to can reduced the prevalence of Viral infections including Hepatitis B Viral infection to as low as 8.8% and thereby reduce the spread of the disease to the patients and other people around [21].

Based on this research among ambulance drivers and mortuary workers, 5.4% are positive in male while 83.3% are positive in female which shows a higher positivity in female. But there are more of males in this job than female which suggest that some of the female might have got the infection not as a result of the risk factor attached to the job. Based on previous research on sexual activities among ladies in Plateau State, and the level of sexually transmitted disease in plateau state, high prevalence among the female may be as a result of this [22]. Those who got infected as a result of risk factor associated to their job may get infected as a result of poor handling of infected patient or poor disinfection of working bench. The inconsistency in research among sex as regards to Hepatitis B Virus also shows that the infection affects both the male and females in same way.

Nigeria is one of the countries with highest population in the world; with children and young adult constituting the bulk of these numbers. It is also a low–middle income nation with gross national income per capital purchasing power party (PPP) of $2290. Moreover, it has relatively low life expectancy at birth 54 years [19].This account for higher prevalence in the Age group between 21 and 30 (11.1%). Youths between these ages are more involved in several risk factors of Hepatitis B Virus Infection like having casual sex, having more than one sexual partner and are more involved in more involved in Social Vices [19]. Statistic on prevalence of Hepatitis B Virus in Nigeria shows a higher prevalence in the young youths between the ages of 21-30 which is related to this research on Hepatitis B virus among Ambulance Drivers and Mortuary workers.

In this study, it's been shown that among the state of origin represented by the respondents, Plateau has the highest prevalence of Hepatitis B Virus Infection and highest number of people working in this field are from Plateau State Origin. Plateau represents the highest prevalence of 9.7% and is been supported in the previous research which shows Plateau is one of the states with high prevalence of Hepatitis B among the middle-belt states in Nigeria (21Emechebe *et al.,* 2014). Hepatitis B virus is sexually transmitted disease [23]. This risk factor is increased with having more sex partners [24]. This is shown in this study conducted Ambulance Drivers and Mortuary workers in Plateau State with respondents with more than one partner has higher percentage of 15%.

Part of the ethical code guiding mortuary workers and ambulance drivers is the use of personal protective equipment. [25]. It's amazing that some of the workers in the mortuary and the ambulance drivers fail to adhere to their work ethic code. These include the use of gloves, lab coats e.t.c [26]. In this study, 0% of those who use personal protective equipment were positive. The use of these Protective reduces the chances of contacting infections by serving as the first barrier against them but still for its effectiveness, it has to be used properly. [25]. Disposable gloves should be disposed after use and not kept to be used later again or next day. So also, lab coats should be kept clean. Enough of this Personal Protective Equipment should be supplied well enough on regular basis.

One of the common ways of acquiring Hepatitis B virus in Nigeria is through blood contact [27]. 50% are positive of those with prior exposure to blood transfusion. It shows possibility of acquiring the infection through blood transfusion. This may be from the equipment used or improperly screened blood [28].

The study also shows a higher prevalence of Hepatitis B virus of 11.8% among ambulance drivers and 7.9% among mortuary workers. Ambulance drivers are more easily exposed as they are the one that come first in attending to patients and the mortuary workers comes last [26]. Some patients' primary cause of being admitted is not because they are HBV positive. It may be because they are involved in accidents. Most ambulance drivers in Nigeria helps in getting the injured patients and even corpses into the car in which some of them may be positive to Hepatitis B Virus. In this way, they are predisposed to this virus.

5. CONCLUSION

At the end of the study, it was shown that Hepatitis B virus is common among Ambulance Drivers and Mortuary workers and they are carriers of this virus in the health sector. The Ambulance Drivers and Mortuary workers not only contact Hepatitis B Virus through the exposure to their work by contact with infected body fluid but also through other risk factors outside their work.

The best protection against HBV infection however, is the Hepatitis B vaccine. The vaccine offers the protection for about 10 years or more, however, it's of no use in those already infected with HBV [11]. Vaccination of all workers should be encouraged and ensured in all hospitals.

Use of Personal Protective Equipment (PPE), well screened blood and having one sexual partner needs to be advocated through public enlightment campaigns for proper prevention of Hepatitis B Virus infection among Health care workers in Plateau State.. There should be Hepatitis B Virus awareness programme to help educate the Ambulance Driver and Mortuary workers about the risk of the infection if not treated.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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