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Detection of Hepatitis B Virus Surface Antigen (Hbsag) among Students of Federal University of Technology, Minna, Niger State, Nigeria

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Abstract An investigation was conducted to detect the prevalence of hepatitis B virus infection among students of Federal University of Technology, Minna, Nigeria. One hundred blood samples were collected from the students in two seasons (May to December). The blood samples were screened for possible detection of Hepatitis B virus, using paper strips. Eight blood samples were positive, representing 8%. Students within the age group 21 – 23years had high prevalence of 4% and the lowest prevalence (2%) was found with students within the age groups 24 – 26 and 27 – 29 years respectively. Students who had history of blood transfusion recorded very high prevalence of 8% while those with no history of blood transfusion had no incidence. The prevalence was high in wet months (Rainy season) (5%) compared to dry months (Dry season) (3%). Similarly, infection rate was high (6%) among male students compared to their female counterparts who had (2%). The overall prevalence of 8% observed in this study is deemed high. Further investigations should be conducted to ascertain the incidence rate of the disease among the students using higher sample sizes.

Keywords: Detection, Hepatitis B virus, Students, Prevalence, Blood sample

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1. Introduction

Hepatitis B virus is a member of the hepadna virus family. The viral particle consists of an outer lipid envelope and an icosahedral nucleocapsid core composed of protein. The nucleocapsid encloses the viral DNA and a DNA polymerase that has reverse transcriptase activity (Locarinini, 2007). The outer envelope contains embedded proteins which are involved in viral binding to susceptible cells.

The virus is one of the smallest enveloped animal viruses with a diameter of 42nm, but pleomorphic forms exist including filamentous and spherical bodies lacking a core antigen. The particles are not infectious and are composed of the lipid and protein that forms part of the surface of the virion, otherwise called the surface antigen (HBsAg) and is produced in excess during the life cycle of the virus (Howard, 1986).

The genome of Hepatitis B virus is made of circular DNA, but it is unusual because the DNA is not fully double stranded. One end of the full length strand is linked to the virus DNA polymerase. The genome is 3020 – 3320 nucleotide long and 1700 – 2800 nucleotide short (Kay and zoulim, 2007). The negative sense; is complimentary to the viral mRNA. The viral DNA is found in the nucleus of the host cell soon after infection. The partially double – stranded

DNA is rendered fully double stranded by completion of the positive sense strand and removal of a protein molecule from the negative sense strand and a short sequence of RNA from the positive sense strand. Non coding bases are removed from the ends of the negative sense strand and the ends are rejoined (Beck and Nassal, 2007). There are four known genes encoded by the genomes called C, X, P and S. The core protein is encoded for by gene C (HBcAg) and its start cordon is preceded by an upstream in frame AUG start codon from which the pre – core protein is produced.

The hepatitis B virus if it finds its way into the host cell, it primarily interferes with the function of the liver by replicating in liver cells, known as hepatocytes (Tong and Wand, 1999). During HBV infection, the host immune response causes both hepatocellular damage and viral clearance. The adaptive immune response, particularly virus specific cytotoxic T lymphocytes contributes to most of the liver injury associated with HBV infection (Liang, 2009). This study was aimed at determining the prevalence of HBV infection among Students of Federal University of Technology Minna Niger State, Nigeria.

2. Material and methods

2.1 Collection of blood samples

Five milliliter of blood was collected from each of the 100 students involved. The blood samples were dispensed into EDTA bottles in each case separately and were transported to the Microbiology laboratory of the Federal University of Technology, Minna, Niger State, Nigeria for further screening (Kuta *et al.*, 2013).

2.2 Preparation of the blood samples for the screening

The blood samples in the EDTA bottles were centrifuged at 10,000 rpm for 5 minutes in each case. The supei 30 (plasma cells) were collected and stored for further ai (Kuta *et al*., 2013).

2.3 Screening of the plasma cells for possible detection of hepatitis B virus surface antigen (HBVsAg)

The test paper strips were immersed vertically in the plasma in each case separately for 10 seconds. After which the test strips were removed and placed on a disinfected non absorbent table tops for 5 minutes. Observation for the formation of pink colour band(s) on the paper strips was done and the results recorded (Kuta *et al*., 2013).

2.4 Statistical analysis

Chi-square test was used to determine the link between the rate of infection and demorgraphic information such as age, history of blood transfusion, seasonal variation and the rate of infection at $P > 0.05$.

3. Results

The one hundred blood samples screened for hepatitis B virus surface antigen indicated the prevalence of 8%. Students within age group 21 – 23 years recorded higher prevalence of 4%, compared to other age groups (Table 1)

Table 1: Prevalence of Hepatitis B virus in accordance with the student's age group

Age (year)	Number of Samples Screen	Number of Positive Samples	Prevalence (%)
18 – 20	21	0	0
21 - 23	53	4	4
24 - 26	17	2	2
27 – 29	9	2	2
Total	100	8	8

$\chi 2 = 0.643$

Students who had received blood from any donor (transfusion) had the prevalence of 8% while those with no history of blood transfusion recorded no positive case (Table 2).

Table 2: Infection rate among students in accordance with the history of blood transfusion

History of blood Transfusion	Number of Blood Samples Screened	Number of Positive blood Samples	Prevalence (%)
Yes	54	8	8
No	46	0	0
Total	100	8	8

$\chi 2 = 0.594$

Out of the 100 blood samples screened; higher prevalence of 5% was observed in wet months compared to dry months 3% (Table 3).

Table 3: Infection rate according to seasonal variation

Season (Month)	Number of Blood Samples Screened	Number of Positive blood Samples	Prevalence (%)
Wet months (May- Aug)	48	5	5
Dry months (Sept-Dec)	52	3	3
Total	100	8	8

$\chi 2 = 0.536$

Out of the 100 blood samples screened; male students recorded high prevalence of 6% while female students recorded as low as 2% prevalence (Table 4).

Table 4: Infection rate according to gender of the students

Gender	Number of Blood Samples Screened	Number of Positive blood Samples	Prevalence (%)
Male	56	6	6
Female	44	2	2
Total	100	8	8

$\chi 2 = 0.493$

4. Discussion

In this study, blood samples were collected from 100 students in federal university of technology, Minna, Niger State, Nigeria. The blood samples were screened for the detection of hepatitis B virus. The report indicated prevalence rate of 8%.

Higher prevalence (11%) of Hepatitis C virus has been reported (Kuta *et al*., 2013) in same institution and the report identified lapses associated with the students life style as a major contributing factor in the transmission of the disease. The outcome of this study could further be attributed to poor sanitary condition of their hostels environments particularly in a developing country like Nigeria.

Students within the age group 21 – 23 years recorded higher prevalence of 4% compared to other age groups (Table 1). The age group (21-23years) is considered as the sexually active age and as such, may have engaged in unprotected sexual intercourse as reported by (Kuta *et al*., 2013). It could also be attributed to patronage of clinics managed by half baked medical practitioners, where unscreened blood samples are transfused. Although there seems to be difference in the prevalence (Table 1) with other age groups but chi-square test indicated it was not significant at $P > 0.05$, hence age was not a factor.

The prevalence of hepatitis B virus infection among students according to their history of blood transfusion was as follows: students with history of blood transfusion had 8% and those with no history of blood transfusion recorded no positive case (Table 2). Besides the general infrastructural decay in our health institutions in Nigeria, there are also inadequacies on the part of trained personnel in our hospitals. This may have contributed substantially to high prevalence of hepatitis B virus among students. However, despite the prevalence as observed in this study, chi-square test indicated not significant at $P > 0.05$.

Infection rate with hepatitis B virus among students in this study was high in rainy (wet months) season (5%) than dry season (3%) (Table 3). This could be attributed to humidity. Already it has been established by Howard (1986) that hepatitis B virus can remain active and infectious in an environment that is characterized with dirt and moist. In most parts of Nigeria, rainy season is associated with dirty environment and high humidity. These may have contributed substantially to the high prevalence observed in the rainy season. But chi-square test indicated that seasonal variation was not a factor.

Male students had higher rate of infection compared to their female counterparts (Table 4). This could be attributed to lapses on the life style associated with adolescent male children, coupled with the ignorance about the possible route of transmission of the disease. Already the demographic information obtained during the blood samples collection revealed that majority of the male students resides in the rural areas. In Nigeria, rural areas have remain safe haven for non-professional medical personnel and counterfeit drug dealers where they unleash their evil acts (such as transfusion of unscreened blood, exchange of syringe and needle for medication, sales of fake drugs etc). All these may have contributed to the high prevalence of hepatitis B virus infection among the students investigated. In conclusion, hospitals in Nigeria should be equipped with trained manpower for effective services delivery, effective sanitary laws should be enacted and enforce and Infected individuals should be treated and the population at risk should be immunized.

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