



A Cross-sectional Study on the Sero-prevalence of Hepatitis B Surface Antigen (HBsAg) among Apparently Healthy Students of a Tertiary Institution in North-Eastern Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author MYT design the study, wrote the protocol and carried out statistical analyses. Author OI proof read the first draft of the manuscript and make amendment. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/IJTDH/2015/16469

Editor(s):

- (1) Yingjun Yan, Department of Medicine, Vanderbilt University School of Medicine, USA.
(2) Shankar Srinivasan, Department of Health Informatics, University of Medicine and Dentistry of New Jersey, USA.

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(3) Anonymous, Denmark.

Complete Peer review History: <http://www.sciencedomain.org/review-history.php?iid=1010&id=19&aid=8729>

Original Research Article

Received 3rd February 2015
Accepted 18th March 2015
Published 9th April 2015

ABSTRACT

Aims: This study was carried out to ascertain the prevalence of hepatitis B virus infection and its relationship to gender and age among apparently healthy students of a tertiary institution in North-eastern Nigeria.

Study Design: Sero-prevalence of HBsAg in relation to gender and age.

Place and Duration of Study: Federal Polytechnic Mubi, North-eastern Nigeria, between August 2013 and September, 2014.

Methodology: In this study, 200 apparently healthy students of a tertiary institution in North-

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eastern Nigeria were screened randomly to determine the prevalence of Hepatitis B surface antigen (HBsAg). To achieve this, 200 blood samples were screened in a step wise order using One Step Strip Style HBsAg test. The blood was allowed to retract and then centrifuged at 2500 rpm for 10 minutes. The test device was dipped into the serum sample for 3 sec and read after 10 min.

Results: The result showed an overall HBsAg seroprevalence of 31.5%. The seroprevalence of HBsAg among males (43%) was higher than that of females (27%) but with no statistical significant difference ($p=0.462$). The age-specific distribution of HBsAg among subjects in this study showed higher HBsAg prevalence rate among the age group 35 & above (50%), closely followed by the age group 30-34 (48%) with no statistical significant difference between all the age groups ($p=0.353$).

Conclusion: The result of this study confirmed the high endemicity of HBsAg among apparently healthy individuals in North-eastern Nigeria which is alarming. It is therefore recommended that as a matter of urgency Nigerian government should extend HBV vaccination programme to the adult folks and not just limited to the national childhood immunization programme.

Keywords: Hepatitis B surface antigen; sero-prevalence; apparently healthy; students; Nigeria.

1. INTRODUCTION

Hepatitis B is an infectious illness caused by hepatitis B virus (HBV) [1,2] an enveloped partially double-stranded circularised DNA virus of complex structure. The virus is a major cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma (HCC). HBV is highly contagious and relatively easy to transmit from one infected person to another by blood contact, during childbirth, unprotected sexual intercourse, intravenous drug abuse, ear piercing, tattooing, barbers razor and by sharing needles [3-5].

Based on the prevalence of HBV chronic carriers amongst adults in the general population, countries are classified as having low endemicity (< 2%), intermediate endemicity (2%–5%), or high endemicity (> 5%) of infection [6]. In Nigeria, several reports have established the endemic nature of HBV by the presence of HBsAg in different population groups from different parts of the country, including doctors [7], intending blood donors in Benin City [8], Jos, [9], University College Hospital, Ibadan, [10], blood donors attending Ahmadu Bello University Teaching Hospital (ABUTH) Zaria [11]. HBV infections constitute a major public health concern in Nigeria and about 75% of the population reported likely to have been exposed to the virus at one time or the other [3].

This study therefore was carried out to ascertain the prevalence of hepatitis B virus infection and its relationship to gender and age among apparently healthy students of a tertiary institution in North-eastern Nigeria. Although many reports concerning the subject matter abound in Nigeria; however, this study is relevant because the subject matter was never reported in Mubi, neither the study area.

2. MATERIALS AND METHODS

2.1 Study Area

The study area is Federal Polytechnic Mubi, located at Mubi metropolis. Federal Polytechnic Mubi was established by decree No. 33 of 1979. As at the 2009/2010 academic session, the institution had a student's population of well over 14, 000 and 36 accredited programmes.

2.2 Ethical Consideration

Verbal informed consent of each participant was obtained prior to testing. Ethical approval was also obtained from the institutions' Research and Seminar Committee Board. The individual laboratory results were kept confidential and given to the participants at the completion of the project. Positive individuals were referred to medical facility within the institution for guidance.

2.3 Inclusion Criteria

All subjects who gave informed consent were included in the study.

2.4 Exclusion Criteria

Subjects who had once been vaccinated with the required three doses of the vaccine and those who declined to offer consent were excluded from the study.

2.5 Hypotheses

1. Males and females differ not significantly in HBsAg seropositivity

2. There is no significant association between HBsAg seropositivity and age brackets

2.6 Assay for Detection of HBsAg

This study was carried out in the Microbiology Laboratory of Biological Science Technology, Federal Polytechnic Mubi Adamawa State, Nigeria from August, 2013 to September, 2014. Subjects were chosen at random and those who satisfied the inclusion criteria were recruited for the study. Five millilitres of venous blood was collected from the antecubital vein of each subject. The blood was allowed to retract and then centrifuged at 2500 rpm for 10 mins. The sera were stored at -20°C until tested. DiaSpot® HBsAg Test strips (manufactured by DiaSpot Diagnostics, USA), was used in a stepwise order for the detection of HBsAg in the blood. These methods which are immunochromatographic and qualitative in nature, detect the presence of HBsAg in human blood and can be read in-vitro having more than 99.9% sensitivity and 99.75% specificity. The test device was dipped into the serum sample for 3 sec and read after 10 min. Sample positive for HBsAg showed colour band at the test and control lanes while negative sample showed colour band at the control but none at the test lane. Invalid result was read when there was either colour [12].

2.7 Data Analysis

The prevalence for HBV infection was calculated. The data generated was subjected to statistical analysis using analysis of variance (Duncan multiple range test) was used to test for significant difference among age brackets, while non-parametric Mann-Whitney test was used to test for significant difference among males and females. All statistical analyses were carried using SPSS computer software version 16.0 for Windows to determine any significant relationship between infection rate, age and gender.

2.8 Limitations of the Study

This study is limited to apparently healthy students of Federal Polytechnic Mubi, Adamawa State, Nigeria. The number of subjects used was relatively few compare to the number of students in the institution. This was partly due to inclusion and exclusion criteria used for the study. Consequently, the results of this study may have short coming – as it is only a projection from number of samples used for the study.

3. RESULTS

A total of 200 students participated in this study. Of these, 61(30.5%) were males and 139(69.5%) were females. On the overall, 63(31.5%) were positive for HBV, while 137(68.5%) were not reactive to HBV. Of the 61 males and 139 females participants, 26(43%) and 37(27%) respectively were infected (Table 1). The result however, showed no significant difference in prevalence rate between males and females ($p=0.462$).

The result in Table 2 showed HBsAg prevalence according to gender. The result showed that the age group 20-24 (43.5%) was the most sampled population, followed by 25-29 (18%), while the least was the age group 35 & above (5%). The result further showed that the age group 35 & above had the highest prevalence rate of HBsAg (50%), closely followed by 30-34 (48%). While the least age group with HBsAg were 20-24 and 25-29 with 25% prevalence rate each. Using Duncan multiple range test (DMRT), the result showed that all the age groups were likely to be infected at the same rate ($P=0.353$). In addition, among males, the age group 30-34 (39%) had the highest prevalence rate while the least were age group 20-24 and 25-29 (6% each). Among females, the age group 35 & above has the highest prevalence rate (30%), while the least was 30-34 (9%).

4. DISCUSSION

The result of this study showed 31.5% HBsAg prevalence rate among apparently healthy students. This observation is lower (44.7%) than the ones reported among apparently healthy primary school pupils in Borno, North-eastern Nigeria [13]. Similarly, higher prevalence rate of 42.7% was reported among Afro-descendent community of Brazil [14]. About 42.3% prevalence rate was also reported among cohort of students in Bangui, Central Africa Republic [15]. Contrary to the findings of this study, lower prevalence rate have been reported by some authors in Nigeria. Lower prevalence rate of 18.6% and 19.9% have been reported in Osogbo Osun State [16,3]. In addition, 14.5%, 14.5% and 12.0% prevalence rate respectively were reported by Lawal et al. [10] among blood donors in Ibadan, Agbaji [17] in Jos University Teaching Hospital and Ophori et al. [18] among pregnant women attending antenatal clinic at central hospital, Warri, Delta State. Also, the HBsAg prevalence rate of 31.5% as shown in this study

Table 1. HBsAg prevalence according to gender

Sex	No. tested	HBsAg positive	Prevalence (%)
Male	61	26	43
Female	139	37	27
Total	200	63	31.5

Table 2. HBsAg prevalence according to age and gender

Age group (yr)	No. Tested	Male	Female	Sample
		No. Positive (%)	No. Positive (%)	Total positive (%)
15-19	34(17)	4(12)	7(21)	11(32)
20-24	87(43.5)	5(6)	17(19)	22(25)
25-29	36(18)	2(6)	7(19)	9(25)
30-34	33(16.5)	13(39)	3(9)	16(48)
≥35	10(5)	2(20)	3(30)	5(50)

is by far higher than those reported by various authors in Nigeria. These include Okonko et al. (12) who reported 2.5% HBsAg in University College Hospital Ibadan, 2.4% and 1.2% prevalence rate were reported in North-eastern Nigeria [19,20], 4.3% among pregnant women in Port Harcourt [21] and 5.4% in Benin city (8). Also, 1.5% and 1.1% HBsAg prevalence rates were reported in Niger-Delta Region [22,23].

Studies from other African and Asian countries have reported lower prevalence rates comparable to the finding of this study. Such studies include those of Muktar et al. [24] and Matee et al. [25] who reported 8.3% and 8.8% HBsAg respectively in Tanzania. Prevalence rate of 2.2% was reported in Pakistan blood donors [26], 4.0% was reported in Kenyan donors [27], 10% prevalence was reported by Elfaki et al. [28] in Sudanese blood donors, while 8.7% and 8.8% were reported in Muhimbili National Hospital in Dar es salaam [29]. It is worthy of note that the difference in prevalence in these studies could be due to difference in geographical locations, exposure to risk factors and difference in population selection.

The result of this study based on gender distribution showed that males (43%) are more likely to be infected with HBV than females (27%). However, result from statistical analysis showed that male and female differ not significantly in HBsAg seropositivity ($P=0.462$) in accordance with the null hypothesis. The finding of this study can be comparable with previous reports that showed HBsAg prevalence rate of 7.4% and 4.6% respectively among males and females with no statistical difference ($P>0.05$) [30]. This report is consistent with previous studies that reported higher infection rate among

male than females with no statistical difference [31,32,4]. The lack of statistical significant difference in HBsAg seroprevalence between males and females as shown in the present study however implies that the difference might be due to chance which suggests that both sexes are equally susceptible to HBV infection and that gender might not be an important significant epidemiological tool to determine HBV infection among study population. This suggestion was strongly upheld and reported previously [18,30].

The observation of this study went contrary to the findings of some workers in Nigeria who reported that females had higher seropositivity for HBsAg than their male counterpart [33,34]. Although, Arwa et al. [35] reported significant higher seropositivity ($p<0.0001$) in females than in males among patients with liver complaints; they however, showed that there is no association between HBV seropositivity and gender among apparently healthy individuals which is consistent with the present study. Although Okonko et al. [18] in their study showed that males had prevalence rate of 10.2% while females had 5.9% prevalence rate, their results however, disagree with the present study in that the difference between males and females was significant statistically. Contrary to the finding of this study also, higher prevalence rate of HBsAg in males than females in both rural and urban areas with observation that male sex was an important risk factor for HBsAg positivity has been reported [36]. Other studies in Nigeria in which higher HBsAg prevalence rate among males than females were reported include those of Inyama et al. [37] and Uneke et al. [9] in Jos, Balogun et al. [38] in Lagos, Lawal et al. [10] in Ibadan. No concrete explanations can be attributed for the higher vulnerability of males to

the infections than females [30]. Other authors however identify and attributed certain factors as reasons which include; shorter HBsAg carrier rate in females than in males [12,10,39], multiple sexual partnership and polygamy [10]. Other reason for proportionate high prevalence among males than females though not significant as shown in this study might not be unconnected with care free attitude which might be reflected in sharing of sharp objects/nail cutter, shaving from barbers, unprotected sex which is rampant among male students.

When compare dprevalence rates across age groups, there was a relatively high infection rates across all age brackets, though those aged 35 and above were more likely to be infected followed by those aged 30-34. However, results from statistical analysis revealed that there is no significant association between HBsAg seropositivity and age bracket ($P=0.353$). This observation was consistent with previous studies by Komas et al. [15] and Adoga et al. [30] who reported that HBsAg prevalence rate was not correlated with age brackets. Motta-Castro et al. [14] reported in their study that age was not significantly associated with HBsAg seropositivity among Afro-descendent community in Brazil which was also consistent with previous study in Nigeria [12]. Considering the higher prevalence rate of HBV among these age brackets in this study, one may speculate that most of these students may have acquired the infection through sex and transfusion of unscreened blood in their life time. However, this hypothesis may require further investigations.

5. CONCLUSION

The discovery of such a high HBV prevalence of 31.5% as shown in this study among students of tertiary institution in an urban population which supposedly should have a low prevalence rate – due to their supposed level of awareness on risk factors- is alarming! The Nigerian government should also as a matter of urgency extend HBV vaccination programme to the adult folks and not just limited to the national childhood immunization programme.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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