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Seroprevalence of hepatitis B Surface antigen among apparently healthy primary school pupils in Batagarawa Local Government area of Katsina State, Nigeria

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Abstract*: Introduction:* Hepatitis B virus infection is a major public health problem worldwide. It is more infectious and more in Nigeria than the Human Immunodeficiency Virus (HIV). It is a major risk factor for the development of liver cirrhosis and hepatocellular cancer in hyperendemic areas. This study was carried out between 8th January and 7th March, 2012, to assess the prevalence of Hepatitis B virus infection among apparently healthy primary school pupils in Batagarawa Local Government, Katsina state.
Methods: Hepatitis B surface antigen was tested for in 240 apparently healthy primary school pupils in Batagarawa Local Government, Katsina state in North-Western Nigeria using commercial recombinant enzyme-based HBsAg test strip.
Results: Of the 240 samples screened, 56 (23.3%) were seropositive. HBsAg seroprevalence was higher among children aged 7 – 9 years (7.9%), and among male (15.8%) than female (7.8%) subjects. Of the predisposing factors for HBV infection studied, traditional circumcision among the male subjects recorded the highest prevalence of 30%.
Conclusion: The high prevalence of HBV infection amongst the subjects studied strongly suggests that urgent preventive measures, particularly health education of the general public on HBV infection and provision of universal HBV vaccination should be given urgent priority.

Keywords: Children, HBsAg, Primary school, Seroprevalence

Introduction

Hepatitis B virus infection is a disease of global distribution and constitutes a major public health problem.[1]More than one third of the world's population is estimated to have been infected and there are over 350 million chronic carriers of the virus.[1,2]Nigeria is classified among the group of countries that are highly endemic for HBV infection with 19 million Nigerians already infected.[3] The virus is the second most important cause of cancer in the country.[3]In endemic areas, infections are more frequently acquired in infancy and early childhood.[4]Globally, over 25% of persons infected early in life often remain asymptomatic and unrecognized for up to 2 – 3 decades only to develop cirrhosis and hepatocellular carcinoma as adults.[4,5]

HBV infection is a vaccine-preventable disease and HepB vaccine has been available for decades in developed countries.[5,6] Northern Nigeria has one of the lowest rates of immunization coverage in the world.[7] Information on the prevalence of HBV infection in certain parts of Northern Nigeria such as the study area is scarce.[7,8] This study is aimed at estimating the prevalence and identifying possible risk factors associated with the transmission of Hepatitis B among primary school children in a community in North-Western, Nigeria.

Materials and Method

The study was conducted in Batagarawa Local Government Area of Katsina state. This community is predominantly inhabited by the agrarian population of Hausa-Fulani, belonging to the middle and low socioeconomic classes with inadequate infrastructures and other social amenities. The Batagarawa Local Government Education Authority (LGE) has a total of 76 primary schools, distributed across its six (6) political districts.
The study design was a descriptive cross-sectional survey. The study population consisted of primary school pupils drawn from the 76 primary schools in Batagarawa Local Government Area.

The number of pupils sampled was guided by the upper limit required to give 95% confidence interval at an expected prevalence of 17.7% considering that North-Western Nigeria is endemic for HBV infection.[1,6,8,16] Thus, minimum number of 240 subjects was recruited for the study. A multistage sampling method was adopted for the study.

Data collection was primarily done using questionnaires. After obtaining informed consents of parents and head teachers of the subjects, questionnaires were administered which contained biodata and all relevant questions aimed at meeting the objectives of the study. Venous blood samples were collected in screw-capped glass containers in the field and brought to the microbiology laboratory of General Hospital, Katsina. The samples were centrifuged at 2,500rpm for 10 minutes and sera separated and stored at -20^0c in a freezer until tested. Serologic testing of HBsAg was done by the use of commercial recombinant enzyme-based immunoassay (NOVA test® HBsAg serum strip – ATLAS LINK BIOTECH CO., LTD) kits.
The data generated was validated and analyzed using the Statistical Package for Social Sciences (SPSS) version 18 computer software. A p value of <0.05 was considered as significant.

Results

There were 132 (55%) males and 108 (45%) females with a male: female of 1.2:1 (Table 1). Of the 240 blood samples analysed, 56 (23.3%) were positive for HBsAg while 184 (76.7%) were sero-negative (Table 2). The overall seroprevalence of HBsAg among the pupils was 23.3%. The distribution of HBsAg by age and gender among subjects studied is shown in Table 3 and Table 4. The seroprevalence was highest in children aged 7-8 years; and it was also higher in males (15.8%) than females (7.5%). The difference in age and gender were statistically significant.

Table 1: Age and sex distribution of the study population

Age group	Male n (%)	Female n (%)	Total n (%)
5 - 6 years	27(60)	18(40)	45 (100)
7 - 8 years	24(50)	24(50)	48 (100)
9 - 10 years	50(61)	32(39)	82 (100)
11 - 12 years	31(48)	34(52)	65 (100)
Total	132 (55)	108 (45)	240 (100)

Table 2: Distribution of HBsAg seroprevalence according to age

Age group	Positive n (%)	Negative n(%)	Total n(%)
5-6 years	11 (4.6)	34 (14.2)	45 (18.8)
7-8 years	19 (7.9)	29 (12.1)	48 (20.0)
9-10 years	15 (6.2)	67 (27.9)	82 (34.1)
11-12 years	11 (4.6)	54 (22.5)	65 (27.1)
Total	56 (23.3)	184 (76.7)	240 (100)

$\chi^2 = 9.77$ df= 3 p-value = 0.02

Table 3: Distribution of HBsAg seroprevalence according to gender

Sex	Positive n (%)	Negative n (%)	Total n (%)
Male	38 (15.8)	94(39.2)	132 (55.0)
Female	18 (7.5)	90(37.5)	108 (45.0)
Total	56 (23.3)	184 (76.7)	240 (100)

$\chi^2 = 4.88$ df = 1 p-value = 0.02

Table 4 shows the possible predisposing factors to HBV infection in the study subjects. Circumcision by traditional method, immunization status and history of sharing blades and sharp instruments were statistically significant ($p < 0.005$).

Table 4: Possible predisposing factors to HBV infection

Variable	HBsAg + n(%)	HBsAg (-) n(%)	Number N(%)	χ^2	P-value
Place of circumcision					
Hospital	6(18.0)	27(82.0)	33(100)		
Traditional	36(30.0)	83(70.0)	119 (100)	6.39	0.04*
Uncircumcised	14(16.0)	74(84.0)	88(100)		
Immunization status					
Fully immunized	15(13.4)	97(86.6)	112 (100)		
Partially immunized	16(19.5)	66(80.5)	82 (100)	19.3	0.00*
Not immunized	25(54.0)	21(46.0)	46(100)		
History of sharing					
blades	8(53.3)	7 (46.7)	15(100)	6.36	0.01*
Yes	48(21.3)	177	225		
No		(78.7)	(100)		
History of blood transfusion	1(8.3)	11(92.0)	12(100)	Fisher'	0.36
Yes	55(24.0)	173	228	s	
No		(76.0)	(100)		
Place of delivery				1.68	
Hospital	16(18.6)	70(81.4	86(100)		0.20
Home	40(26.0)	114	154		
		(74.0)	(100)		
Socio-economic class					
Upper	13(20.0)	22(80.0)	35(100)		
Middle class	18(22.5)	62(77.5)	80(100)	4.54	0.10
Lower	25(20.0)	100 (80.0)	125 (100)		
Family Hx of suspected HBV - infected member					
Yes	5(45.0)	6(55.0)	11(100)	Fischer 's	0.13
No	51(22.0)	178 (78.0)	229 (100)		

* = significant Hx = History

Discussion

This seroprevalence study in Batagarawa Local Government Area, Katsina state showed an overall high prevalence of 23.3 per cent amongst primary school pupils, based on WHO classification of HBV endemicity.[1,3,9] This is expected due to the fact that, in general, higher prevalence rates are encountered in rural areas such as this study area, compared to urban areas. This could be attributed to obvious risk factors that favour the spread of HBV which are more prevalent in the rural areas such as low socio-economy with its antecedent poverty, ignorance and overcrowding as well as certain cultural

practices such as scarification marks, traditional births, circumcision and inadequate healthcare facilities.[10]
The sero-prevalence rate obtained in this study is by far lower than 44.7% prevalence rate reported by Bukbuk *et al*.[8] amongst primary school children in Borno state, northeastern Nigeria.[8]This difference can be attributed to difference in the selection of subjects. Unlike in this study where approximately 50:50 male-to-female ratio was selected from four districts in the LGA, the Borno study had more males than females (M:F = 3:1) from only two districts. Male gender had been identified as an important risk factor for the transmission of HBV infection in previous studies.[8,11,12]However, the figure (23.3%) obtained in this study is higher than 9.7% among primary schoolchildren from Kuru,[11]north-central Nigeria and 7.6% from Nnewi,[12]south-eastern Nigeria.

This difference may be a reflection of the environments as this study was conducted in a rural area where the burden of HBV infection is said to be higher.[10] Conversely, the finding of statistically significant ($p< 0.005$) higher HBsAg sero-positivity among the male subjects (15.8%) compared to their female counterparts (7.8%) in this study was in agreement with the findings of Bukbuk *et al.*[8] from Borno and Gogos *et al.*[12] from Greece who reported higher prevalence rates among male subjects screened. This implies that the two genders were exposed to different possible predisposing factor(s) to HBV transmission in the environment and that is most probably the practice of circumcision by traditional healers which is generally decreasing among the female children in Nigeria.[13] This is corroborated by the findings by Ndako *et al*.[11] from North-Central Nigeria, Kiire CF from sub- Saharan Africa and Ayoola *et al.* who demonstrated higher HBsAg sero-prevalence among male children who had circumcision by traditional healers.[14,15,16]

The role of the universal HBV vaccination in the prevention against and/or reduction in the incidence and prevalence of HBV infection has been well documented in the literature.[8-11]Ayoola *et al.*[15]observed a decline in the prevalence of hepatitis B between the year 1995 and 1998 particularly amongst children in South-Western Saudi Arabia as a result of inclusion of HepB vaccine in the routine schedule of immunization. This corroborates the findings of this study in which responses to vaccination status of the children showed that the seroprevalence of HBsAg decreased with improving/improved immunization status ($p < 0.005$). Exposure to risk factors such as blood transfusion, surgical procedures, family history of HBV, sharing of sharp objects, and giving birth/scarification marks were also studied and result observed showed a veritable predisposing factor among the subjects screened.

Conclusion

The finding of 23.3% of apparently healthy primary school pupils positive for HBsAg in this study implies that these children stand an important risk of HBV-related complications. The high incidence of HBV-related diseases, including hepatocellular carcinoma, has made the eradication of HBV infection as one of the most important tasks facing public health authorities in hyper-endemic regions of the world such as the North-Western Nigeria. All children should be regarded as being at "high risk" for HBV as most infections are acquired in childhood. Mass vaccination of the remaining community, however, does not appear to be practical because of the high cost. Targeting certain easily accessible groups who would benefit maximally from vaccination might be a pragmatic alternative. This study demonstrated that maximum benefit could be achieved by vaccinating children on school entry; probably by making HepB vaccination as one of the pre-requisite for primary school entry. By any yardstick, hepatitis B virus infection stands out as an important public health problem warranting high priority efforts, prevention, and control.[16]

Authors' contributions:
HB conceptualized the research and manuscript writing. BR and IM reviewed and edited the manuscript.
Conflict of interest: None
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Limitations

The study detected unspecified HBV-infected subjects. It could not classify subjects into acute HBV infection, chronic HBV infection or carrier state of HBV based on the HBsAg – positivity alone.

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