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Full Length Research Paper

Sero-epidemiological survey of hepatitis B surface antigenaemia in children and adolescents in Ekiti State, Nigeria

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This study was carried out between October, 2010 and February, 2011 to determine the prevalence of hepatitis B surface antigen (HBsAg) among 1,000 children and adolescents in Ado-Ekiti and Ido-Ekiti, Ekiti State, Nigeria. Serum samples were collected from the subjects and screened for antibodies to HBsAg, using hepatitis B kits with double sandwich antibody principles. Also, standardized questionnaire was used to collect data from the subjects. The results were recorded as positive or negative to HBsAg and were subjected to statistical analysis using a statistical package, SPSS windows version 17 and a *p* value of less than 0.05 was considered significant. Out of the 1,000 subjects enrolled in this study, 529 (52.9%) were males and 471 (47.1%) were females, aged between 9 and 20 years. HBsAg was detected in 115 (11.5%) subjects comprising 74 (14.0%) males and 41(8.7%) females. Prevalence rate was highest in age range 13 to 16 years (50.4%) and was lowest in age range 9 to 12 years (13.0%). Out of the 65 subjects who had previous history of blood transfusion, 7 (6.1%) were seropositive. A total of 21 (18.3%) subjects out of the 201 subjects recorded as having shared sharp instruments and personal materials were positive for HBsAg. Also, 26 (22.6%) out of the 71 subjects who have had sexual intercourse were seropositive. The high risk behaviors associated with Hepatitis B virus (HBV) transmission in this population were; sharing of sharp instruments or personal materials (18.3%) and sexual contact (22.6%). There was no significant difference (P < 0.05) between the age, gender and location of the subjects and the prevalence of HBV. It was observed in this study that 115 (11.5%) of adolescents studied in Ado-and Ido-Ekiti harbor HBV and are ignorant of the disease caused by this virus. Mass screening, immunization against the virus and public health education to enlighten the public of the virus, and the possible routes of infection are recommended to reduce the spread of the virus. This study may provide invaluable base line information in controlling the spread of HBV infection in the study location and beyond.

Key words: Hepatitis B surface antigen, children and adolescents, sero-prevalence.

INTRODUCTION

Hepatitis B virus (HBV), a DNA virus of the family hepadnaviridae, is the causative agent of hepatitis B infection (Pungpapong et al., 2007). It is 50 to 100 times more infectious than HIV, and 10 times more infectious than hepatitis C virus (HCV). Approximately 350 million people are infected with HBV worldwide (Kurbanov et al., 2010). Hepatitis B is a highly prevalent disease, with 350 million chronic cases worldwide (Lok and McMahon, 2007). It is however, an endemic disease in Asia and Sub-Saharan Africa, with seropositivity rate ranging from

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Table 1. Pattern of HBV seroprevalence among subjects in subject with their age.

Age groups (years)	Number screened in Ado-Ekiti	Number and HBV% positive in Ado-Ekiti	Number screened in Ido-Ekiti	Number and HBV% positive in Ido-Ekiti
9 - 12	123	5 (4.1)	105	10 (9.5)
13 - 16	222	11 (5.0)	206	47 (22.8)
17 - 20	155	7 (4.5)	189	35 (18.5)
Total	500	23 (4.6)	500	92 (18.4)

15 to 60% in Africa (Alikor and Erhabor, 2007). Nigeria is a holoendemic area for HBV, with carrier rate of 15 to 35% (Bojuwoye, 2007) and an estimated 12% of the total population being chronic carriers of HBsAg (Olumide, 2007).

HBV has been reported to be transmitted via parenteral route, and by transfusion of HBV infected blood and blood products from mother to child, needle stick injury, ear piercing, during tattoo and other tribal ceremonies (scarification), barber's razors, among others (Agbede et al., 2007; Glebe and Urban, 2007; Bell and Nguyen, 2009). Infection was also discovered to be spread by formites (inanimate objects), sharing of tooth brush, abrasion and sexual contact with infected persons (Otegbayo et al., 2003; Keffe and Marcellin, 2007; Olokoba et al., 2009; Kurbanov et al., 2010).

To the best of our knowledge, there has not been any report on the prevalence of Hepatitis B surface antigen (HBsAg) among adolescents and children in Ekiti State Nigeria. The aim of this study was to determine the effect of demographic and high risk factors such as age, sex, history of blood transfusion, sharing of sharp instruments and personal materials, as well as sexual, contact on the prevalence to HBV infection among adolescents and children in Ekiti State Nigeria.

MATERIALS AND METHODS

Study area

This study was conducted among subjects in Ado-Ekiti and Ido-Ekiti, Ekiti State, representing urban and rural areas of the state, respectively. The study was conducted between October, 2010 and February, 2011.

Study population and sample size determination

The study population consists of one thousand adolescents and children in Ado-Ekiti and Ido-Ekiti. The method of Daniel (1983) was used for the determination of the sample size. This was determined based on the prevalence rate of the study of Pennap et al. (2010). The sample size (N) was estimated using the marginal error of 1.5% and 95% confidence interval.

$N = \text{Prevalence} \times (100 - \text{Prevalence}) / (\text{Allowable error} / 1.96)^2 \approx 969$

However for more accurate results, a total of 1,000 samples were collected from children and adolescent in the study area.

Study design

The aim of the study was explained to the subjects and their parents, and a well structured questionnaire was administered only to the subjects who gave a verbal consent. A structured questionnaire interview was used to collect data. The questionnaire used in the interview was evaluated, reviewed carefully, and then pre-tested on 20 respondents, and it consisted of two parts: the first focused on socio-demographic characteristics of respondents such as age, sex, age and location. The second involved factors predisposed to hepatitis B.

Collection of serum samples

Two millilitre of blood was aseptically collected by vein puncture into appropriately labeled bottles. The blood samples were allowed to clot and centrifuged for five minutes at 2,000 rpm in order to separate the serum from the clotted blood. The serum was then collected aseptically into another labeled bottle using an automated pipette. Serum that was not tested immediately was stored in the refrigerator until tested.

Serological detection of hepatitis B surface antigen (HBsAg)

The HBsAg One step hepatitis B surface antigen test strip (Gold Medical Diagnostics Reagent, USA), a rapid chromatographic immunoassay for the qualitative detection of Hepatitis B surface antigen in serum/plasma, was used for screening the participants. It utilizes a combination of monoclonal and polyclonal antibodies to selectively detect elevated levels of HBsAg in serum/plasma. The test was carried out and interpreted according to the manufacturer's instructions.

Data analysis

The data generated from this study were analyzed for level of significance using chi-square using SPSS (version 17). The level of significant was determined at p-value of $p = 0.05$ in all the statistical comparisons.

RESULTS

The total number of subjects enrolled in this study was 1,000: 500 from Ado-Ekiti and another 500 from Ido-Ekiti. Their age ranged from 9 to 20. The male to female ratio was 1: 1.2 for Ado-Ekiti and 1.5:1 for Ido-Ekiti. Table 1

Table 2. Pattern of HBV seroprevalence among subjects in respect to their sex.

Number of subject	Location	Sex		
		Male	Female	Total
Number tested	Ado	232	268	500
	Ido	297	203	500
	Total	529	471	1000
Number positive	Ado	13	10	23
	Ido	61	31	92
	Total	74	41	115
Seropositivity (%)	Ado	5.6	3.7	4.6
	Ido	20.5	15.3	18.4
	Total	14.0	8.7	11.5

Table 3. Seropositivity pattern of HbV and exposure to risk factors.

Number of subject	Location	Predisposing factor		
		Blood transfusion	Sharing of sharp objects	Sexual intercourse
Number tested	Ado	15	103	20
	Ido	50	98	51
	Total	65	201	71
Number positive	Ado	3	9	7
	Ido	4	12	19
	Total	7	21	26
Seropositivity (%)	Ado	4.6	8.7	35.0
	Ido	6.2	4.5	37.3
	Total	10.8	6.0	36.6

shows the results from the risk factors for hepatitis B surface antigen seropositivity among the subjects. The prevalence was higher among subjects with age range between 13 and 16 (13.6%) while the least prevalence was recorded among subject between 9 and 12 (6.6%).

In Ado-Ekiti, Hepatitis B surface antigen (HBsAg) was detected in 23 (4.6%) subjects comprising 13 (5.6%) males and 10 (3.7%) females. A total of 92 (18.4%) subjects comprising 61 (20.5%) males and 31 (15.3%) females were positive for HBsAg in Ido-Ekiti, as shown in Table 2. Prevalence rate was high in age group 13 to 16 years which was 11 (5.0%) and 47 (22.8%) in Ado-Ekiti and Ido-Ekiti, respectively. In both locations, the incidence was lower among subjects aged from 9 to 12 years with 4.1 and 9.5% in Ado-Ekiti and Ido-Ekiti, respectively. As shown in Table 3, out of 15 subjects that had histories of blood transfusion in Ado-Ekiti, 3 (4.6%) were positive for HBsAg. In Ido-Ekiti, 4 (6.2%) out of the 50 subjects that had been blood transfused were seropositive. In Ado-Ekiti, there were recorded 9 (4.5%) seropositive subjects out of the 103 subjects that shared sharp instruments and personal materials, while Ido-Ekiti had 98 subjects who shared sharp objects hving a prevalence rate of 6.0% (n = 12). The rate was lower in Ado-Ekiti 4.5% (n = 9). Also in Ado-Ekiti, 7 (35.0%) out of the 20 subjects that admitted to having had sexual intercourse were positive for HBsAg while 19 (20.7%) of the subjects in Ido-Ekiti were seropositive. There was no significant difference ($P < 0.05$) between age, gender and location of the children and the occurrence of hepatitis B virus.

DISCUSSION

This study shows that children and adolescents can contract hepatitis B as reported by Ladapo et al. (2011). The seroprevalence rate of HBV infection among the subjects in Ado-Ekiti was 4.6% while that of subjects in Ido-Ekiti was 18.4% as shown in Table 1. These values

were lower than the 21.3% reported in Ibadan, Oyo State by Otegbayo et al. (2003). Hence, Ado-Ekiti is moderately endemic to HBV infection. Also, according to Bojuwoye (2007), Nigeria is a holendemic area for HBV with carrier rate of 15 to 37%. Ido-Ekiti, a typical rural area, was highly endemic for HBV infection compared to Ado-Ekiti, an urban area. This is in agreement with the report of Oje (2011).

The overall HBV prevalence rate of 11.5% recorded in this study was higher than the 7.6% reported in primary school children in Nnewi, Nigeria. The incidence at early stage of life showed that HBV can be contracted in early childhood as stated by Alter (2003). The prevalence rate was higher in the rural area (Ido-Ekiti) than urban area (Ado-Ekiti). This may be due to lack of information and poor personal hygiene. The prevalence rate of 18.4% recorded in Ido-Ekiti is higher than the 12.4% reported by Alikor and Erhabor (2007) in children attending tertiary health institution in Niger Delta region of Nigeria, and the lowest prevalence was observed in children within 9 and 20 years while it was highest among subject within the 13 and 16 years age group. This observation supports the findings of Zaki et al. (2003) that prevalence of hepatitis B virus infection increases with increasing age of children.

There was no significant difference ($P < 0.05$) between the age, gender and location of the children and the occurrence of HBV. This is contrary to the findings of Odusanya et al. (2005) that reported higher in males than females. Considering the risk factors associated with HBV infection in both locations, it seems that sharing of sharp instruments or personal materials (10.4%) and of sexual intercourse (36.6%) were the major risk factors for HBV transmission in this population as shown in Table 3. This finding is in agreement with the scientific report that unsafe use of sharp instruments and sexual contact are important routes of HBV transmission (Agbede et al., 2007; Keffe and Marcellin, 2007; Kurbanov et al., 2010). History of blood transfusion had the lowest seropositivity (10.8%). This confirms the findings by Redd et al. (2007) that HBV is no longer transmitted by blood transfusion because all blood for transfusion is screened to exclude contamination with HBV.

Conclusion

Hepatitis B surface antigen was determined in 1,000 secondary school children in Ado-Ekiti and Ido-Ekiti, Ekiti State, Nigeria with 115 (11.5%) subjects seropositive. Ado-Ekiti and Ido-Ekiti were both, respectively, moderately and highly endemic for HBV infection. There was no significant difference ($p < 0.05$) with respect to age, gender and location. Adolescents in the studied area harbour asymptomatic HBV and are ignorant of the disease caused by this virus. We recommend that governmental and non-governmental organizations should assist in the area of mass screening, mass immunization against the virus and public health education to enlighten the public of the danger of the virus and the possible routes of infection.

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