MOTHER TO CHILD TRANSMISSION OF HEPATITIS B VIRUS IN THE UNIVERSITY OF ILORIN TEACHING HOSPITAL, NIGERIA.

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ABSTRACT

A total of 237 pregnant women participated in this study between September 1 to December 31, 2012. Seropositive mothers were indentified following screening of both booked and unbooked pregnant women who consented to participate in the study. The Seropositive mothers were counselled and followed up to delivery and had the babies umbilical cord blood checked for Hepatitis B Surface antigen or otherwise. The seronegative women were counselled on the implication of their status and the need to remain negative. The data were analyzed using SPSS version 16. Out of the 30 seropositive mothers, twelve had seropositive babies giving a vertical transmission rate of 40%. Vertical transmission of Hepatitis B Virus plays a significant role and this stresses the significance of routine Hepatitis B virus screening amongst pregnant women. It also indicates the need for proper management of seropositive mothers to prevent the adverse sequelae associated with Hepatitis B virus infection in them or their neonates.

Keywords: Transmission, Hepatitis B Virus

1 INTRODUCTION

Infection with the Hepatitis B Virus (HBV) is a public health problem worldwide. According to the World Health Organization (WHO), it was estimated that in the year 2000 there were about 400 million carriers of the infection. It was also estimated that approximately one million people died from HBV infection and the development of its clinical forms such as acute hepatitis, chronic hepatitis, liver cirrhosis and hepatocellular carcinoma.1,3 HBV infection can be classified according to its prevalence as low(<2%), moderate(2-7%) and high(>7%).4 It has been shown that vertical transmission is significantly responsible for infection in endemic regions of the world.5 The other means of transmission is by horizontal means which are sexual intercourse, exchange or transfer of body fluids like blood or saliva, needle sharing with drug addicts, tattooing, contact with persons with jaundice, dental procedures and blood transfusions. In Africa, there is a high risk of HBV infection due to the relatively high prevalence of the infection. About 8% of inhabitants are chronic carriers with most of these infections occurring during delivery and infancy.6,7 The endemicity of HBV infection has also been observed to be between moderate to high levels in Nigeria.8,9

The period of pregnancy provides window of opportunities for reversing the current trend in the prevalence of Hepatitis B surface antigen especially in sub-Saharan Africa, this is because many women only present to the hospital for antenatal care or visit the hospital for delivery purposes only, thus, screening for HBsAg at these times remain a significant primary health care approach. The inclusion of the vaccine against HBV in the universal vaccination program has been recommended among the strategies for controlling the infection in the general population, this vaccine is to be administered
to seronegative individuals.\textsuperscript{10-12} In addition, timely administration of HBV vaccine (active and passive) to newborns of seropositive mothers is also advocated to reduce the burden of HBV infection and its sequelae.\textsuperscript{13-15} The determination of vertical transmission of HBV is very important as infection early in life may result in a chronic carrier state in the infected infants.\textsuperscript{1,2,3} Research work on the seroprevalence of hepatitis B Surface Antigen among pregnant women include the study from a tertiary hospital in Osogbo, southwestern Nigeria,\textsuperscript{16} 18 of the 272 women were seropositive giving a prevalence rate of 6.62%, these seropositive mothers had the umbilical cord blood of their babies taken at delivery to check for HBsAg, however, it was observed that 12 out of the 18 neonates had positive results, this resulted in a vertical transmission rate of 66.67%.\textsuperscript{16} Other research work also observed a prevalence rate in the region of intermediate or high prevalence in the mothers and neonates.\textsuperscript{1,7,18} In this study both seropositive mothers and their babies were followed up appropriately and treatment recommendations were made. The aim of this study is to determine the vertical transmission rate amongst infants of seropositive women at delivery in our hospital.

2 MATERIALS AND METHODS

2.1 Study Design: A prospective cross sectional study

2.2 Study Setting: The antenatal clinic of the department of obstetrics and gynaecology, University of Ilorin Teaching Hospital, Ilorin, Kwara State, Nigeria.

2.3 Subjects/ Participants: A total of 237 pregnant women participated in this study between September 1 to December 31, 2012. Seropositive mothers were indentified following screening of both booked and unbooked pregnant women who consented to participate in the study. The exclusion criterion was refusal to participate in the study.

2.4 Determination of Sample Size:

According to a previous study done in Ilorin, the Prevalence of Hepatitis B surface antigen in pregnant women was 16\%\textsuperscript{27} This prevalence was used to calculate the minimum sample size for this study.

The minimum sample size for the study was calculated using the following equation.\textsuperscript{30}

\[
n = \frac{z^2pq}{d^2}
\]

\(n\) = the minimum sample size
\(z\) = the standard normal deviate = 1.96
\(p\) = the proportion in the target population estimated to have a particular characteristic which is 16\% (0.16)
\(q\) = 1.0 - p = 1 - 0.16 = 0.84
\(d\) = Degree of accuracy desired which is 5\% (0.05) consequently by applying the formula as follows

\[
n = \frac{(1.96)^2 \times 0.16 \times (1 - 0.16)}{0.05^2}\]

= 206.5 approximately 207

Considering the 10\% non response (attrition) on 207 is approximately 21, then the minimum sample size for this study is 207+21=228. A minimum sample size of 230 was chosen for this study.

2.5 Procedure for data collection:

After obtaining informed consent, venous blood was collected from each subject by venepuncture using a 21 G Five millilitre single use syringe, after wearing latex gloves and cleaning the venepuncture site with a cotton wool swab containing methylated spirit, the aspirated blood was then poured into a universal specimen bottle that does not contain an anticoagulant. Two millilitres of blood was used for this test and the remainder was used for other routine haematological investigations to reduce multiple venepuncture. Blood sample was also taken from the umbilical cord of babies of seropositive mothers i.e (from the placental end after the baby had been separated) to determine the status of the infant at delivery. The blood was allowed to clot and the sera separated by decantation, the separated sera was then be used for the test. The test was carried out on the day of collection of the sera but when the sera was not be used on the day of collection, like in patient that present in labour at night or deliveries of seropositive mothers that occur at night, the sera was stored in the refrigerator. The duration of storage was not longer than three days. Such stored frozen sera
were brought to room temperature to effect thawing of the specimen before it was used for the test.

The testing for hepatitis B surface antigen (HBsAg) was done using the Clinotech Diagnostic HBsAg detection Kit. This is a rapid generation chromatographic immunoassay for the qualitative detection of hepatitis B Surface antigen in serum. This test is primarily based on the principle of sandwich immunoassay in which monoclonal and polyclonal antibodies are employed to identify HBsAg. The test device or strip membrane is percolated with anti-HBsAg antibodies on the test line region of the strip. During testing, the serum reacts with the anti-HBsAg antibodies conjugated particles. The mixture migrates upward on the membrane chromatographically by capillary action to react with anti-HBsAg antibodies on the membrane and generate a coloured line. The presence of the coloured line in the test region indicates a positive result while its absence indicates negative result. To serve as a procedural control, a coloured line will always appear in the control line region indicating that proper volume of specimen has been collected.

2.6 Limitation of the test method

The test is only a qualitative test. Neither the quantitative value nor the rate of HBsAg concentration can be determined by the test. The test method cannot detect less than 1ng/ml of HBsAg in specimens.

2.7 Ethical Approval

Ethical approval was obtained from research and ethics committee of the University of Ilorin Teaching Hospital.

2.8 Sponsorship/ Conflict of interest

The study was sponsored by the researchers and there was no conflict of interest in the conduct of the study.

2.9 Data Analysis

The data generated from the structured questionnaire was analyzed using the SPSS 16 software. Data collected was entered using numeric codes. Frequency distribution tables of variables were generated. Measures of central tendency and dispersion for quantitative variables as well as proportions for qualitative variables were determined. Categorical data were summarized as frequencies and percentages while continuous data were summarized as mean +/- standard deviation. Discrete variables were analyzed using Chi square test. A p value of less than or equal to 0.05 was considered as being statistically significant at 95% confidence interval.

3 RESULTS

Twelve of these thirty women had seropositive babies giving a vertical transmission rate of 40.0%. Of the thirty seropositive pregnant women, nineteen(63.3%) were booked and were regular on antenatal follow-up visits. Forty percent were in the age range of 30-34 years (p=0.018). On the analysis of sociodemographic characteristics like religion and ethnicity, it was observed that Islam and the yoruba ethnic group contributed to a greater percentage of both recruited and seropositive women respectively this is probably because the religion and ethnic group accounted for a significant number in the population, hence, this was not statistically significant. A consideration of risk factors for HBV infection shows that four (1.7%) patients had a co-infection of HBV and HIV. Among the thirty seropositive, two gave a previous history of dental manipulation in the past, six had tattoo or native scarification markings on their body. Five (16.7%) gave a history of previous usage of intravenous drugs administered whereas 12(40.0%) has had blood transfusion in the past. It was observed that only seropositive mothers with a previous history of blood transfusion had vertical transmission of HBV from mother to child (p=0.046).

4 DISCUSSION

Infection with hepatitis B virus is a public health problem and has a global implication. Its prevalence in Nigeria has been observed to be mainly between the moderate and high levels. Vertical transmission contributes significantly to the burden of this virus and it has been observed that 80-95% cases of vertical transmission occur at delivery. In this study the seroprevalence of HBV infection was 12.7% and this falls in the range of high endemic prevalence, it is similar to what obtains in other centres in Nigeria, though there may be minor variations in values because of the differences in the attendant sociocultural and other risk factors which vary from one locality to another.

In a study in Ilorin on pregnant women attending antenatal clinic, the seroprevalence of hepatitis B virus infection was found to be 16%27 this is higher than the 12.7%
obtained in this study; the reason for this difference may be due to the different times at which these two studies were conducted, the fact that the previous study was only on the pregnant women attending the antenatal clinic and the differences in sample size of these studies. Another reason for this finding is probably due to the improved awareness on the prevention of HBV infection and the expanded program on immunization especially on the newborn babies.

Presently, the routine antenatal investigations done at the UIITH does not include the screening for HBsAg. However, the routine investigations include packed cell volume, haemoglobin genotype, blood group and rhesus typing, venereal disease research laboratory test, urinalysis and human immune-deficiency virus screening. It is worthy of note that many of these routine investigations are either at same cost as screening for HBsAg or even more expensive, hence, it is worrisome that screening for HBsAg was excluded despite its emergence as a public health issue.

The result obtained from this study showed that most seropositive women were older than thirty years of age, this was also observed in some previous studies.11–27 This was because majority of the women in this age category are at a great risk of exposure to HBV seropositivity because of the prevailing risk factors associated with its spread. There was also a significant relationship between spouse education level and HBV seropositivity though this was not reported in the previous studies.11–27 Nevertheless, the other sociodemographic variables like booking status, marital status, religion did not show any significant association with HBV seropositivity in this study. Amongst the various risk factors for HBV considered, it was observed that previous history of blood transfusion was related with HBV infection and mother to child transmission of the infection this was so because all the twelve mothers who had seropositive babies had blood transfusion in the past. This implies that there is a further need for proper screening of blood and blood products meant for transfusion to reduce the burden of HBV infection.

Twelve of the thirty babies of seropositive mothers were found to be positive, hence, vertical transmission rate for HBV infection was 40.0% and this is similar to the 42.89% obtained by Onakewhor et al in Benin City, however, Fadero et al in Osogbo obtained a vertical transmission rate of 66.67%.16,18 It is important to note that in the study carried out by Onakewhor et al; none of the pregnant women was a previous intravenous drug abuser nor affirmed to a history of blood transfusion in the past, this may be responsible for the seroprevalence rate of 2.19% which is relatively low and may be a contributory factor for the vertical transmission rate which is less than the value obtained by Fadero et al. However, the later inference may be a doubt because a vertical transmission rate of 40% was obtained in this study, similar to those of Onakewhor et al despite the inclusion of pregnant women with a previous history of blood transfusion and intravenous drug abuse. It was observed from this study that there was a statistical significant difference in the level of spouse education of seropositive women when compared with their seronegative counterparts because the spouses of the seropositive women were less likely to have a tertiary education, p=0.048(Table3) hence, could be of a lower socioeconomic status while all the other socio-demographic variables did not show a significant difference in the two groups of women. Hence, it was not surprising that only three of the seropositive mothers were able to afford hepatitis B immunoglobulin as a form of passive vaccination at delivery due to the high cost of this vaccine. The babies of seropositive women have a mean birth weight less than those of their seronegative counterparts as stated above, the reason for this weight difference is unknown thought it is important to note that there are many other confounding factors like difference in sociodemographic factors which may be responsible for this finding.

Nevertheless, all seropositive babies had the active vaccination which is part of the expanded program on immunization. Seropositive mothers were counseled and referred to the gastroenterologist for appropriate follow-up care which usually includes serial abdominal scan to check for the liver architecture and other test like HBeAg, HBV DNA etc. Seropositive babies are also to be followed up because of the risk of chronic carrier state in these individuals. Seronegative mothers were also counseled on the need to remain seronegative.

5 CONCLUSION AND RECOMMENDATION

In summary, this study confirms a high endemicity of HBV infection among pregnant women
in Ilorin and a corresponding high vertical transmission rate. Hence, there is a need to consider the introduction of screening for HBV infection as part of the routine investigations for pregnant women in the University of Ilorin Teaching Hospital.

Mass active immunization program for HBV in the entire population should be sustained and it should also be expanded to accommodate subsidizing the current cost for procurement of Hepatitis B Immunoglobulin. This can be ensured by government and donor agency commitment towards achieving this.

Health care providers and policy makers must recognize the risk factors for the spread of HBV infection in this area and design an effective prevention program. This include ensuring that National Blood Transfusion Centre provide standard screening centres all over the country for the provision of safe blood and blood products for transfusion services as well as oversight functions in the various hospitals and laboratories that carry out blood transfusion services. Overall, there is a need to ensure that the Millennium Development Goals are attained so that the burden of hepatitis B virus can be significantly reduced.

Institution where research was conducted:

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