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Original Research Article

Sero-prevalence and associated factors of hepatitis B virus infection among antenatal women at booking in a tertiary hospital

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ABSTRACT

Background: Hepatitis B virus (HBV) infection is a global public health problem affecting about two billion people worldwide. About 95% of the infection is acquired during the perinatal period. Though studies have been carried out on these in different parts of Nigeria, information regarding the prevalence and risk factors of HBV infection in antenatal clinic attendees in south-south Nigeria is scanty. We determined the sero-prevalence of hepatitis B surface antigen (HBsAg) and the associated factors among pregnant women in south-south, Nigeria.
Methods: A retrospective study carried out at the antenatal clinic of Rivers State university teaching hospital (RSUTH) between 1st January, 2015 and 31st December, 2020. At booking visit, 9,990 women were tested for HBsAg. Data was analyzed using the IBM SPSS version 23.0. P<0.05 was considered statistically significant.
Results: A total of 9,990 women were screened for HBV infection. Prevalence of HBV infection was 160 (1.6%). Age group 30-39 years had most HBV infection, 103 (64.4%). Most who were positive for HBsAg were married 158 (98.7%), traders 45 (28.1%), para 2-4, 65 (40.6%); in their second trimester, 78 (48.8%) and with tertiary level of education 111 (69.3%). Associated factors of HBV infection with statistically significant difference in proportion of HBsAg positives and negatives include gestational age, educational status, occupation, presence of HIV and VDRL.
Conclusions: Although the study reveals a low prevalence of HBV infection, continued routine screening for HBV infection is highly recommended.

Keywords: HBV, HBsAg, Antenatal women, Prevalence, RSUTH

INTRODUCTION

The HBV infection, a public health problem affects about two billion people worldwide. Of this, about 350 million people have chronic infection and 75% of the chronic liver disease is caused by hepatitis infection.[1,2] Transmission of HBV results from exposure to contaminated blood, body fluids, needles, having unprotected sexual intercourse with an infected person, blood transfusion and vertical transmission from mother to child.[3,4] In Sub-Saharan Africa, the overall HBsAg carrier rate is 5-20%.[5] In Nigeria, the prevalence rate among the general population is 12.2% and a systematic review of HBV infection among Nigerian pregnant women was 14.1%.[3]

Apart from vertical transmission from mother to child, occurring in 1-5%, horizontal transmission in childhood also occurs. Infants who are infected by their mothers before 5 years often develop chronic infection and the risk is more than 90%.[1,5] Therefore, pregnant women constitute a severe health risk to their foetuses and the society at

large.[4,5] Perinatal transmission occurs around delivery through contact of the baby with mother's blood and body fluids. Breast milk has not been fully implicated as a major source of vertical transmission.[6]

It is important for pregnant women to be screened for HBV at booking and babies of positive women, should receive both first dose of the hepatitis B vaccine (HBVc) and hepatitis B immunoglobulin (HBIG) at birth. When they are given within 12 hours of delivery, the baby has more than 90% lifelong protection against hepatitis B infection[6]. Infection in the mother is associated with low birth weight (LBW) and prematurity.[6] This screening also assists those that are positive to receive treatment with their partners and household. Drugs that can be safely given in pregnancy for treatment of HBV infection include lamivudine, telbivudine and tenofovir.[7] Determining seroprevalence of HBV infection among women who booked for antenatal care will assist to know if screening and treatment method used in this center and national programme on immunization (NPI) which started in Nigeria since 1998 have favorable outcome in pregnant women.

METHODS

A retrospective study involving pregnant women, who booked for antenatal care (ANC) at RSUTH from 1st January, 2015 to 31st December, 2020. It is a teaching hospital located in the southern part of Nigeria, dominated by Christians. It serves as a major referral centre for all the primary and secondary centres and privately owned hospitals in and around the State. More than 5 million people live in the State. The average daily attendance to the antenatal clinic is 70 women.

Data was obtained from laboratory registers where records of investigations done at booking were kept within the study period. Data obtained were sociodemographic characteristics of antenatal clinic attendees, their full blood count, HBsAg, human immunodeficiency virus (HIV), venereal disease research laboratory (VDRL), blood group and genotype. Blood (5 ml) was collected from each patient into tube containing anticoagulant, ethylenediaminetetraacetic acid (EDTA). Sera obtained from centrifuging some of the blood sample was tested for HBsAg using rapid agglutination slide test kit. The data collected was analyzed using IBM SPSS version 23.0.

Comparative analysis was done with the chi square test at a 95% CI and p value of<0.05 was statistically significant.

RESULTS

Total number of women who registered for ANC during the study period was 9,990 women. The yearly distribution of the women is shown in Figure 1. Women who registered for ANC in the first trimester were 1,925 (19.27%); 5,822 (58.28%) in second trimester and 2,243 (22.45%) in third trimester. The mean age ± S.D was 31.44±4.72 years, modal age was 30 years, age range was 15-48 years and most, 6,234 (62.4%) were in age group 30-39 years. The mean gestational age (GA) during the study period was 20.51±7.50 weeks and the GA range was 6-40 weeks. Modal parity was para 0, most women, 3,751 (37.5%) were Para 2-4. Most, 9,975 (99.8%) had formal education. Fifty-eight (0.6%) women had primary education while 2,871 (28.7%) and 7,046 (70.5%) had secondary and tertiary levels of education respectively. Few, 237(2.4%) were single while 9,753 (97.6%) were married. Majority, 5822 (58.3%) registered for antenatal care in their second trimester and most 3479 (34.8%) were civil servants. The socio-demographic characteristics of the women in their trimesters is shown in Table 1.

Of the 9,990 women screened for HBsAg, 160 were seropositive giving a prevalence rate of 1.6%. This is shown in Figure 2. Majority, 103 (64.4%) in age group 30-39 years were positive for HBsAg. Most who were positive for HBV infection were in their second trimester, 78 (48.8%), para 2-4, 65 (40.6%), had tertiary education, 111 (69.3%), were traders, 45 (28.1%), married, 158 (98.7%), blood group O positive, 79 (49.3%) and hemoglobin genotype AA, 129 (80.6%). Table 2 shows the relationship between the socio-demographic characteristics and HBV infection. Table 3 shows the relationship between HBV infection, blood group and genotype.

Most women positive for HBsAg, 106 (66.2%) were negative for HIV. Also, most women positive for HBsAg, 117 (73.1%) negatives for VDRL, 54 (0.5%) seropositive for both HIV and HBV infection and 43 (0.4%) were seropositive for both VDRL and HBV infection (Table 4) associated factors of HBV infection with statistically significant difference in proportion of HBsAg positives and negatives include gestational age, educational status, occupation, presence of HIV and VDRL.

Table 1: Socio-demographic characteristics of women in their trimesters.

Parameters	1st trimester	2nd trimester	3rd trimester
Number	1925	5822	2243
Year	N (%)	N (%)	N (%)
2015	350 (18.2)	1179 (20.3)	501 (22.3)
2016	401 (20.8)	1317 (22.6)	605 (27.0)
2017	224 (11.6)	847 (14.6)	298 (13.3)
2018	369 (19.2)	1113 (19.1)	397 (17.7)
2019	441 (22.9)	998 (17.1)	322 (14.4)
2020	140 (7.3)	368 (6.3)	120 (5.3)

Continued.

Parameters	1st trimester	2nd trimester	3rd trimester
GA	≤13 weeks	14-26	>26
Mean	10.45	19.7	31.26
Median	11	20.0	31
Mode	11	21	29
Range	7	12	13
Maximum	13	26	40
Minimum	6	14	27
Standard deviation	2.23	3.58	3.03
Educational status			
No formal education	0 (0)	12 (0.2)	3 (0.1)
Primary	10 (0.5)	31 (0.5)	17 (0.8)
Secondary	472 (24.5)	1718 (29.5)	681 (30.4)
Tertiary	1443 (75)	4061 (69.8)	1542 (68.7)
Occupation			
Civil servants	699 (36.3)	2137 (36.7)	643 (28.7)
Hair stylist	54 (2.8)	123 (2.1)	43 (1.9)
Housewife	291 (15.1)	1012 (17.3)	502 (22.4)
Lawyer	2 (0.1)	9 (0.2)	4 (0.2)
Make-up artist	5 (0.3)	9 (0.2)	16 (0.7)
Medical doctor	0 (0)	3 (0.1)	3 (0.1)
Seamstress	54 (2.8)	104 (1.8)	68 (3.0)
Students	142 (7.4)	397 (6.8)	151 (6.8)
Teacher	38 (2)	139 (2.4)	37 (1.6)
Trader	640 (33.2)	1889 (32.4)	776 (34.6)
Marital status			
Married	1866 (96.9)	5701 (97.9)	2186 (97.5)
Single	59 (3.1)	121 (2.1)	57 (2.5)
Age (In years)			
Mean	31.09	31.59	31.36
Median	31	32.00	31
Mode	30	30	30
Range	32	33	30
Maximum	48	48	46
Minimum	16	15	16
Standard deviation	4.574	4.68	4.92
Age groups (In years)			
≤19	9 (0.5)	49 (0.8)	24 (1.1)
20-29	701 (36.4)	1785 (30.7)	761 (33.9)
30-39	1149 (59.7)	3725 (64.0)	1360 (60.6)
≥40	66 (3.4)	263 (4.5)	98 (4.4)
Parity			
Mean	1.06	1.39	1.44
Median	1.00	1.00	1
Mode	0	0	0
Range	8	8	8
Maximum	8	8	8
Minimum	0	0	0
Standard deviation	1.285	1.37	1.38
Parity			
0	909 (47.2)	1989 (34.2)	688 (30.7)
1	396 (20.6)	1426 (24.5)	597 (26.6)
2-4	585 (30.4)	2267 (38.9)	899 (40.1)
≥5	35 (1.8)	140 (2.4)	59 (2.6)

Table 2: The relationship between the socio-demographic characteristics and HBV infection.

Variables	HPV infection				
Age (in years)	**Negative**	**Positive**	**% Positive**	**Fisher exact test**	**P value**
<19	81	1	0.6	0.390	0.93
20-29	3196	51	31.9		
30-39	6131	103	64.4		
≥40	422	5	3.1		
Parity					
0	3532	54	33.8	4.048	0.25
1	2385	34	21.3		
2-4	3686	65	40.6		
≥5	227	7	4.3		
GA (in weeks)					
≤13	1888	37	23.1	6.12	0.047
14-26	5744	78	48.8		
>26	2198	45	28.1		
Educational status					
No formal education	13	2	1.3	9.05	0.025
Primary	56	2	1.3		
Secondary	2826	45	28.1		
Tertiary	6935	111	69.3		
Occupation					
Civil servant	3436	43	26.9	34.611	<0.01
Hair stylist	216	4	2.5		
House wife	1772	33	20.6		
Lawyer	13	2	1.3		
Make-up artist	29	1	0.6		
Medical doctor	6	0	0.0		
Seamstress	218	8	5.0		
Student	675	15	9.4		
Teacher	205	9	5.6		
Trader	3260	45	28.1		
Marital status					
Married	9595	158	98.7	0.884	0.264
Single	235	2	1.3		

Table 3: The relationship between HBV infection, blood group and genotype.

Variables	HBV infection				
Blood group	**Negative**	**Positive**	**% positive**	**Fisher's exact test**	**P value**
A-	57	4	2.5	13.86	0.051
A+	2184	47	29.4		
AB-	3	0	0.0		
AB+	293	6	3.8		
B-	30	0	0.0		
B+	1473	21	13.1		
O-	194	3	1.9		
O+	5596	79	49.3		
Genotype					
AA	7650	129	80.6	7.82	0.143
AC	3	0	0.0		
AS	2136	30	18.8		
SC	4	1	0.6		
SS	37	0	0.0		

Table 4: Relationship between HBV infection, HIV infection and VDRL.

Variables	HBV infection				
	Negative	Positive	% Positive	X^2	P value
HIV infection					
Negative	9293	106	66.2	226.333	<0.01
Positive	537	54	33.8		
VDRL					
Positive	9792	117	73.1	1373.52	<0.01
Negative	38	43	26.9		

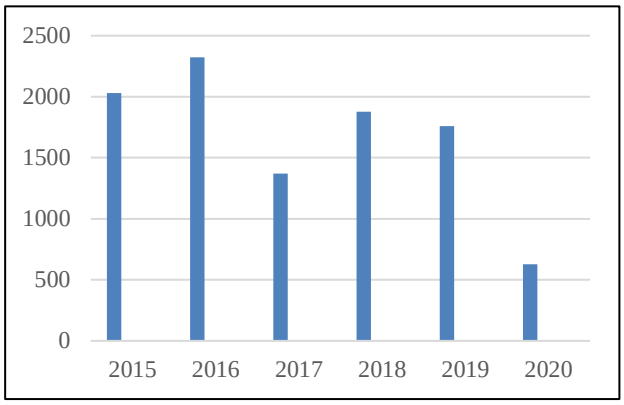

Figure 1: Yearly distribution of booked antenatal women.

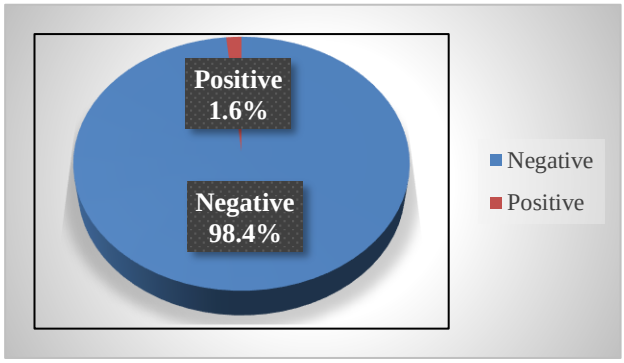

Figure 2: Prevalence of hepatitis B virus infection.

DISCUSSION

The sero-prevalence of HBV infection in this study is 1.6%. The is similar to a study done in Iran with the same prevalence rate of 1.6%.[8] A systematic review and meta-analysis of data in Nigeria published between 2010 and 2019 revealed a prevalence rate of HBV infection of 9.5%.[9] According to WHO criteria for HBV endemicity, this prevalence is low. (≥8 is high, 2-7% is moderate and <2% is low).[9] This rate is very low compared to the high rates found in Northern parts of Nigeria which include 8.2%, 7.9%, 6.7%, 11.6%, 17.2% and 19.8%.[3,10-14] The prevalence rates in Southern part of Nigeria are also high and they include 16.5%, 8.5%, 16.3%, 12.5% and 7.3% from Osogbo, Ibadan, Edo and Lagos respectively.[4,15-18] Also, prevalence rates of HBsAg in studies done in Uganda, Ghana, Eastern Ethiopia, Tanzania and Kenya were 2.9%, 9.5%, 8.5%, 3.9% and 3.8% respectively.[5,19-22] These differences in the prevalence rates of HBV infection may be due to differences in the geographical location, socio-cultural practices, study design, level of care of women in the facility, sample size and methodology of the study.

America reported a prevalence of 0.38% indicating low endemicity like in our study.[23] The low endemicity areas have implemented HBV infection prevention strategies like creation of HBV infection awareness, testing of pregnant women at booking for the infection, vaccination and immunization of babies delivered by mothers who tested positive to HBV infection.[5,24] This is practiced in our centre leading to the low prevalence seen in this study.

The drastic decline in the number of women who attended antenatal clinic in 2020 was due to COVID-19 pandemic which started in 2019. This study was done in a tertiary institution where a larger number of women had tertiary level of education and more information on the HBV infection. This would have contributed to the low prevalence of HBsAg in this study. Majority of the women including the medical doctors registered for antenatal care in their second trimester buttressing the fact that most women in the developing countries book late for antenatal care possibly due to various cultural or traditional reasons.[25,26] This is at variance with the study done by Kayondo et al where majority (60%) of the women presented in their first half of the pregnancy.[5]

Most women (64.4%) who were seropositive for HBsAg belonged to age group 30-39 years and the least prevalence (0.6%) was seen among those who were 19 years or less. This agrees with the study done by Okunade et al where 0% prevalence was seen in those between 15-19 years.[4] This indicates improved education, awareness and childhood immunization.[4] Other studies also had similar findings of having highest prevalence of HBsAg in women who are ≥35 years.[3,4,14] Most women with tertiary level of education were positive for HBsAg probably because they accounted for most women 6935 (69.4%) in the study. This is at variance with study done by Okunade et al where none of the studied women with tertiary level of education tested positive for HBsAg.[4] The overall seroprevalence of HIV in this study is 5.9% which is lower than HIV prevalence rates of 9.7% and 6% respectively in other studies and

higher than 2.6% in another study.[21-28] Also, HBV and HIV co-infection prevalence of 54 (33.8%) in this study is higher than in other studies, 25% and 13% respectively.[21,27] The co-infection prevalence of HBV and syphilis infection in our study is 43 (26.9%). This group of women are more at risk of having pregnancy associated with morbidities and mortalities for both the mother, foetus and baby. At booking visit, the mothers are offered screening for three infectious diseases namely, HIV, hepatitis and syphilis. This is done so that treatment will commence early, if need be, to reduce risk of passing the infection to the baby.[28]

Most women were civil servants; 3436 (34.4%). Of the 160 women who are positive for HBsAg, 45 (28.1%), 43 (26.9%) and 33 (20.6%) were traders, civil servants and housewives respectively. The three occupations alone accounted for 76% of all the HBV positive women. This high value among this group of women is not surprising as they accounted for most women, 8468 (84.7%) attending the antenatal care during the study period. None of the pregnant medical doctors tested positive for HBsAg. In a study done in Uganda, 3% of those who were sero-positive for HBsAg were health workers.[5] Apart from through sexual means of transmission of HBV infection, health workers and intravenous drug addicts are most exposed to contracting it.

Like similar studies, most women who tested positive for HBV infection were married. This is also not surprising because ANC is mostly attended by married women.[3-5]

Lao and Lui et al suggested that blood group O was associated with increased HBV infection while blood group B and AB were associated with its reduced prevalence.[29,30] Their findings were similar to those of Jing et al.[31] In this study, blood group O occurred most (51.2%) in women who tested positive to HBV infection. This is in agreement with previous studies.[29-31] The occurrence of blood group B and AB is low accounting for 13.1% and 3.8% respectively. This is also in agreement with previous studies.[29-31] Blood group A accounted for 31.9%. Most women (76.6%) have Haemoglobin genotype AA and accounting for the highest (80.6%) no of positive HBV infection. The women with Hb SS and HbAC had no HBV infection. Women with Hb AS and Hb SC accounted for 18.8% and 0.6% of those positive for HBV infection. These findings are similar to those of Abdulazeez et al.[32] Statistical analysis showed no significant differences in the rate of HBV infection in relation to ABO blood grouping system and Hb genotype, also similar to a previous finding.[32]

Associated factors of HBV infection with statistically significant difference in proportion of HBsAg positives and negatives in this study include gestational age, educational status, occupation, presence of HIV and VDRL. A study done by Mustapha et al showed no statistically significant difference in proportion of HBsAg positives with respect to age, level of education, employment status, parity, age and marital status.[4] Factors positively associated with HBV infection in a study by Kayondo et al were marital status, age, socio-economic status, HIV seropositivity among others.[6]

Limitation

A retrospective study with information restricted to what is in the client's card and hospital records.

CONCLUSION

This study reveals a low prevalence of HBV infection among antenatal women in Southern Nigeria which is highly commendable. Factors such as gestational age, educational status, occupation, presence of HIV and VDRL were statistically significant.

Recommendations

Pregnant women in this part of world should be encouraged to register for antenatal care early so that the screening for transmissible infections is done and treatment commenced early to prevent maternal and foetal morbidity and mortality.

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