ORIGINAL ARTICLE

PREVALENCE OF HEPATITIS B SURFACE ANTIGEN AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE SERVICE AT DEBRE-TABOR HOSPITAL, NORTHWEST ETHIOPIA

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ABSTRACT

BACKGROUND: ***Hepatitis B virus (HBV) is a public health problem worldwide. It is highly endemic in Asia and Sub-Saharan Africa. Horizontal and perinatal transmissions are thought to be major modes of transmission in these countries. The present study was undertaken to determine the sero-prevalence of hepatitis B virus infection using hepatitis B surface antigen marker and to identify the possible risk factors for acquisition of the infection in pregnant women attending antenatal care service at Debre-Tabor Hospital, Northwest, Ethiopia.***

METHODS: A cross-sectional study was conducted from January to March 2004 in a total of 209 ***pregnant women aged 16-40 years attending the antenatal clinic, Debre-Tabor Hospital. Hepatitis B surface antigen was detected by enzyme-linked immunosorbent assay (ELISA) method. Data was collected using a pre-tested structured questionnaire and analyzed using SPSS version 11.0.***

RESULTS: ***The overall prevalence of hepatitis B surface antigen among pregnant women was 5.3%. Majority of the study participants 6 (75.9%) belonged to age group of 16-22 years. History of use of sharp materials, hypodermic needles and tattoo for cosmetics had statistically significant association with the hepatitis B surface antigen seropositivity (p <0.05). There was an intermediate endemicity of hepatitis B virus infection in pregnant women attending antenatal care service at Debre Tabaor Hospital.***

CONCLUSION: ***This study has shown that HBV prevalence in pregnant women is of intermediate endemicity (5.3%) in the study area and use of sharp materials, hypodermic needles and tattoo for cosmetics were associated with hepatitis B infection. Therefore increasing awareness of transmission of hepatitis B infection through traditional unsafe injections and harmful traditional practices is needed.***

Key words: ***HBsAg, pregnant women, Northwest Ethiopia***

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INTRODUCTION

Hepatitis B virus (HBV) infection is one of the major diseases of mankind and is a serious global public health problem. Of the 2 billion people who have been infected with HBV, more than 350 million have chronic infections. HBV infections result in 500,000 to 1.2 million deaths per year as a result of liver diseases (chronic hepatitis, cirrhosis, and hepatocellular carcinoma. HBV infection prevalence varies markedly in different geographic areas of the world, as well as in different population subgroups. It ranges over 10% in some Asian, Western Pacific and sub Sahara African countries to under 0.5% in the United States and northern European countries (1). Overall, approximately 45% of the global populations live in areas of high chronic HBV prevalence. The prevalence of chronic HBV infection worldwide could be categorized as high (>8%), intermediate (2-7%) and low endemicity (<2%) (2).

The main modes of HBV transmission are perinatal, horizontal, parenteral and sexual, and the relative rates of these vary throughout the world. Parenteral and sexual transmission predominates in industrialized countries, whereas horizontal and perinatal transmission predominates in developing countries. It is claimed that horizontal transmission usually occurs via in apparent percutaneous routes, through cuts and lesions (3,4).

Ethiopian national hepatitis study showed that 10.8% of young males from all regions of the country were positive for HBsAg (5). A community based seroepidemiological survey of Addis Ababa, Ethiopia has shown a 7% seroprevalence for HBsAg, higher in males than females (6). Another study done in Ethiopia has shown an overall HBsAg prevalence of 6.2% and infection occurring early in life and continuing to increase gradually without leveling off (7). Published information's on the seroepidemiology of HBV infection among pregnant women are sparse and these reports were mainly from Addis Ababa (5%) and Jimma (3.7%, range 1.4-6.4%) (8,9). HBsAg carrier pregnant mother transmit infection to neonates usually during birth or soon after birth following close contact. Neonates who contract HBV will have an almost 85-90% risk of developing chronic HBsAg carriage and chronic liver disease (10).

The present study was conducted to determine the sero-prevalence and risk of HBsAg among pregnant women attending antenatal care service Debre-Tabor Hospital, Gondar, northwest Ethiopia. The result will help policy makers design public health interventions to prevent the transmission of the disease.

PATIENTS AND METHODS

This cross-sectional study was conducted in Debre-Tabor Hospital located in South Gondar, Amhara Regional State to determine the sero-prevalence of HBsAg among pregnant women attending antenatal clinic between January and March 2004.

The total population projected from the 1994 census within the catchment area of Debre Tabor Hospital was 28,248. Out of this, 13,223 were women in the age group of 15-49 years of which 661 mothers were expected to be pregnant. The sample size was estimated with the following assumptions: an

expected prevalence of 50%, margin of error of 5%, at 95% confidence level which gives 243. Making corrections for finite population gives a sample size of 177. Adding 20% for non response, the final sample size of 212 mothers was estimated.

Five millilitre of venous blood were collected from peripheral vein using aseptic technique from each study participants. The sera were separated from clotted blood by centrifugation at 4,000 Revolution per minute (RPM) for 10 minutes. Serum samples were kept in a cold chain and transported to Bahir-Dar Regional Laboratory, which is a reference laboratory providing laboratory services to the Amhara National Regional States. All sera were stored at -20°C until tested for serology.

Sera were assayed for HBsAg by ELISA method, based on one-step "sandwich method using a commercial kit (Human, Diagnostic, Germany) as described by Tsitilonis *et al.* (11). Each well is coated with anti-HBs (mouse) monoclonal against HBsAg and contains a lyophilized horseradish peroxidase (HRP) labeled anti-HBs (mouse) conjugate sphere. The samples, positive and negative controls were transferred into the wells, agitated on micro shaker for 15 seconds and incubated for 1 hour at 37°C. The contents of the well were soaked and washed with diluted washing solution. Substrate tetramethylbenzidine (TMB) solution was added to each well and incubated at room temperature for 30 minutes. After incubation 1M sulphuric acid was added to stop the reaction. The absorbance values were read at 450/655 nm using a Bio-Rad spectrophotometer. At the end of the test, samples with absorbance values greater or equal to the cut-off (0.05) were initially considered positive. If positive results were obtained, retesting was done in duplicate. A positive result obtained on retesting of the sample was considered as positive for HBsAg. The accuracy of ELISA method used in this study in terms of sensitivity and specificity was reported to be greater than 98% (12).

Statistical analyses included were frequency tables, chi-square for testing significance of difference between proportions and multivariate analysis. Multivariate logistic regression analysis was conducted to study the association between exposure to HBV and various risk factors. All analyses were conducted using Epi-Info, version 5.0, and SPSS for windows, version 11.0. P-value less than 0.05 were considered as statistically significant.

Ethical clearance was obtained from Amhara Regional State Health Bureau ethical committee. Objectives and procedural details of the study were explained to each pregnant women and written informed consent was obtained before enrolment. Study subjects were assured that all information obtained would be treated with confidentiality. All relevant data (socio-demographic, exposure to risk factors and HBsAg results) were transferred to a questionnaire prepared for this study.

RESULTS

Out of 212 mothers intended to be included in the study, 209 were enrolled in the study giving a response rate of 98.6%. The mean (±sd) age of the mothers' was 25.4 (± 6) with range. Majority of the pregnant women 143 (68.4%) were between the age group of 16 and 28 years. Two

hundred six (98.6%) of the study subjects were married. Of the 209 pregnant women, 122 (58.4%) were from urban, and the remaining 87 (41.6%) were from rural area.

Almost all the study participants reported exposure to at least one HBV infection risk factor. Exposure to risk factors such as use sharp materials, hypodermic needles for injectable medications, practice of tattoo for cosmetics, history of multiple sexual practices, and blood transfusion was observed in 195 (93.3%), 13 (6.2%), 15 (7.2%), 4 (1.9%) and 2 (1%) of pregnant women, respectively (Table 1).

Table 1. Socio-demographic characteristics of pregnant women (n=209) attending antenatal clinic of Debre Tabor Hospital, Gondar, northwest Ethiopia.

Variables	No. (%)
Age (in Year)	
16-22	79(38.0)
23-28	64(30.5)
29-34	42(20.0)
35-40	24(11.5)
Marital status	
Married	206(98.6)
Single	3(1.4)
Gestational Period	
First Trimester	21(10.1)
Second Trimester	117(56.0)
Third Trimester	71(34.0)
Living area	
Urban	122(58.4)
Rural	87(41.6)
Use of sharp material	
Yes	195(93.3)
No	14(6.7)
Use of hypodermic needles	
Yes	13(6.2)
No	196(93.8)
Practice of tattoo for decoration	
Yes	15(7.2)
No	194(92.8)
History of multiple sexual practices	
Yes	4(1.9)
No	205(98.1)
History of blood transfusion	
Yes	2(1.0)
No	207(99.0)

Table 3. Risk factors and prevalence of HBsAg among pregnant women (n=209) attending antenatal clinic at Debre-Tabor Hospital Gonder, northwest Ethiopia.

Variables	HBsAg Positive	HBsAg Negative	P-value	Odds ratio (95%CI)
Variables				
Age (in Year)				
16-22	6	73		
23-28	4	60		
29-34	1	41	0.09*	
35-40	0	24		
Marital status				
Married	9	197	0.00*	0.02(0.0-0.37)
Single	2	1		
Gestational Period				
First Trimester	2	19		
Second Trimester	5	112	0.70*	2.23(0.29-15.3)
Third Trimester	4	67		
Living area				
Urban	9	113	0.09*	3.38(0.66-23.3)
Rural	2	85		
Use of sharp material				
Yes	10	190	0.39*	0.42(0.04-9.83)
No	1	8		
Use of hypodermic needles				
Yes	2	193	0.00*	0.01(0.0-0.04)
No	9	5		
Practice of tattoo for decoration				
Yes	7	8	0.00*	41.5(8.4-24.8)
No	4	190		
History of multiple sexual practices				
Yes	1	3	0.10*	6.5(0.0-8)
No	10	195		
History of blood transfusion				
Yes	0	2	0.89*	0.00(0.0-8)
No	11	196		

*Fisher exact test

Table 2. HBsAg practice in different age groups of pregnant women (n=209) attending antenatal clinic of Debre Tabor Hospital, Gonder, northwest Ethiopia.

Age (in year)	No.HBsAg positive (%)
16-22	6/79(75.9)
23-28	4/64(62.5)
29-34	1/42(23.8)
35-40	0/24(0.0)
Total	11/209(5.3)

Among the 209 pregnant women screened for HBsAg, 11 (5.3%) were found to be positive. At least one sero-positive case for HBsAg was found in all age groups except in the age range 35-40. There is no statistically significant difference in HBsAg prevalence across various age groups ($p>0.05$) (Table 2). History of use of sharp materials, hypodermic needles and tattoo for cosmetics had statistically significant association with the HBsAg seropositivity ($p<0.05$). Other risk factors included in the study had no statistically significant association ($p>0.05$) (Table 3).

DISCUSSION

HBV infection affecting pregnant women may result in severe disease to the mother and chronic infection to the newborn. In the present study, the overall seroprevalence of HBsAg in pregnant women attending Debre-Tabor Hospital, south Gondar was 5.3%. This shows an intermediate endemicity of HBV infection according to WHO criteria (13). The seroprevalence finding in this study is in agreement with the previous studies done among pregnant women in Addis Ababa (5%), and Jimma, Ethiopia (1-4%-6.4%) (8,9). Similar findings were reported in Nigeria (4.3%-4.6%), Sierra Leone (6.2%), Zambia (6.5%), USA, only for Asian Americans (5.6%), Jeju Island of Korea (4.9%-6.4%), and Turkey (4.2%) (14-20). However, there are reports from other parts of the world showed a low prevalence in the same study population, a prevalence of 0.14%-0.97% in USA, except Asian Americans, in Mexico (1.65%), in the northern part of Kerala state in South India (0.21%), Qatar and the United Arab Emirates (1-1.5%) were reported(18,21-23). A higher prevalence was found among a similar study population in Mali (15.5%), Hong Kong (10%), Papa New Guinea (11%), Taiwan (12%), Oman (7.1%) and in Brazil (18.5%, ranging from 7.2%-38.5%) (23-28). Comparison of our result with other studies from different countries on pregnant women showed a variable result. The difference in demographic characteristics of the study population such as socio-cultural environment, tribal practices, traditional operation, sexual practices and medical exposure and the difference in hepatitis epidemiology in these countries might explain these discrepancies.

In the present investigation, when age specific prevalence was considered, age group 16-22 had a higher prevalence (75.9%), and there was a tendency of declining in the prevalence

in the remaining age groups, even though there was no statistical significant difference across various age groups. This finding is in contrast to HBV infection prevalence, which normally shows a linear rise with age reported by other investigators in pregnant women and in other studies (5-7,27). Such discrepancy could be due to the differences in study design, population and geographical.

Risk factors, including, use of sharp materials, hypodermic needles and practice of tattoo for cosmetics were associated with HBV infection in this study. In a previous study conducted in Ethiopia, risk factors such as dental procedure, caesarean section and tattooing were associated with HBsAg positivity in pregnant women (9). A number of risk factor analyses studies confirmed that HBV infection had statistically significant association with absence of vaccination and other risk factors such as needle stick injury, sharp injury, and occupation (among health professionals) (29-31).

In conclusion, results from this study have shown that HBV prevalence in pregnant women is of intermediate endemicity and use of sharp materials, hypodermic needles and tattoo for cosmetics were associated with hepatitis B infection in the study area. Therefore increasing awareness of transmission of hepatitis B infection through traditional unsafe injections and harmful traditional practices is needed. One of the limitation of the study was sample size is small; hence large epidemiological studies need to be conducted in different parts of the country to determine whether these data reflect the situation in pregnant women.

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