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Original Research Article

Survey of Hepatitis B virus infection and risk factors among pregnant women at public hospital in Ethiopia

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Abstract

Background: Hepatitis B is a global public health problem and a major cause of liver disease, including chronic hepatitis, cirrhosis and liver cancer. Pregnant women with hepatitis B virus infection are reservoir for the virus and do have high potential to transmit it to their fetuses and newborns. The objective of the study was to investigatesero-prevalence of hepatitis B surface antigen and assesses risk factors among pregnant women in Ethiopia.

Methods: Institution based cross-sectional study was conducted from July to September, 2014 among pregnant women in Ethiopia. A pretested structured questionnaire was employed to collect data on socio-demographic and potential risk factors for HBV infection. Blood sample was collected and tested for the presence of hepatitis B surface antigen using Enzyme Linked Immunosorbent Assay kit. Obtained data were evaluated by frequency, logistic regression analyses, and a significance level of 5 % ($\alpha = 0.05$) was established.

Result: Of the total pregnant women**,** 11(5.4%) of the study participants were positive for HBsAg. Majority (40.1%) of participants were in age group 25-29 years. The prevalence of HBV infection was higher above 20 years of age. Our finding revealed that none of the study participants were aware of their HBV sero-status. Sero positivity for hepatitis B surface antigen was statistically associated with history of abortion (AOR: 6; 95% CI :(1.39-27.69); P-value: 0.017), surgery (AOR: 5;95% CI: 1.04-24.31; P-value: 0.045) and family history for hepatitis (AOR: 11; 95% CI (1.63 80.44); P-value: 0.014).

Conclusion: According to the research findings, there was an intermediate endemicity of hepatitis B virus infection. The finding revealed that history of abortion, surgery and family history for hepatitis were the major risk factors for the high prevalence of hepatitis B infection in the study area. Appropriate, targeted and timely response is mandatory for tackling the harmful health effects of HBV infection/disease.

Keywords: Hepatitis B, Pregnancy, Prevalence of HBsAg, Risk factors, Ethiopia

1.Introduction

More than 350 million people in the world are living with chronic hepatitis B virus(HBV) infection[1]. The majority of individuals living with chronic HBV infection acquired the infection during the perinatal period and early childhood[2].

There is a huge difference in the probability of developing chronic hepatitis B infection between individuals who acquire the infection during perinatal period and those during adult hood. When the infection is acquired during the perinatal period, the risk of becoming a chronic hepatitis B infection carrier is 95% for infections acquired during perinatal period[3] compared with only 5% for those acquired during adulthood[4].

The risk of HBV transmission to newborn infants accounts 70-90% during the simultaneous positivity of mothers with HBsAg and HBeAg seromarkers. On the other

hand,10–40% of risk of HBV transmission observed if mothers test positive for only HBsAg[5, 6]. Thus therefore, pregnant women attending antenatal care should be routinely screened for HBV and vaccine against HBV should be administered at birth to infants whose mothers test positive [7, 8].

HBV is vaccine preventable and immunization offers more than 95% protection against the development of chronic infection [9]. HBV immunization should be administered at birth for infants exposed to the virus [10].

Few previously conducted study and clinical reports in Ethiopia indicated that the burden of liver disease is posing great health problems. Of those researches findings, a nationwide research report has shown that the prevalence of HBV found to be 5% among pregnant women [11]. Another earlier study done to determine the prevalence of HBsAg among Ethiopian women attending antenatal care (ANC) in Addis Ababa hospitals revealed that the prevalence of HBsAg was (5%) [12]. A recent study conducted among pregnant women at Addis Ababa and Bahir Dar showed that the prevalence of HBV infection among pregnant women was intermediate (2-7%) [13, 14].

In our country and very particularly in the study area, there are only few epidemiological studies on HBV among pregnant women. Therefore, the present study was conducted to determine the prevalence and assess predictors for Hepatitis B virus at Bishoftu General Hospital. This research will help in understanding the magnitude of HBV infection and tracing associated factors and this will give future insights on how to prevent and generating treatment guideline for HBV associated infection.

2. Methods and materials

2.1 Study area, design and period

Our research employed health institution based cross-sectional, descriptive study design to determine the prevalence and associated risk factors for HBV infection among pregnant women attending ANC at Bishoftu General Hospital, Ethiopia from July to September, 2014. Sample size was calculated using single population proportion formula.Based on the formula, 202 study participants were included as part of the conducted study. Pregnant women attending the hospital ANC department were used as both study and target population for the study purpose. To attain the required sample size, we engaged the study participants consecutively. Exclusively all pregnant women who were attendant at the hospital ANC unit were eligible to take part in and participation was voluntarily. Prior to data collection all study subjects were briefed about the purpose of the research and data was collected only from those who were consented.

2.2 Data collection and laboratory investigation

A pre-tested semi-structured questionnaire was used to collect the socio-demographic and other exposure variables of the study participants by face to face interview. The data collection instrument was checked for its validity through consistent revision, peer review, senior expert and field test. A pretest was done on 5 % of the study population group who were not from study area. The study used well designed laboratory protocol to collect blood sample for HBV marker investigation. The presence of hepatitis B surface antigens (HBsAg) in serum was detected using ELISA kit (Linear chemicals, Joaquim Costa, Barcelona, Spain) according to the manufacturer's instructions.

2.3 Quality control

To make sure that the questionnaire was appropriate and understandable, it was pretested among pregnant women other than the actual study sites. The collected data were checked daily for its consistency and accuracy. Standardized procedures were strictly followed during blood collection, storage and analytical process. Positive and negative controls were performed in parallel with the tests.

2.4 Statistical analysis

Data were reviewed and entered in to EPI Version 3.5.1. Statistical package and transformed and analyzed by SPSS Version 16.0 package. Obtained data were evaluated by frequencies and binary and multiple logistic regression analyses, and a significance level of 5 % ($\alpha = 0.05$) was accepted.

2.5 Ethical considerations

Ethical clearance was obtained from Armauer Hansen Research Institute (AHRI)/All Africa Leprosy and Tuberculosis Rehabilitation and Training Center (ALERT) and Ethical Review Committee (AHRI/ALERT ERC). The protocol was carefully explained and study participants were well informed on the objectives of the study and written informed consent was obtained. All procedures were done according to the standards involving minimum risks. Each participants test result was disclosed for the ANC health care providers for further management.

3. Result

3.1 Participants' General characteristics

The present study approached 202 study participants during the study period. Table 1 shows socio-demographic characteristics of pregnant women. Of the total, 175(86.6%) were from urban setting and the mean age of ANC attendant was 25.28(SD +/- 4.54). Of the total, 138(68.3%) were from orthodox religion.

Table 1: Socio- demographic characteristics of pregnant women at Bishoftu Hospital, Oromia regional state, Ethiopia (July-September, 2014)

Demographic characteristics	Frequency	Percent (%)
Residence		
Urban	175	86.6
Rural	27	13.4
Age (in years)		
15-19	17	8.4
20-24	72	35.6
25-29	81	40.1
30-34	26	12.9
35-39	4	2
40+	2	1
Marital status		
Married	201	99.5
Unmarried	1	0.5
Education level		
Illiterate	15	7.4
Primary	65	32.2
Secondary	84	41.6
Certificate and diploma	31	15.3
Degree and above	7	3.5
Stage of pregnancy		
First trimester	22	10.9
Second trimester	116	57.4
Third trimester	64	31.7

3.2 Sero-prevalence of HBV versus socio-demographic characteristics

Higher positivity of HBsAg, 10(5.7) was investigated among pregnant women who were from urban setting. Age specific prevalence was different across various age groups. Of the total positive cases, majorities were detected among those with age group 25-29 years but the prevalence was higher among old age groups (40+ years) which accounts 50%. With regard to pregnancy status, more than half of the positive cases, which account 7(10.9%) were detected among third stage trimester. Among those who attended primary school, the prevalence of HBsAg was 7(5.5%). However, prevalence of HBV did not vary significantly by age, residence, occupation, educational level, marital status and pregnancy trimester.

Table 2: Prevalence of HBV among pregnant women attending antenatal care at Bishoftu Hospital, Oromia regional state, 2014 (n = 202)

Socio-demographic variables	HBsAg status	
	Positive N (%)	Negative N (%)
Residence		
Urban	10(5.7)	165(94.3)
Rural	1(3.7)	26(96.3)
Age groups (yrs.)		
15-19	1(5.9)	16(94.1)
20-24	4(5.6)	68(94.4)
25-29	3(3.7)	78(96.3)
30-34	1(3.8)	25(96.2)
35-39	1(25)	3(75)
40+	1(50)	1(50)
Religion		
Orthodox	3(2.2)	135(97.8)
Muslim	3(21.4)	11(78.6)
Protestant	5(10.2)	44(89.8)
Others	0(0.0)	1(100)
Occupation		
House wife	4(4.6)	83(95.4)
Government Employee	1(5.3)	18(94.7)
Private Employee	5(10.2)	44(89.8)
Merchant	1(3.7)	26(96.3)
Farmer	0(0.0)	5(100)

Table 2 continue……		
Student	0(0.0)	5(100)
Unemployed	0(0.0)	6(100)
Others	0(0.0)	4(100)
Educational status		
Not literate	0(0.0)	15(100)
Primary level	5(7.7)	60(92.3)
Secondary level	4(4.8)	80(95.2)
Certificate and diploma	2(6.5)	29(93.5)
Degree and above	0(0.0)	7(100)
Marital status		
Married	11(5.5)	190(94.5)
Unmarried	0(0.0)	1(100)
Pregnancy stage		
1° trimester	0(0.0)	22(100)
2° trimester	4(3.4)	112(96.6)
3° trimester	7(10.9)	57(89.1)

3.3 Exposure for HBV risk factors and HBs Ag prevalence

The current study assessed the level of exposure for HBV risk factors and prevalence of HBsAg. The overall prevalence of HBsAg was 5.4% (n=11) and the antibody test demonstrated that 7(3.5%) of the study participants were positive for HIV. Of these,1(14.3%) of pregnant women had both HBV/HIV co-infections. However, there was no statistically significant association between HIV infection status and hepatitis B prevalence.

Of the total with history abortion (n=34), surgery (n=21), blood donation (n=5), and tattoo (n=16), the prevalence of HBsAg was 14.7%, 4.8%, 20% and 12.5%, respectively. As Table 3 shows the prevalence of HBV positivity was higher among study participants who had exposure for the risk factors.

3.4 Association of risk factors with hepatitis B virus infection

Multivariate logistic regression analysis was done to assess independent risk factors for HBV infections and history of abortion (AOR: 6; 95% CI :(1.39-27.69); P-value: 0.017), surgery (AOR: 5; 95% CI: 1.04-24.31; P-value: 0.045) and family history of hepatitis (AOR: 11; 95% CI (1.63 80.44); P-value: 0.014) were significantly associated with the status of HBV positivity (p-value<0.05) (Table 3).

Table 3: Association of explanatory variables and hepatitis B virus infection among pregnant women attending antenatal care at Oromia regional state, 2014 (n = 202)

	HBsAg result				
Variables	**Positive N (%)**	**Negative N (%)**	**COR (CI)**	**AOR (CI)**	**P-value**
Blood transfusion					
Yes	1(20)	4(80)	4.7 (0.48-45.79)	2(0.06-79.98)	0.669
No	10(5.1)	187(94.9)			1
Tattooing					
Yes	2(12.5)	14(87.5)	2.8(0.55-14.28)	2(0.269-14.83)	0.499
No	9(4.8)	177(95.2)			1
History of surgery					
Yes	1(4.8)	20(95.2)	5.6(1.31-23.85)	5(1.04-24.31)	0.045
No	10(5.5)	171(94.5)			1
History of abortion					
Yes	5(9.4)	29(90.6)	4.7(1.33-16.26)	6(1.39-27.69)	0.017
No	6(4.7)	162(95.3)			1
HIV/AIDS status					
Positive	1(14.3)	6(85.7)	3(0.34-28.12)	4.8(0.49-47.61)	0.179
Negative	10(5.1)	185(94.9)			1
Family history of hepatitis					
Yes	2	12	3(0.64-17.08)	11(1.63 80.44)	0.014
No	9	179			

4.Discussion

Globally, Hepatitis B virus causes the major and common infectious diseases of the liver. The investigation of Hepatitis B e antigen (HBeAg) imply that patients are at high risk for transmission of the disease [15].

In countries where there is high HBV endemicity, particularly developing countries; intrauterine transmission is the major way of HBV transmission from positive pregnant mothers to their fetus/newborn. As a result, HBV screening should be done for all pregnant women and those turned out to be positive need to be administered HBIG prophylaxis as passive artificial immunity [13].

In this study, the overall prevalence of HBsAg was 5.4% and the study area was categorized under medium endemicity[16]. The reported HBsAg prevalence of the study was higher than the research in South west, Ethiopia(3.7%)[17] and the capital city of Ethiopia (3%)[13] among the same study population. In contrast, it was lower than the study documented in Uganda (11.8%)[18], Yemen(10.8%)[19] and South Africa (7.4%)[20].

The observed discrepancies in HBV distribution across different geographical location might be attributed by variation in socio-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. Moreover, the variation might be due to geographical situation, methodological difference, the level of awareness, cultural and behavioral differences for the potential risk factors of HBV infection.

The prevalence rate of the infection in the study area was in consistent with researches conducted in Debre Tabor (North West), Ethiopia (5.3%) [21], Niger(5.6%)[22] and India (5%) [23].

According to study by Frambo *et al*.(2014), high level of carrier state in women of reproductive age will suggest that there is a high risk of mother-to-infant transmission in the study areas[24].

Different studies conducted across Africa have shown a variation in the prevalence of HIV/HBV co-infection in pregnancy. The prevalence of HIV/HBV co-infection in this study (14.3%) was higher than the study done in rural hospital in Ethiopia (0.6%) [25] . But the current HIV/HBV co-infection figure was lower than a study conducted in Bahir Dar, Ethiopia(19%)[14]. Furthermore, the prevalence of HIV infection among HBsAg positive pregnant women was 9.1% which was in agreement with report from South Africa[26]. The simultaneous appearance of HBV and HIV might be explained by their nature of sharing similar mode of transmission.

The research finding revealed that the prevalence of HBsAg varied across various age groups. A minimum ofa single positive case was found in all age groups of the study. Previously conducted research shown that age of acquiring the infection/disease was one of the major determinant factor for HBsAg positivity[27]. In our study, despite of its insignificant association, high prevalence was observed in age groups greater than 25 years and this was in agreement with study conducted in Addis Ababa Ethiopia (P >0.05)[13] and China (P<0.05) [28] where high prevalence rate was recorded among 25 years and above compared with the younger age women. In contrary, related research report demonstrated that the prevalence of HBV infection was higher among women aged 20 years or younger (20%) [18]. The observed high prevalence of HBV positivity among younger age group could be defined with the high probability of exposure for high risk health behavior [29].

The highest prevalence of HBsAg was detected in pregnant women who were on a tertiary trimester. This was in contrary with the study conducted in Minna, Nigeria [30]. With regard to vaccination status, none of the pregnant women were vaccinated for HBV. This finding was in line with a study conducted in Yemen[19]. But research finding from Cameroon revealed that Just 2.7% of the pregnant women had previously been vaccinated against HBV[31].

The present study tried to address the level of exposure for HBV infection and history of sexual partner. As per the finding, high positivity was recorded among those with single sexual partner. Our finding was in agreement with previous study conducted in Ethiopia which stated that sexual intercourse would have less probability for the transmission of HBV infection among the same study population [32] where HBV infection through sexual mode of transmission merely significant in the context of Ethiopia. However, in area where HBV is endemic transmission from mother to the fetus or new born found to be commonest means of HBV infection spread[33].

Although sentinel surveillance do not show the true estimates of HIV prevalence for the general population, in Ethiopia much of the information on national HIV prevalence estimates is derived from antenatal care clinics. The antibody test for HIV revealed that the prevalence of HIV in the study area among ANC attendant was found to be 7(3.5%).The finding was lower than HIV prevalence report which was 5.3%[34] and another study finding which was 6.6% from Bahir Dar Ethiopia.[14] among the same study population.

The study determined the prevalence of HIV in all the age groups of ANC attendant but did not observe statistical association between HIV infection and age. But according to the study report, pregnant women who were above 20 years of age were more positive for HIV. Similar early study in same study population from Ethiopia[35] and Nigeria (8.4%) [16] revealed that the aforementioned age groups had high risk of exposure for HIV infection. The most probable explanation could be because of sexual or other risky health behavior, younger age groups are highly subjected age group for HIV and other sexually transmitted

infection which share the same transmission mode like HBV, HCV and the likes.

None of the socio-demographic variables were statistically associated with HBV and HIV infection. Statistical significance of potential risk factors was investigated using bivariate and multivariate logistic regression. The adjusted odd ratio in multi-variate analysis revealed that pregnant women with history of abortion were 6 times more likely to be positive for HBsAg (AOR: 6; 95% CI :(1.39-27.69); P-value: 0.017). A previous study conducted among pregnant women also revealed that this variable was identified as predictor factor for HBsAg positivity[36, 37]. It is known that abortion most of the time associated with unwanted and unsafe sexual intercourse which is linked with increased risk of HBV infection[38]. Contaminated instruments used during the procedure might increase the probability of acquiring HBV infection.

Moreover, the report demonstrated that the probability of HBV infection was higher among those with history of any form of surgery. The odd of having HBV infection was 5 times more likely higher among pregnant women undergoing surgical procedure and statistically significant(AOR: 5; 95% CI: 1.04-24.31; P-value: 0.045) .Inconsistent with the current study, research finding from Egypt showed that history of surgery had linear relationship with HBV prevalence [39]. Among the study participants who had family history of hepatitis the odds of having hepatitis was 11 times than their counterparts (AOR: 11; 95% CI (1.63 80.44); P-value: 0.014).

5.Conclusions

The study finding declared that the prevalence of HBsAg was 5.4%. The prevalence was slightly higher than prevalence in different parts Ethiopia. Furthermore, majority of positive cases were recorded among mothers exposed for potential risk factors.

Taking in to account the current prevalence and health impact of HBV, screening for pregnant women and vaccination women for new born should be strengthened and instituted throughout the country. Hepatitis B immunoglobulin (HBIG) should be given for newborns born from positive mothers.

Furthermore, health information on the risk factors, mode of transmission, treatment, prevention and health impact of HBV should be administered. Since HBV treatment guideline is absent in Ethiopia, the responsible stake holders should take the responsibility to develop and implement treatment modalities in the country. In the future large-scale studies which employ additional serological markers and molecular techniques are required so as to design a working strategy for evidence based intervention

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Declaration of conflict of interests:

The author declared that the manuscript is free of competing interest.

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