



Original Research Article

## Seroprevalence of Hepatitis B Surface Antigenemia among Pregnant Women Attending Antenatal Clinic in Jigjiga, East Ethiopia: A Cross-Sectional Study

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### ABSTRACT

**Background:** Infection with the hepatitis B virus (HBV) can lead to both acute and chronic hepatitis. Maternal to fetal transmission from chronic carriers is high in endemic areas. Although, it is a major public health problem worldwide and in Africa; information on the prevalence of HBV infection among pregnant women in Jigjiga is scarce. Thus, the aim of this study was to determine the seroprevalence of HBsAg among pregnant women attending antenatal care in the selected health institutes of Jigjiga, East Ethiopia.

**Methods:** A cross-sectional study was undertaken from September to January, 2013. Structured interviews were used to collect socio-demographic and obstetric data. Hepatitis B surface antigen (HBsAg) was detected using an enzyme linked immunosorbent assay (ELISA). Data were analyzed using SPSS-19, computer software package and were summarized by descriptive statistics and binary logistic regression.

**Results:** Of the 301 pregnant women studied, reactive HBsAg was noted in 18 (6%). The highest HBsAg recorded was 11/18 (61.1%) for pregnant women between aged 20-34 years while the lowest recorded were 1/18 (5.6%) for those aged greater than 34 years. There was no significant difference in HBsAg positivity in relation to maternal age, gravidity, gestational age, family type, level of education and occupation. None of the risk factors assessed were significantly associated with HBsAg positivity.

**Conclusion:** Our data showed that HBV infections are important public health concerns among pregnant women in the Jigjiga area. Hence, we recommend that all pregnant women ought to be routinely screened for HBsAg infection accompanied with health education during their antenatal visits.

**Keywords:** Antenatal care, HBsAg, Jigjiga, Pregnancy.

### INTRODUCTION

Hepatitis B virus (HBV) infection is one of the most common public health problems worldwide. It has been estimated that 350 million people world-wide are chronic carriers of hepatitis B virus. These chronically infected persons are at a high risk of death from liver cirrhosis and hepatocellular carcinoma. [1-3] over one

million people die annually of HBV -related chronic liver disease. The worldwide prevalence of hepatitis B virus ranges from 0.1% to 20%. [4,5] This wide range is largely due to differences in age at the time of infection. Following acute HBV infection, the risk of developing chronic infection varies inversely with age: 90% for perinatal infection, 25-50% for infection at age 1-5

years and 1-5% for all others. Infants with chronic infection have a 25% lifelong risk of developing cirrhosis and/or hepatocellular carcinoma. The burden of HBV infection is highest in the developing world particularly in Asia and sub-Saharan Africa. [6-8] Screening of pregnant women for HBV and managing infected women and their infants appropriately in order to interrupt mother-to-child transmission is therefore of paramount importance.

Hepatitis B virus is transmitted primarily through parenteral and sexual exposure to HBsAg positive blood or other body fluid. [9] This viral hepatitis during pregnancy is not only associated with the high risk of maternal complications but also a high rate of vertical transmission causing fetal and neonatal hepatitis. In developing countries, the main routes of transmission are: neonatal with HBV carrier mother infecting her infant usually during birth or soon after birth following close contact, transfer of HBV via cuts, sexual transmission, transfusion of infected blood or blood products, needle stick injury, contamination of eye, re-use of HBV contaminated needles, syringes, lancets and instruments including those used in tribal ceremonies, possibly blood sucking insects and bed bugs. [10]

HBV is also another serious disease of mankind and constitute a global public health problem. It is 50 - 100 times more infectious than HIV and 10 times more infectious than hepatitis C virus (HCV) with many carriers not realizing they are infected with the virus & thus referred to as a "silent killer. [10,11] In addition, the incidence of ante-partum haemorrhage overall was raised in the HBsAg carriers. This was related to increases in both the incidence of placenta previa and placental abruption. HBsAg carriers were also at increased risk of delivery before 34 weeks. [12,13]

Although, studies have been carried up on HBV in other parts of the country, information is very scarce on the prevalence of HBV among pregnant women in Jigjiga area. As a result guidelines and other

adequate information on the prevention and control strategies are lacking. Thus, obtaining periodical estimates of the local epidemiological picture of these infections by monitoring various risk groups is essential for guiding clinical action, resource allocation, and intervention protocols to make progress toward elimination. The objectives of this study therefore are to determine the prevalence of hepatitis B virus carrier pregnant women in Jigjiga and to provide information on its prevention and control strategies.

## **MATERIALS AND METHODS**

### **Study design and area**

A cross-sectional study was conducted among pregnant women attending Antenatal clinic (ANC) in three selected health institutes of Jigjiga; Karamhara hospital, Jigjiga health center and Family Guidance Association of Ethiopia (FGAE). Jigjiga is the capital city of Ethio-Somali regional state that located about 620 km East of Addis Ababa.

### **Sample size and sampling technique**

The study population was all pregnant women who attended antenatal care from the selected health institutes during a data collection time. The single population proportion formula was used to determine the sample size by considering 7.3% prevalence of HBV in previous study, [16] 95% CI and a 3% margin of error and 10% non-response rate. Accordingly, a total of 301 study participants were included.

The sampling method was consecutive. All pregnant women attending ANC in the health district were eligible for participation and were included after they agreed to participate.

### **Data Collection Steps**

An MCH nurses were identified in each health institution to interview the subjects to collect the data according to the pre-structured questionnaire. The questionnaire included level of education, occupation, ethnicity and history of dental and surgical procedure, tattooing, exposures to unsafe injection, history of caesarean

section, abortion, liver disease, blood transfusion and ear piercing in jewellers shop. The purpose and procedures of the study was explained to pregnant women who came for antenatal care in the study sites during the study period and enter the data according to the designed pre-structured questionnaire.

### Specimen collection and laboratory processing

After consent was obtained, 4 ml of blood sample was collected in disposable tubes under aseptic condition by experienced laboratory technician. These tubes were numbered and processed at the time of collection. The blood sample taken from the individual was centrifuged for 5 minutes and the serum was separated and stored at 4°C to -20°C. HBs Ag was detected using enzyme linked immunosorbent assay (ELISA) kit (Hepalisa HBs Ag M/S J. MITRA & CO. LTD. NEW DELHI) in accordance with the manufacturer's instructions. Results were determined spectrophotometrically and interpretation of test results was as per manufacturers guidelines. A repeat of ELISA test was performed on each positive HBs Ag sample, in order to eliminate false positivity after carrying out a neutralization test for each positive test sample detected. Results were finally regarded as positive after a repeated positive ELISA test.

### Data Processing and Analysis

After the completion of the data collection, the questionnaire was checked for its completeness, unrecorded values and unlikely responses and then was manually clean up on such indication. From data collection format sheet pre-coded checked data was entered to Microsoft excel 2010 and then exported to SPSS-19, computer software package was used for data analysis. Descriptive statistics, Chi – square ( $X^2$ ) test, odd ratio (OR), univariate and multivariate logistic regression analysis computation were used and p-value < 0.05 was considered as indicator for statistical significance.

### Data Management and Quality Control

Data collectors were trained prior to data collection time. In addition, there was a daily follow up by the principal investigator. The tests were conducted based on the manufacturers' instruction. The analytical quality assurances of serological diagnosis for HBs Ag were applied through using Known positive and negative sera.

### Ethical Consideration

This research project has been approved by the research Committee of Jigjiga University. After approval, a formal letter was written to the respective study sites then permission was obtained to conduct the study. A written informed consent was obtained from all participants involved in the study. The study did not have any harm except the minimal pain associated with blood drawing. Confidentiality was maintained by numeric coding of serum samples and questionnaires. Positive results were communicated to the respective individuals and clinician for intervention.

## RESULTS

Table.1. Sero-prevalence of HBV infection among pregnant women attending antenatal care at Jigjiga city, 2013. (n = 301)

| Socio-demographic Variables   | HBs Ag status  |                |         |
|-------------------------------|----------------|----------------|---------|
|                               | Positive N (%) | Negative N (%) | P-value |
| <b>Residence</b>              |                |                |         |
| Urban                         | 18 (6.0)       | 269 (89.3)     | 0.999   |
| Rural                         | 0 (0)          | 14 (4.7)       |         |
| <b>Age in years</b>           |                |                |         |
| under 20 years                | 6(2.0)         | 55(18.3)       | 0.256   |
| 20-34                         | 11(3.7)        | 210 (69.8)     |         |
| 35-49                         | 1 (0.3)        | 18 (6.0)       |         |
| <b>Educational Status</b>     |                |                |         |
| Can't read and write          | 13(4.3)        | 177(58.8)      | 0.944   |
| Primary level                 | 3 (1.0)        | 61(20.3)       |         |
| Secondary level +             | 2(0.7)         | 45(15.0)       |         |
| <b>Occupation</b>             |                |                |         |
| House wife                    | 18(6)          | 252(83.7)      | 0.999   |
| Merchant                      | 0(0)           | 25(8.3)        |         |
| Others                        | 0(0)           | 6(2.0)         |         |
| <b>Religion</b>               |                |                |         |
| Muslim                        | 18(6)          | 244(81.0)      | 0.998   |
| Christian                     | 0(0)           | 39(13)         |         |
| <b>Family type</b>            |                |                |         |
| Monogamy                      | 16(5.3)        | 253(84)        | 0.99    |
| Polygamy                      | 2(0.7)         | 30(9.9)        |         |
| <b>Trimester of pregnancy</b> |                |                |         |
| First trimester               | 5(1.7)         | 107(35.5)      | 0.499   |
| Second trimester              | 9(3)           | 105(34.9)      |         |
| Third trimester               | 4(1.3)         | 71(23.6)       |         |
| <b>Gravidity</b>              |                |                |         |
| Prim gravid                   | 7(2.3)         | 116(38.5)      | 0.787   |
| Multigravid                   | 11(3.7)        | 167(55.5)      |         |

### Socio-demographic characteristics

A total of 301 pregnant women attending antenatal clinic were enrolled in this study. Out of the 301 participant's, 201(66.8%) were from Karahmara Hospital, Jigjiga and the remaining 100(33.2%) were from Jigjiga Health Center and FGAE Jigjiga branches. Of 301 pregnant women, 287(95.3%) were living in an urban setting. The majority of the pregnant women, 221 (73.5%) were between the age group of 20 and 34 years. The mean age of the study participants was 25.12 ±4.9 years old (range from 15-42 years). Majority of the study participants were housewives 270 (89.7%). About two third (63.1%) of the participants cannot read and write. Majority of the pregnant women were 269 (89.4%)

monogamy the only wife to their husbands and 178(59.1%) multigravida. One hundred twelve (37.2%) of the pregnant women were in their first trimester while 114 (37.9%) in the second trimester and the remaining 75 (24.9%) in the third trimester.

### Prevalence of HBs Ag infection

Overall, 18 (6.0%) of the pregnant women were positive for HBs Ag. The highest 14 (4.7%) prevalence of HBs Ag was recorded in age group of 20–34 years while the lowest of 1 (0.3%) was recorded in age group greater than 34 years (Table 1). The highest prevalence was obtained in multigravida 11 (3.7%) and the least prevalence 7 (2.3%) was obtained in primigravid.

**Table 2: Association of HBs Agsero-positivity and Risk factors among pregnant women attending antenatal care at Jigjiga city, 2013 (n = 301)**

| variables                           | HBs Ag         |                | Odd Ratio | 95%(CI)    | P- value |
|-------------------------------------|----------------|----------------|-----------|------------|----------|
|                                     | Positive N (%) | Negative N (%) |           |            |          |
| <b>History of dental Procedure</b>  |                |                |           |            |          |
| Yes                                 | 2 (0.7)        | 39 (13)        | 1.00      | 0.21-4.77  | 0.997    |
| No                                  | 16 (5.3)       | 244 (81.1)     |           |            |          |
| <b>Tattooing /tooth or tribal/</b>  |                |                |           |            |          |
| Yes                                 | 1 (0.4)        | 20 (6.6)       | 1.09      | 0.12-9.44  | 0.936    |
| No                                  | 17 (5.6)       | 263 (87.4)     |           |            |          |
| <b>History of Body Fluid Splash</b> |                |                |           |            |          |
| Yes                                 | 1 (0.4)        | 9 (3)          | 0.76      | 0.07-8.01  | 0.824    |
| No                                  | 17 (5.6)       | 274 (91)       |           |            |          |
| <b>History of Abortion</b>          |                |                |           |            |          |
| Yes                                 | 2 (0.7)        | 32 (10.6)      | 0.84      | 0.17-4.16  | 0.839    |
| No                                  | 16 (5.3)       | 251 (83.4)     |           |            |          |
| <b>History of FGM</b>               |                |                |           |            |          |
| Yes                                 | 14 (4.7)       | 201 (66.8)     | 0.470     | 0.13-1.68  | 0.245    |
| No                                  | 4 (1.3)        | 82 (27.2)      |           |            |          |
| <b>History of Liver Disease</b>     |                |                |           |            |          |
| Yes                                 | 1 (0.3)        | 18 (6)         | 1.28      | 0.13-12.8  | 0.835    |
| No                                  | 17 (5.7)       | 265 (88)       |           |            |          |
| <b>Ear Piercing</b>                 |                |                |           |            |          |
| Yes                                 | 10 (3.3)       | 192 (63.8)     | 2.08      | 0.69-6.3   | 0.191    |
| No                                  | 8 (2.7)        | 91 (30.2)      |           |            |          |
| <b>Caesarian Section</b>            |                |                |           |            |          |
| Yes                                 | 1 (0.3)        | 10 (3.3)       | 0.86      | 0.08- 8.85 | 0.904    |
| No                                  | 17 (5.7)       | 273 (90.7)     |           |            |          |

### Factors associated with HBV

Out of the total participants, 41(13.7 %) and 10 (3.4%) have had history of dental procedure and body fluid splash, respectively. Of these, only 2 (4.9%) and 1(10%) had HBV infection, respectively. Out of the total participants, 19 (6.3%), 202(67.1%), 34(11.3 %), 11 (3.6%) of them had history of contact with liver disease patients, ear piercing using sharp materials,

abortion, and had caesarean section, respectively. Of these, 1 (5.2%), 10 (5.0%), 2 (5.9%), and 1(9.1%) were HBs Ag positive, respectively. Of 301 study participants with tattooing and tribal marks 21(7%), only 1 (4.8%) were HBs Ag positive. Pregnant women who experienced female genital cutting and ear piercing using sharp materials had higher prevalence of HBs Ag, 4.7% and 3.7%, respectively and

the odds of having HBs Ag was more than twice in those who have experienced ear piercing than those pregnant women that had no such history of risk factors. *Toxoplasma gondii* seroanalysis was done on the same specimen. Among pregnant women with toxoplasmosis, 11(10.5%) were also positive for HBs Ag. This is significantly associated with the HBs Ag positivity ( $p=0.028$ ). Other risk factors included in the study had no statistically significant association ( $p>0.05$ ) with the HBs Ag positivity (Table 2).

## DISCUSSION

Screening asymptomatic people is an important instrument of disease detection, prompt diagnosis and intervention especially concerning a typically asymptomatic infection such as HBV and *Toxoplasma gondii* infection. Given that infected pregnant women stand the chance of transmitting the HBV and *Toxoplasma gondii* infection to their newborn babies, we decided to conduct a cross-sectional study to determine what proportion of pregnant women attending ANC in Jigjiga Health institutes have been affected by HBV infection. The information gathered from this piece of work will be used by the health managers to make decisions in an attempt to improve on the health standards of the district as a whole, but specifically for pregnant women.

In the present study, the overall prevalence of HBsAg among pregnant women was found to be 6.0%. According to the WHO classification, the prevalence of HBV among pregnant women in this study was intermediate (2-7%).<sup>[14]</sup> This is relatively high in view of the fact that a vast majority of participants were asymptomatic. The prevalence of HBV infection in the present study conforms to reports from the study in Nigeria (6.6%)<sup>[15]</sup> and Gonder, Ethiopia (7.3%).<sup>[16]</sup> However, the prevalence of HBV in the current study was higher than the study conducted in Bahardar, Ethiopia (3.8%),<sup>[17]</sup> Jimma, Ethiopia (3.7%),<sup>[18]</sup> Tripoli, Libya (1.5%)

<sup>[19]</sup> and London (1.05%).<sup>[20]</sup> In contrast, it was lower than the study documented in, Yemen (10.8%),<sup>[21]</sup> Uganda (11.8%),<sup>[22]</sup> Buea, Cameroon (9.7%),<sup>[23]</sup> Nigeria (16.5%),<sup>[24]</sup> Burkinafaso (9.8%)<sup>[25]</sup> and Taiwan (15.5%).<sup>[26]</sup> These differences might be attributable to cultural, socioeconomic status, traditional practices and behavioural or the natural difference attached to different geographic zones.

The majority of HBsAg positive participants in this study were among the age group 20–34 years old. Similarly, HBV was reported in the same age group (25-34 years) in Osogobo, Nigeria.<sup>[24]</sup> This correlates with the peak age of highest sexual activity in the society, hence supporting the role of sexual intercourse in the transmission of hepatitis B virus. There was no significant difference between age-groups as they relate to HBsAg prevalence ( $P = 0.256$ ), therefore establishing the fact that HBV is common in all age-groups of life. Pregnant women who are living in more urbanized setting may have more HBV exposure than those in the rural population, as a result of risky life style practices. This is in line with studies conducted in Bahir Dar, Ethiopia<sup>[17]</sup> and Jazan.<sup>[27]</sup>

Regarding socio-demographic status of the study participants, the highest proportion of HBV infection was among pregnant women who couldn't read and write and those who are house wives. Likewise, similar finding was also reported from Bahardar,<sup>[17]</sup> Jimma Ethiopia<sup>[18]</sup> and Jazani, Saud Arabia.<sup>[27]</sup> The highest prevalence of HBsAg was detected in pregnant women who were on a secondary trimester. This was also in line with the study conducted in Bahardar, Ethiopia<sup>[17]</sup> and Nigeria.<sup>[24]</sup> However, all of the socio-demographic variables were not statistically significant.

Though there is no statistically significance association, the high prevalence of HBsAg in multigravids (3.7%) compared to primigravid (2.3%) were observed which might be due to longer period of marriage

and multiple deliveries in the locality. This is in consistence with the report of Aganga [28] and Osogbo, Nigeria [24] that women with longer period of marriage might have greater sexual activities and multiple deliveries, thereby exposing them to risk of HBV infection.

Risk factors, including body fluid contact, liver disease, dental procedures, abortion, caesarian section, female genital cutting, ear piercing and tattooing were not associated with HBV infection in this study as a whole. But the odd of having HBs Ag with ear piercing was twice, as compared with those who did not experience these risk factors. These differences should be confirmed in further studies.

## CONCLUSION

HBV infection recorded in an apparently healthy population of pregnant women attending ANC are important public health issues in Jigjiga health district that need to be addressed. On the basis of the current findings we recommend screening of pregnant women for HBV infection in routine antenatal care services. Further studies will be needed to assess the risk of mother-to-child transmission of HBV.

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## Competing interests

The authors declare that they have no competing interests.

**Authors' Contribution:** AN and EB conceived and designed the study. A performed the tests and all data collection. AN analyzed the data. AN and EB wrote the manuscript. All authors read and approved the final manuscript.

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