Prevalence and associated factors of hepatitis B virus infection among pregnant women attending antenatal care at Agena health center, South Ethiopia, 2019: a cross sectional study

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Abstract

Background; Hepatitis B virus (HBV) is the world’s most common and highly contagious liver infection. Its transmission methods are: mother to child, via open wounds, sexual contact, blood transfusion and other blood contact related activities. Prevalence of HBV among pregnant women in Africa ranges from 3.67 - 16.5% and in Ethiopia 2.4 to 8.4%. Hepatitis B infection leads to high morbidity and mortality for mother as well as for their infants due to the vertical transmission. Hence assessing the prevalence and associated factors of Hepatitis B Virus infection is a priority. Methodology : An institution based cross sectional study was conducted with a total of 194 of pregnant women attending antenatal care at Agena health center from May 1-30/2019. Frequency analysis and Logistic regression test was used to determine the associated factors associated with Hepatitis B virus by using SPSS version 25. Results: The prevalence of HBV in Agena health center among pregnant women were 4.1% and it was associated with marital status, history of hospital admission and history of abortion. Conclusion : The prevalence of HBV in Agena health center among pregnant women was intermediate. Since routine screening and immunization of all pregnant women is mandatory. Key words: Hepatitis B infection, pregnant women, Agena health center

Background

World Health Organization report that more than 350 million people are infected with HBV since 2017 worldwide[1]. HBV is highly contagious and its main routes of transmission are: mother to child, via open wounds, sexual contact, blood transfusion and other blood contact related activities[2]. WHO has launched a global program against hepatitis in May 2016 which aims to reduce by 90% the number of new cases of hepatitis, reduce by 65% the number of hepatitis related deaths, and treat 80% of eligible people infected with viral
hepatitis by 2030[3].

Even if HBV is the most common and highly contagious diseases for the whole population, it is highly prevalent among pregnant women (general population 9.41% versus pregnant women11.11%) and it has different maternal complications and fetal death due to vertical transmission [4]. There is a high chance of vertical transmission from HBV infected mothers to their infants during delivery and during breast feeding [5, 6]. A Study in Addis Ababa shows that based on the infants cord blood samples, 75% infants were infected with HBV who were born from the infected mothers[7]. To prevent the vertical transmission of HBV, vaccination and Antiviral therapy for the infected pregnant women is very crucial [8]. Hepatitis B vaccination should be also given for the infants who are infected with HBV [9]. HBsAg prevalence among pregnant women was 3.1% in Shenyang, China. Only 23.4% and 17.7% of pregnant women knew their HBV status before gestation and before delivery respectively [10].The prevalence of HBV infections among pregnant women in Africa was 6.8% and child vaccination, routine and universal antenatal hepatitis B virus screening program is very important [11]. The prevalence of HBV infections among pregnant women was 16.5% and 9.2% in Osogbo, Nigeria and Gambia respectively [12, 13]. Studies show that the prevalence was low among pregnant women who were vaccinated for HBV infection but high prevalence was seen among pregnant women who did not vaccinated for HBV infection[12, 13].

In Ethiopia the prevalence of hepatitis B virus infection among pregnant women was intermediate (4.7%), with the prevalence of HBSAg positivity ranging from 2.3% to 7.8% [14]. Different studies in Ethiopia shows those pregnant women who have history of multiple sexual partners, history of abortion, and history of surgical procedures, body tattooing and ear/nose piercing have a high chance of infected with HBV[15-19].

Prevention of HBV infection among pregnant women is very important to prevent the
transmission of HBV infection from mother-to-child. An effective strategy for reducing the incidence of the infection is identifying and handling the associated factors as well as giving awareness for the pregnant women. However, limited information has been published regarding the prevalence of HBV among pregnant women in Ethiopia as well as in Gurage zone and there is no evidence based interventions. Therefore, the aim of this study was to assess the sero-prevalence and risk factors of HBV status among pregnant women receiving care at Agena health center ante-natal care (ANC) clinic.

Methods

Study design and area

Institutional based cross-sectional study design was conducted in Agena town, Ezha woreda at Agena health center, Gurage zone Ethiopia from May 1-30, 2019. Agena is the only urban kebele found in Ezha woreda, Gurage zone, South Ethiopia. Agena is located to the Southwest 198 km from Addis Ababa, 38 km from wolkite and 23.17 km from Wolkite University.

Source population

The source populations were all pregnant mothers who were attending ANC in Agena Health Center.

Study populations

The study populations were pregnant mothers who were attending ANC follow-up and fulfill the inclusion criteria in Agena health center from May 1-30, 2019.

Exclusion criteria and inclusion criteria

The pregnant women who have at least one ANC visit at Agena health center were included in the study. The pregnant women whose HBV status is unknown, who is already in labour, which is seriously ill or admitted in the ICU ward was excluded from the study.

Sampling size determination
The sample size was determined by using a single population proportion formula by considering the following assumptions: standard normal distribution with confidence interval (CI) of 95% ($Z_{a/2} = 1.96$), absolute precision or tolerable margin of error ($d = 0.05$), and the prevalence of HBV infection among pregnant women Attending Antenatal Care in Public Health Facilities, Dire Dawa in 2018 was 8.4% [20]. Assuming a 10% non-response rate the total sample size of 194 pregnant women were selected from Agena Health Center. A study participant was selected by using systematic random sampling method from the appointment log of May, 2019.

Data collection tool and method

Data was collected by face-to-face interview using structured and pre-tested questionnaire which is adapted from relevant literatures and modified to local context in such a way that all the variables to be assessed were included and HBV status was taken from routine ANC document for each participants. The tool was first prepared in English and translated to Amharic then to the local Guragegna language then back to English again to check for its consistency.

Data processing and analysis

Data was checked for its completeness and cleaned before it was entered to a computer. Then it was coded and entered into EpiData version 4.2.0.0 and importing to SPSS version 25 software packages for data analysis. Frequencies and proportions were used to describe the study participants. The data was presented by using tables and graphs. Bivariate analysis and crude odds ratio with 95% confidence interval (CI) was used to see the association between independent variable and the outcome variable by using binary logistic regression. Independent variables with $p$-value of $= 0.25$ were included in the multivariate analysis to control confounding factors. Adjusted odds ratio along with 95% CI was estimated to identify the factor associated with HBV infection among pregnant women.
using multivariable logistic regression analysis. Level of statistical significance was declared at P-value = 0.05.

**Ethical clearance**

The ethical clearance was approved and obtained from Wolkite University Institution Research Board. Letter was submitted to Gurage zone health office and Agena Health Center then permission was obtained from those bodies. Prior to interview; all participants recruited to the study were received written informed consent about the study. The participants did not gain any incentives and direct benefit, yet the result can be used as a baseline for further studies. The study has no any risk for the participants and their confidentiality was kept.

**Results**

**Socio-demographic and economic characteristic**

194 pregnant women were included in the analysis, and majority of them 138(71.1%) were urban in residence, 72(37.1%) were between 25-29 years old, 164 (84.5%) were from Gurage ethnic group and most of the study participants 174 (89.7%) were married. Among the pregnant women 118(60.8) completed their primary education, 91(46.9%) of them were merchant, 85(43.8%) had an average monthly income between 500-1500 ETB and 140(72.2%) were multigravida (Table 1).

**Hospital associated factors for HBV infection**

Among the total population of the respondents 27(13.9%) had at least one history of hospital admission, 25(12.8%) had history of dental procedure in hospital, 20(10.3%) of them had surgical procedure and blood transfusion or donation each in their previous history.
Socio cultural behavioral associated factors of HBV infection

Based on this study among the total respondents 31(15.9%) of them had history of abortion, 185(95.3%) had history of circumcision, 192(98.9%) were had ear piercing, 61(31.4%) had history of alcohol consumption, 5(2.6%) had history of chat chewing, and 15(6.7%) had tattoo on their body.

Prevalence of hepatitis B virus

Based on this study, the prevalence of HBV in Agena health center among pregnant women were 4.1%.

Factors associated with HBV infection among pregnant women

Those variables with a P-value of ≤ 0.25 in the Binary logistic analysis were entered to multivariable logistic analysis to identify the independent factors associated with hepatitis B virus among pregnant women.

In bivariate analysis the independent variables: marital status, history of hospitalization, blood transfusion or donation, abortion, circumcision, alcohol drinking, chat chewing, were associated with hepatitis B virus among pregnant women. In multiple logistic regression analysis, the independent variables: marital status, history of hospital admission, and abortion were statistically significant at 5% level and were found to be the associated factors of hepatitis B virus infection among pregnant women (Table 4).

According to this study married pregnant women were 66% times less likely to be reactive to HBV infection than single pregnant women [AOR=0.66(0.004-0.985)]. Those pregnant women with history of hospitalization were 97% times more likely to be reactive to HBV infection than pregnant women who had no history of hospitalization [AOR=0.030(0.002-0.377)], and those pregnant women who had history of abortion were 10 times more likely to be reactive to HBV infection than pregnant women who had no history of abortion.
Discussion

Prevalence of Hepatitis B virus in pregnant women

In this study the prevalence of HBV infection among pregnant women in Agena health center was 4.1%. This finding was relatively comparable with study reported from Dawuro Zone, south Ethiopia, Arba Minch Hospital, Bahir Dar city, Southwest Ethiopia and Kinshasa, Congo in which prevalence of HBV infection among pregnant women were 3.5%, 4.3%, 3.8% and 4.7% respectively [16, 18, 19, 21]. This prevalence was higher than the studies reported from Addis Ababa, Ethiopia, Shenyang, China, and East Wollega Zone, Ethiopia in which prevalence of HBV infection among pregnant women were 3.1%, 2.4% and 4.3% respectively [7, 10, 22]. The difference might be occurred due to the variation in socio-economic status of the population, sample size, design, and study setting.

This prevalence was lower than the studies reported from Osogbo, Nigeria, Gambia, Yirgalem Hospital, Ethiopia, Deder Hospital, Eastern Ethiopia, Hawassa University referral hospital, Southwestern Nigeria, Yaounde-Cameroon, Eastern Region of Ghana, Buea Health District, Cameroon, Juba Teaching Hospital, Republic of South Sudan, Myanmar-Thailand Border and Shaanxi, China in which the prevalence of HBV infection among pregnant women were 16.5%, 9.20%, 7.2%, 6.9%, 7.8%, 8.3%, 7.7%, 10%, 9.7, 11%, 6.2% and 7.07% respectively [12, 13, 15, 17, 23-30]. The difference might be occurred due to the variation in duration, because currently there is a great modification regarding to health care service for HBV infection.

Associated factors of HBV among pregnant women

In this study only marital status, history of hospitalization and history of abortion were significantly associated with HBV infection among pregnant women. Married pregnant
women were 66% times less likely to be reactive to HBV infection than single pregnant women [AOR=0.66(0.004-0.985)]. This finding was inconsistent with studies conducted at Addis Ababa, Ethiopia, Gambia, Yirgalem Hospital, Ethiopia, Dawuro zone, Southwest Ethiopia, Bahir Dar city, Northwest Ethiopia, Health Facilities in East Wollega Zone, West Oromia, Ethiopia, and Buea Health District, Cameroon [7, 13, 15, 16, 19, 22, 27].

Generally being single exposes for HBV infection because single women might have multiple sexual partners. But in those studies there might be an increased prevalence as a result of married women might be more diagnosed than single during ANC follow up and during the delivery procedure.

Those pregnant women with history of hospitalization were 97% times more likely to be reactive to HBV infection than the pregnant women who had no history of hospitalization [AOR=0.030(0.002-0.377)]. This finding was consistent with the study conducted at Arba Minch Hospital [18]. This might be occurred due to that hospitalized women might easily acquire the infection during different procedures than the pregnant women who had no history of hospitalization.

Those pregnant women who had history of abortion were 10 times more likely to be reactive to HBV infection than the pregnant women who had no history of abortion [AOR=10.331(1.161-92.926)]. This finding was consistent with the studies conducted at Dawuro zone, Southwest Ethiopia, at Deder Hospital, Eastern Ethiopia and Bahir Dar city, Northwest Ethiopia [16, 17, 19]. It might be occurred due to the abortion might be unsafe so it expose for HBV infection. However, no significant association between previous history of abortion and HBsAg positivity was observed at the studies conducted at Yirgalem Hospital, Arba Minch Hospital, and Hawassa university referral hospital [15, 18, 23]. This may be due to the implementation of policies aimed at reducing the incidence of unsafe abortions and health education related to unsafe abortions.
Strengths And Limitations

Strength of the study

Many different variables were assessed to identify factors associated to HBV among pregnant women and standard and valid questionnaire were used which was adapted for the study.

Limitation of the study

The associated factors were assessed by interview so there might be a recall bias and since the study was cross-sectional; it did not show the real cause-effect relationship.

Conclusions

This study has found that the prevalence of HBV infection among pregnant women were intermediate endemic area (with prevalence of 2-7%) based on WHO classification criteria that require routine screening and vaccination program. Pregnant women with marital status, previous history of hospitalization and abortion were significantly associated with HBV infection. Routine screening, immunization and treatment of all pregnant women and their infants should be incorporated in the antenatal and postnatal follow up in health facilities to reduce vertical transmission of HBV from infected mothers to their infants. Others large epidemiological studies that can cover large study population and experimental studies that can show the real cause-effect relationship should be studied.

Abbreviations

AIDS- Acquired immune disease syndrome
ANC - Antenatal care
HBV- Hepatitis B virus
HBsAg- Hepatitis B Surface Antigen
MTCT- Mother to child transmission
Declarations

Ethical approval and consent to participants

The ethical clearance was obtained from Wolkite University Institution Research Board. Letter was submitted to Gurage zone health office and Agena Health center then permission was obtained from those bodies. Prior to interview, all participants recruited to the study were receive written informed consent about the study and for participants who were children (under 16 years old), the consent was taken from their parent or guardian. Respondents were insured about the confidentiality of information obtained and the respondents did not ask to tell their names.

Consent for publication

It is not applicable for this study

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

Computing of Interests

There is no competing of interests

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Funding for this study was got through won from grants which were offered by Wolkite University so it covers the financial cost for the completion of the study starting from data collection up to the dissemination of the result.

Authors’ contributions

HW conceived the study and developed the study design, analysis, report writing and
drafted the manuscript. MN, IT and AA were involved in data entry, data analysis, report writing and manuscript preparation. All authors read and approved the final manuscript.

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Tables

Table1: Socio-demographic and economic characteristics of the pregnant women (n=194) attending ANC at Agena health center, Gurage zone, South Ethiopia, 2019
| Variables          | Frequency | Percentage |
|--------------------|-----------|------------|
| **Age**            |           |            |
| 15-19              | 3         | 1.5        |
| 20-24              | 59        | 30.4       |
| 25-29              | 72        | 37.1       |
| 30-34              | 40        | 20.6       |
| >35                | 20        | 10.3       |
| **Residence**      |           |            |
| Urban              | 138       | 71.1       |
| Rural              | 56        | 28.9       |
| **Ethnicity**      |           |            |
| Gurage             | 164       | 84.5       |
| Amhara             | 12        | 6.2        |
| Oromo              | 6         | 3.1        |
| Others             | 12        | 6.2        |
| **Marital status** |           |            |
| Single             | 20        | 10.3       |
| Married            | 174       | 89.7       |
| **Educational level** |       |            |
| cannot read and write | 26        | 13.4       |
| read and write( informal) | 40 | 20.6 |
| Primary (1-8)      | 118       | 60.8       |
| high school and above  | 30        | 15.5       |
| **Occupation**     |           |            |
| government employee| 18        | 9.3        |
| Merchant           | 91        | 46.9       |
| house wife         | 81        | 41.8       |
| Others             | 4         | 2.1        |
| **Income**         |           |            |
| <500               | 42        | 21.6       |
| 500-1500           | 85        | 43.8       |
| 1501-2000          | 50        | 25.8       |
| >2000              | 17        | 8.8        |
| **Gravidity**      |           |            |
| Primi              | 54        | 27.8       |
| Multi              | 140       | 72.2       |
Table 3: Socio-cultural and behavioral associated factors of the pregnant women attending antenatal care at Agena health center, South, Gurage zone, Ethiopia, 2019 (n=194)

| Variables     | Frequency | Percent |
|---------------|-----------|---------|
| Abortion      | Yes       | 31      | 15.9   |
|               | No        | 163     | 84.1   |
| Circumcision  | Yes       | 185     | 95.3   |
|               | No        | 9       | 4.7    |
| Ear piercing  | Yes       | 192     | 99     |
|               | No        | 2       | 1      |
| Alcohol       | Yes       | 61      | 31.4   |
|               | No        | 133     | 68.6   |
| Chat          | Yes       | 5       | 2.6    |
|               | No        | 189     | 97.4   |
| Tattoo        | Yes       | 15      | 6.7    |
|               | No        | 179     | 93.3   |

Table 4: Factors associated with HBV among pregnant women at Agena health center, South Ethiopia, 2019, n=194

| Variables                      | HBV | COR (95%CI) | AOR (95%CI) |
|--------------------------------|-----|-------------|-------------|
| Marital status                 |     |             |             |
| Single                         | 4(20.0%) | 16(80.0%) | 1.00        | 1.00 |
| Married                        | 4(2.3%) | 170(97.7%) | 0.094(0.021-0.412) | 0.66(0.004-0.9) |
| Admitted to hospitalization    |     |             |             |
| yes                            | 5(18.5%) | 22(81.5%) | 1.00        | 1.00 |
| No                             | 3(1.8%) | 164(97.2%) | 0.080(0.08-0.360) | 0.03(0.002-0.3) |
| Abortion                       |     |             |             |
| Yes                            | 3(9.7%) | 28(90.3%) | 3.343(0.756-14.785) | 10.331(1.161-)
| No                             | 5(3.07%) | 158(96.93%) | 1.00        | 1.00 |
Figures

Figure 1

Prevalence of HBV infection among pregnant women attending antenatal care at Agena health center, Gurage zone, South Ethiopia, 2019 (n=194)