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# Sero-prevalence and Predictors of Hepatitis B Virus and Hepatitis C Virus Infections among Pregnant Women Attending Antenatal Care in Adjibar Rural Health Center, Northeast Ethiopia

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## Abstract

**Background:** In pregnant women infection by hepatitis B virus (HBV) and hepatitis C virus (HCV) results high rate of vertical transmission and have adverse effect on both the mother and child. Hence, the aim of this study was to determine the prevalence and predictors of HBV and HCV infections among pregnant women attending antenatal care clinic at Tenta Adjibar health center. Amahara Region, northeast Ethiopia.

**Methods:** A cross-sectional study was conducted from November 1, 2017 to January 30, 2018. A pretested and structured questionnaire was used to collect socio-demographic characteristics and possible risk factors. In addition, 5 ml of venous blood was collected from each study subjects and serum was tested for HBsAg and anti-HCV antibody using rapid test kits. Logistic regression analysis was employed to examine the association between risk factors and hepatitis virus infections. P-value < 0.05 was considered as statistically significant.

**Results:** A total of 385 pregnant women were enrolled in this study within the age range of 18 - 42 years and their mean age was 26.6 years. The overall prevalence of HBV and HCV infections were 3.4% and 1.3% respectively. In multivariate analysis, the prevalence of HBV infections was significantly higher among patients who had history of multiple sexual practices (AOR 19.92; 95% CI 5.3 - 54.3, P = 0.000). There was no HBV/HCV co-infection in this study.

**Conclusion and Recommendation:** This study showed an intermediate and low prevalence of HBV and HCV infection among pregnant women respectively. Multiple sexual practices were found to be significant predictors of prevalence of HBV. Even though their prevalence was intermediate and low understanding the epidemiology of these viruses could be valuable to take appropriate preventive measures and increasing awareness of transmission of HBV and HCV and regular screening of pregnant women for hepatitis viruses is recommended.

***Keywords:*** *Hepatitis B Virus; Hepatitis C Virus; HBsAg; Anti-HCV Antibody; Pregnancy*

## Abbreviations

DNA: Deoxyribonucleic Acid; HBeAg: Hepatitis B e Antigen; HBsAg: Hepatitis B Surface Antigen; HBV: Hepatitis B Virus; HCV: Hepatitis C Virus; HCC: Hepatocellular Carcinoma; HIV: Human Immunodeficiency Virus; NDCD: National Center for Disease Control; NND: Neonatal Deaths; RNA: Riboxyribonucleic Acid; WHO: World Health Organization.

## Introduction

Viral hepatitis is the inflammation of the liver by viruses. Hepatitis B virus (HBV) and hepatitis C virus (HCV) are responsible for 96% of all hepatitis mortality [1]. They have public health problems which results in high risk of maternal complications among pregnant women. According to WHO report hepatitis caused 1.34 million deaths in 2015 which are higher compared to annual death caused by *Mycobacterium tuberculosis* and HIV/AIDS [1]. Globally in 2015, there are also about 257 million HBV positive clients [1,2] and in each year 1.75 million people newly acquire HCV infection and an estimated 71 million people had hepatitis C infection [1,3].

Hepatitis B is the world's most common serious liver infection caused by a double stranded deoxyribonucleic acid (DNA) virus, whose main routes of transmission are: mother to child, via open wounds, sexual contact, blood transfusion and other blood contact related activities. This virus is 50 - 100 and 10 times more infectious than human immunodeficiency virus (HIV) and HCV, respectively [2]. Globally the endemicity of HBV ranges from high (≥ 8%) to intermediate (2 - 7%) and low (< 2%) [1]. Without immunization, up to 90% of infants

born to mothers who are positive for Hepatitis B surface antigen (HBsAg) and Hepatitis e antigen (HBeAg), become chronic carriers [1]. Chronic infection is defined by the presence of HBsAg for more than 6 months. Prevalence of HBsAg among pregnant women in Africa ranges from 3.67 - 16.5% [4] and in Ethiopia 3.0 to 8.1% [5,13]. Hepatitis B during pregnancy is associated with maternal complications, death accompanied by impaired mental and physical health of child because of its vertical transmission in the perinatal period. Perinatal transmission is the most common mode of HBV transmission worldwide [1,2]. HBV infection in infancy may followed by liver cirrhosis and hepatocellular carcinoma (HCC) [14]. HBsAg is the serologic hallmark of HBV infection, whilst the soluble extractable protein, the (HBeAg) is a marker for the highly infectious state [2].

HCV is a single-stranded ribonucleic acid(RNA)virus; it is transmitted through infected blood, sexually and vertically. HCV has a long lag time between onset of infection and clinical manifestation of liver disease (up to 20 years) [15]. Complications of HCV during pregnancy associated with premature contractions, intra-uterine growth retardation, placental separation, preterm delivery, vaginal bleeding, gestational diabetes mellitus and mortality [3]. Vertical transmission of HCV from mother to child occurs in 3 - 10% of pregnancies complicated and about 75 - 85% patients with HCV will develop chronic infection and about 10 - 15% develop liver cirrhosis [16]. Worldwide, HCV infection is one of the major health problems [3]. According to World health organization (WHO) 4 million people are newly infected in every year and more than 350,000 deaths are occurring every year due to related complications of HBV, including liver cancer and liver cirrhosis [3]. Worldwide, the prevalence of HCV infection varies from country to country and even in the same country, from region to region [16]. In WHO report, Africa had the highest sero-prevalence with 5.3%, followed by Eastern Mediterranean (4.6%), Western pacific (3.9%), South- east Asia (2.15%) and low prevalence of infection are observed among the North America (1.7%) and Europe (1.03%) [3].

Among pregnant women, chronic infection with HBV and HCV are often asymptomatic. However they can lead to coagulation defects, postpartum hemorrhage and high maternal mortality and poor outcomes of their newborns such as still births, neonatal deaths (NND), jaundice, anorexia (poor appetite), malaise, acute and chronic liver disease (liver cirrhosis) and HCC [14]. Maternal mortality has been shown to increase in pregnant women with liver cirrhosis. Peri-natal transmission of this disease occurs if the mother has had acute Hepatitis B infection during late pregnancy, in the first postpartum or if the mother is a chronic HBsAg carrier [1]. The prevalence of HBV and HCV in a population can be predicted by risk factors associated with the transmission of infection such as injections, blood products transfusion, surgical procedures, body tattooing, occupational injury, sexual and vertical transmission many infected individuals deny history of any of these risks so that the likely source remains unidentified in some subjects [14]. As the prevalence varies from area to area and population to population due to variability in socioeconomic conditions and other factors and there is a scarcity of information on the prevalence of HBV and HCV infection among pregnant women in the study area. Those; the present study was conducted to assess the sero-prevalence of HBV and HCV infection among pregnant women and to identify risk factors associated with HBV and HCV infection in Tenta Adjibar health center, Northeast Ethiopia.

## Materials and Methods

### Study design and area

Institution based cross-sectional study design was conducted at the Adjibar health center from November 1, 2017 to January 30, 2018. Adjibar health center is located at the main city of Tenta woreda 541 KM far from the capital Addis Ababa. The health center has more than 50 staffs among these 32 were health professionals and the rest are supportive. In 2009 a total of 930 pregnant women registered for care in the ANC clinic.

### Study subjects

A total of 385 consecutive pregnant women attending ante¬natal consultations at the ANC clinic of the Adjibar health center were enrolled during the study period. The sample size was determined using single population proportion formula. Since the was no previous studies in the study area, we assume the prevalence of hepatitis B and C virus was 50% and 5% margin of error. Hence, the total number of pregnant women was 930 we take 2 as an interval by using systematic sampling technique, with a participation rate of 100%. Pregnant women who experienced bleeding and required urgent interventions were excluded from the study.

### Data collection

After obtaining informed written consent from each partici¬pant, socio-demographic information and data about potential risk factors were collected using a structured questionnaire by an experienced midwife nurse.

### Blood sample collection, transport, and processing

Approximately 5 mL of venous blood were collected from each pregnant woman. After clotting, serum was separated from the whole blood and rapid HBsAg and anti-HCV testing were performed to de¬liver the result on the same day.

### Laboratory testing

All samples were tested for HBsAg and anti-HCV using rapid diagnostic test employing the principle of immune-chromatography (SD Bioline, Yongin, Korea). The mixture then reacts with anti-HBsAg antibodies and anti-HCV antibodies on the membrane via capillary action and generates a red band. The presence of two red bands indicates a positive result. One red band at the control line indicates a negative result, while the absence of a red band at the control line indicates an invalid result. HIV testing was uniformly performed using the established national rapid testing algorithm: the Beijing Wantai (is used as a screening test), followed by the Unigold HIV1/2 assay if positive. If the Beijing Wantai and Unigold results are discordant, the Vikia HIV1/2 test is used as a tiebreaker to determine the result.

### Quality assurance

The validity and completeness of the data were verified by the principal investigator daily. The performance of the rapid serological test kits were evaluated using known positive and negative controls.

### Data management and analysis

The data were coded, entered, cleaned and analyzed using SPSS version 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics and binary logistic regression analyses were carried out to describe the variables and to identify factors associated with HBV and HCV infection. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated, and p-values $< 0.05$ were considered to indicate statistical significance.

### Ethical considerations

Ethical approval was obtained from Wollo university ethical committee. Informed written con¬sent was also obtained from the study participants for the collection of their socio-demographic data, and to use their serum samples for HBsAg, HIV and ant-HCV screening. A code number was used to ensure the confidentiality of the par-ticipants' information. No participants paid for the tests that were performed and the results were given to the clinicians working in the ANC clinic on the same day for further diagnosis and management.

## Results

### Socio-demographic Characteristics

A total of 385 pregnant women were included in the study under 18 - 41 years. The mean age of the study subjects were 26.61 years with a standard deviation of ± 4.6 years. Majority of the study subjects (66.5%, 55.1%) were housewives, rural dwellers respectively and 69.9% had a monthly income of less than 1500 Ethiopian birr. Around 353 (91.7%) of the study subjects were married and 167 (43.4%) were illiterate. Of 385 pregnant women 177 (46.0%) had no previous birth and 161 (41.8%) had a gestational period of 14 - 28 weeks (Table 1).

### Sero-prevalence and associated risk factors of HBV infections

Among the 385 pregnant women screened, the sero-prevalence of HBsAg was 3.4% (13/385). The highest prevalence of HBsAg (3.6%; 7/193) was observed among pregnant women with the age group of 18 - 26 years old. Relatively higher prevalence of HBsAg (4.4%; 9/212 and 3.4%; 12/353) was observed among rural dwellers and married pregnant women respectively. In this study, an inverse relationship between the educational status of the women and the sero-prevalence of HBsAg was observed. That means; the prevalence of HBV infection was found higher (3.6%; 6/167) among pregnant women that had no formal education but the prevalence was relatively lower among pregnant women that had educational level of secondary school and above. Moreover, the prevalence of HBV infection was higher (52%; 3/58) among pregnant women whom are merchant by occupation. The study also determined the prevalence of HBV infection among HIV positive and HIV negative pregnant women. Accordingly, nine pregnant women (2.3%; 9/385) were positive for HIV. There was no HBV/HIV and HBV/HCV co-infection (Table 2).

| Variable | | No (Frequency) | Percentage |
|---|---|---|---|
| Age | 18 - 26 | 193 | 50.1 |
| | 27 - 45 | 192 | 49.9 |
| Residence | Urban | 173 | 44.9 |
| | Rural | 212 | 55.1 |
| Marital status | Married | 353 | 91.7 |
| | Divorced/widowed | 32 | 8.3 |
| Educational status | Illiterate | 167 | 43.4 |
| | 1 - 8 | 113 | 29.4 |
| | 9 - 12 | 72 | 18.7 |
| | Diploma and above | 33 | 8.6 |
| Occupation | Government employee | 36 | 9.4 |
| | Housewife | 256 | 66.5 |
| | Merchant | 58 | 15.1 |
| | Daily laborer | 35 | 9.1 |
| Income | 1500 and below | 270 | 70.5 |
| | Above 1500 | 115 | 29.9 |
| Place of previous birth | No birth | 177 | 46.0 |
| | Home | 91 | 23.6 |
| | Health institution | 117 | 30.4 |
| Gestational period | 1st trimester | 130 | 33.8 |
| | 2nd trimester | 161 | 41.8 |
| | 3rd trimester | 94 | 24.4 |

***Table 1****: Socio-demographic characteristics of pregnant women in Tenta Adjibar Health Center, Northeast Ethiopia, from November 1, 2017 to January 30, 2018.*

Exposure to different risk factors for HBV infection was assessed and determined. It was found that 98.7% of the pregnant women had ear piercing, 83.1% a history of mutilation, 7.0% hospital admission, 8.1% history of having multiple sexual partners, 9.6% history of abortion, 10.1% tooth extraction, 12.5% share sharp and needle materials with others, 23.6% history of home delivery by traditional birth attendants, 2.3% history of blood transfusion, 12.7% tattooing, 3.9% history of surgical procedures. Among pregnant women that had a history of abortion, 10.8% (4/37) and history of multiple sexual practices, 22.6% (7/31) were positive for HBsAg. Bivariate logistic regression analysis showed that history of abortion (COR 4.57, 95% CI 1.33 - 45.63; P = 0.16) and history of having multiple sexual partners (COR 16.9; 95% CI 5.3 - 54.3, P = 0.000) were significantly associated with HBV infection. On the other hand, there was no statistically significant association between age, residence, marital status, occupational status, educational status, gestational period, place of previous birth, monthly income, history of surgical procedures, hospital admission, blood transfusion, tattooing, ear piercing, tooth extraction, mutilation, sharing of sharp materials and HIV status with that of HBV infection among pregnant women.

Moreover, at multivariate logistic regression; pregnant women who having history of multiple sexual practices were 0.07 times (AOR 16.92; 95% CI 5.3 - 54.3, P = 0.000) more likely of being infected by HBV than pregnant women who had no history of multiple sexual practices (Table 2).

## Sero-prevalence and Associated risk factors of HCV infections

Of 385 pregnant women tested for anti-HCV antibody, 5 (1.3%) were found to be seropositive. Pregnant women of age group of 18 - 26 years comprised 193 (50.1%) of the total study participants, of which 3 (1.6%) were seropositive. High proportion of ant-HCV positivity was seen among illiterate 3/167 (1.8%) and primary school educated 2/113 (1.8%) pregnant women and those whose income was < 1500 Birr/month 4/270 (1.5%). As far as monthly income was concerned the prevalence of HCV decreases as the income increases. Out of the 212 rural dwellers pregnant women 3 (1.4%) were reactive for anti-HCV. HCV antibody sero-positivity was observed to be higher in second trimester (1.9%) and the least in the first trimester (0.8%) but this difference was not statistically significant ($p > 0.05$). Moreover, none of the socio-demographic factors were significantly associated with anti-HCV sero-positivity (Table 3).

| Variable | Frequency | | HBsAg result | | COR (CI) | P-value | AOR (CI) | P - value |
|---|---|---|---|---|---|---|---|---|
| | | | Negative (%) | Positive (%) | | | | |
| Age | 18 - 26 | 193 | 186 (96.4) | 7 (3.6) | Ref | | | |
| | 27 - 45 | 192 | 186 (96.9) | 6 (3.1) | 0.86 (0.28 - 2.6) | 0.785 | | |
| Residence | Urban | 173 | 169 (97.7) | 4 (2.3) | Ref | | | |
| | Rural | 212 | 203 (95.8) | 9 (4.4) | 1.87 (0.57 - 6.19) | 0.303 | | |
| Marital status | Married | 353 | 341 (96.6) | 12 (3.4) | Ref | | | |
| | Divorced/widowed | 32 | 31 (96.9) | 1 (3.1) | 0.92 (0.12 - 7.29) | 0.934 | | |
| Occupation | Housewife | 256 | 246 (96.1) | 10 (3.9) | | | | |
| | Government employee | 36 | 36 (100.0) | 0 (0.00) | | | | |
| | Daily laborer | 35 | 35 (100.0) | 0 (0.00) | | | | |
| | Merchant | 58 | 55 (94.8) | 3 (5.2) | | | | |
| Educational Status | Illiterate | 167 | 161 (96.4) | 6 (3.6) | 1.29 (0.14 - 10.25) | 0.873 | | |
| | 1 - 8 | 113 | 109 (96.5) | 4 (3.5) | 1.17 (0.13 - 10.88) | 0.888 | | |
| | 9 - 12 | 72 | 70 (97.2) | 2 (2.8) | 0.92 (0.80 - 10.45) | 0.943 | | |
| | Diploma and Above | 33 | 32 (97.0) | 1 (3.0) | Ref | | | |
| Monthly income | 1500 and below | 270 | 261 (96.7) | ( (3.3) | 0.96 (0.29 - 3.17) | 0.943 | | |
| | > 1500 | 115 | 111 (96.5) | 4 (3.5) | Ref | | | |
| Place of previous birth | No birth | 177 | 170 (96.0) | 7 (4.0) | 2.37 (0.48 - 11.60) | 0.288 | | |
| | Home | 91 | 87 (95.6) | 4 (4.4) | 2.64 (0.47 - 14.77) | 0.268 | | |
| | Health institution | 117 | 115 (98.3) | 2 (1.7) | Ref | | | |
| Gestational period | 1st trimester | 130 | 126 (96.9) | 4 (3.1) | Ref | | | |
| | 2nd trimester | 161 | 158 (98.1) | 3 (1.9) | 0.6 (0.13 - 2.72) | 0.506 | | |
| | 3rd trimester | 94 | 88 (93.6) | 6 (6.4) | 2.15 (0.59 - 7.83) | 0.247 | | |
| Hospital admission | Yes | 27 | 26 (96.3) | 1 (3.7) | 1.11 (0.14 - 8.86) | 0.922 | | |
| | No | 358 | 346 (96.6) | 12 (3.4) | Ref | | | |
| Surgical procedure | Yes | 15 | 15 (100) | 0 (0.00) | | | | |
| | No | 370 | 357 (96.5) | 13 (3.5) | | | | |
| Tattooing | Yes | 49 | 46 (93.6) | 3 (6.1) | 2.13 (0.56 - 8.01) | 0.265 | | |
| | No | 336 | 326 (97.0) | 10 (3.0) | Ref | | | |
| Mutilation | Yes | 320 | 308 (96.0) | 12 (3.8) | 2.5 (0.32 - 19.52) | 0.384 | | |
| | No | 65 | 64 (98.5) | 1 (1.5) | | | | |
| Blood of Transfusion | Yes | 9 | 9 (100) | 0 (0.00) | | | | |
| | No | 376 | 363 (96.5) | 13 (3.5) | Ref | | | |
| Abortion | Yes | 37 | 33 (89.2) | 4 (10.8) | 4.57 (1.33 - 15.63) | 0.16 | 0.38 (0.1 - 1.5) | 0.169 |
| | No | 348 | 339 (97.9) | 9 (2.6) | Ref | | | |
| Multi-sexual behavior | Yes | 31 | 24 (77.4) | 7 (22.6) | 16.92 (5.27 - 54.3) | 0.000 | 0.07 (0.02 - 0.23) | 0.000 |
| | No | 354 | 348 (98.3) | 6 (1.7) | Ref | | | |
| Tooth extraction | Yes | 39 | 37 (94.9) | 2 (5.1) | 1.65 (0.35 - 7.71) | 0.527 | | |
| | No | 346 | 335 (96.8) | 11 (3.2) | Ref | | | |
| Sharing of sharp materials | Yes | 48 | 47 (97.9) | 1 (2.1) | 0.58 (0.07 - 4.53) | 0.600 | | |
| | No | 337 | 325 (96.4) | 12 (3.6) | Ref | | | |
| Ear piercing | Yes | 380 | 367 (96.6) | 13 (3.4) | | | | |
| | No | 5 | 5 (100) | 0 (0.00) | | | | |
| HIV status | Positive | 9 | 9 (100) | 0 (0.00) | | | | |
| | Negative | 376 | 363 (96.5) | 13 (3.5) | | | | |

***Table 2:*** *Factors associated with hepatitis B and C virus infection among pregnant women in Tenta Adjbar health center.*

Among 385 pregnant women attending ANC clinic 320 (83.1%) had were reported to have history of mutilation and 4 (1.0%) of them were seropositive. However, mutilation was not significantly associated ($p$ = 0.852) with prevalence of HCV infection among pregnant women attending ANC clinic in Adjibar health center. About 380 (98.7%), 320 (83.12%), 49 (12.7%), 48 (12.5%) and 39 (10.13%) pregnant women had the practice of ear piercing, history of mutilation, tattooing, sharing of sharp materials and tooth extraction respectively (Table 3). The respective prevalence of HCV infection among pregnant women who had a history of surgical procedure, tooth extraction, sharing of sharp materials and tattooing was 6.7% (1/15), 2.6% (1/39), 2.1% (1/48) and 2.0% (1/49) respectively. But there was no any HCV sero-positivity in others possible risk factors. Due to unavailability of HCV positivity (some variables do have zero cell values) in pregnant women who had a history of hospital admission, blood transfusion, abortion, multiple sexual partners it was very difficult rather impossible to conduct multivariate logistic regression analysis. In general HCV sero-positivity was no statistically significant with possible risk factors.

| Variable | Frequency | | HCV anti-body status | | COR (CI) | P-value |
|---|---|---|---|---|---|---|
| | | | Negative (%) | Positive (%) | | |
| Age | 18 - 26 | 193 | 190 (98.4) | 3 (1.6) | Ref | |
| | 27 - 45 | 192 | 190 (99.0) | 2 (1.0) | 0.67 (0.11 - 4.04) | 0.659 |
| Residence | Urban | 173 | 171 (98.8) | 2 (1.2) | Ref | |
| | Rural | 212 | 209 (98.6) | 3 (1.4) | 1.23 (0.20 - 7.43 | 0.824 |
| Marital status | Married | 353 | 348 (98.6) | 5 (1.4) | | |
| | Divorced/widowed | 32 | 32 (100) | 0 (0.00) | | |
| Occupation | Housewife | 256 | 251 (98.0) | 5 (2.0) | | |
| | Government employee | 36 | 36 (100) | 0 (0.00) | | |
| | Daily laborer | 35 | 35 (100) | 0 (0.00) | | |
| | Merchant | 58 | 58 (100) | 0 (0.00) | | |
| Educational Status | Illiterate | 167 | 164 (98.2) | 3 (1.8) | | |
| | 1 - 8 | 113 | 111 (98.2) | 2 (1.8) | | |
| | 9 - 12 | 72 | 72 (100) | 0 (0.00) | | |
| | Diploma and Above | 33 | 33 (100) | 0 (0.00) | | |
| Monthly income | 1500 and below | 270 | 266 (98.5) | 4 (1.5) | 1.7 (0.19 - 15.51) | 0.631 |
| | > 1500 | 115 | 114 (99.1) | 1 (0.9) | Ref | |
| Place of previous birth | No birth | 177 | 175 (98.9) | 2 (1.1) | 1.33 (0.12 - 14.79) | 0.819 |
| | Home | 91 | 89 (97.8) | 2 (2.2) | 2.61 (0.23 - 29.21) | 0.437 |
| | Health institution | 117 | 116 | 1 (0.9) | Ref | |
| Gestational period | 1st trimester | 130 | 129 (99.2) | 1 (0.8) | Ref | |
| | 2nd trimester | 161 | 158 (98.1) | 3 (1.9) | 2.45 (0.25 - 23.83) | 0.440 |
| | 3rd trimester | 94 | 93 (98.9) | 1 (1.1) | 1.39 (0.09 - 2.46) | 0.818 |
| Hospital admission | Yes | 27 | 27 (100) | 0 (0.00) | | |
| | No | 358 | 353 (98.6) | 5 (1.4) | | |
| Surgical procedure | Yes | 15 | 14 (93.3) | 1 (6.7) | 6.54 (0.69 - 62.34) | 0.103 |
| | No | 370 | 366 (98.9) | 4 (1.1) | Ref | |
| Tattooing | Yes | 49 | 48 (98.0) | 1 (2.0) | 1.73 (0.19 - 15.8) | 0.628 |
| | No | 336 | 332 (98.8) | 49 (1.2) | Ref | |
| Mutilation | Yes | 320 | 316 (98.8) | 4 (1.0) | 0.81 (0.09 - 7.37) | 0.852 |
| | No | 65 | 64 (98.5) | 1 (1.5) | Ref | |
| Blood of Transfusion | Yes | 9 | 9 (100) | 0 (0.00) | | |
| | No | 376 | 371 (98.7) | 5 (1.3) | | |
| Abortion | Yes | 37 | 37 (100) | 0 (0.00) | | |
| | No | 348 | 343 (98.6) | 5 (1.4) | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Multi-sexual behavior | Yes | 31 | 31 (100) | 0 (0.00) | | |
| | No | 354 | 349 (98.6) | 5 (1.4) | | |
| Tooth extraction | Yes | 39 | 38 (97.4) | 1 (2.6) | 2.25 (0.25 - 20.65) | 0.473 |
| | No | 346 | 342 (98.8) | 4 (1.2) | Ref | |
| Sharing of sharp materials | Yes | 48 | 47 (97.9) | 1 (2.1) | 1.8 (0.2 - 16.2) | 0.613 |
| | No | 337 | 333 (98.8) | 4 (1.2) | Ref | |
| Ear piercing | Yes | 380 | 375 (98.7) | 5 (1.3) | | |
| | No | 5 | 5 (100) | 0 (0.00) | | |
| HIV status | Positive | 9 | 9 (100) | 0 (0.00) | | |
| | Negative | 376 | 371 (98.7) | 5 (1.3) | | |

***Table 3:*** *Risk factors and their association with HCV infection.*

## Discussion

Worldwide, viral hepatitis is the commonest cause of hepatic dysfunction in pregnancy [1]. The prevalence of HBV varies between 2% in developed countries where the prevalence is low to about 8% in developing countries where infection is endemic with sex, age and socioeconomic status as important risk factors for infection [2]. According to the National center for disease control (NDCD), prevalence of HCV and WHO revealed that the prevalence of HCV is categorized and graded as high (> 3.5%), moderate (1.5% - 3.5%) and low (< 1.5%) [3,17]. In our study, the frequency of HBV and HCV infections among pregnant woman attending the Adjibar health center were 3.4% and 1.3% respectively while there was no recorded for both HBV and HCV co-infection. The overall prevalence of HBsAg (3.4%) among pregnant women in this study was categorized as intermediately endemic prevalence according to WHO classification criteria [1]. This prevalence agrees with recent studies from Ethiopia [6,7], Nigeria [18], Tanzania [19]. In contrary, other studies in Ethiopia [8-13,20-22] depicted higher prevalence. On the other hand, in comparison with other country, higher result (10.6%) in Ghana was reported [23]. Whereas lower prevalence were (1.5% and 1.6%) reported in study done in Libya and Algeria respectively [4].

Regarding of HCV, the present study showed that the prevalence of HCV was 1.3% which is similar finding rate reported in India 1.03% [24] and Nigeria 1.39% [25]. But relatively higher prevalence than report from Ethiopia; 0.8% and 0.6% [9,26] whereas very low as compared to the prevalence reported in Egypt 8.6% [28], Yemen 8.5% [29]. This variation might be due to differences in sampling method, sample size used, geographical variation, differences in cultural practices, sexual behavior and practices, and differences in the test methods employed to detect HCV infection. Even though; in the present study, age was found to have no significant associations with HBV infection, in agreement with some studies conducted elsewhere [5,7-9] and the prevalence of HBsAg was high among the age group of 18 - 26 years. This finding is consistent with a report in Deder, Eastern Ethiopia [11] and Nigeria [30]. The possible explanation for this finding could be that women in these age groups are more sexually active and they may have higher chance of multiple sexual partners. However, other studies have reported that HBV infection in pregnant women increased with age and a significantly higher prevalence was observed in women between the ages of 20 to 24 years [31]. There was no difference in sero-positivity of HBsAg between urban and rural pregnant mothers in the present study and it is in agreement with a study reported from Dessie northeastern Ethiopia [9] and Sana'a, Yemen [30]. In contrast to our study, study from Eastern Sudan has shown significantly higher prevalence of HBsAg among pregnant mothers from urban area than the rural counterparts [29]. This difference might be due to the varied numbers of urban and rural study participants as compared to our study.

In the current study educational status was not significantly associated with HBsAg sero-positivity. This finding was similar with study done in Ethiopia [8,11]. On the other hand other studies noted that the sero-prevalence of HBV infection decreased with increasing levels of education [9,12]. This may be due to differences in the level of awareness about the transmission of HBV. Of the 13 women who were HBV-positive, none of them were positive for HIV. In contrast to our study, previous studies in Cameroon [32] have found that HIV infection was closely associated with HBV infection. This finding is comparable with previous studies conducted in Ethiopia 0.6%, 0.74% and 1.3% [7,12,22]. Absence of co-infection rate may be due to the majority of HIV-positive pregnant women in our study were on antiretroviral therapy, which may reduce the replication of HBV-DNA levels that ultimately decreases viral antigen below the detection limit (occult hepatitis) and probably increase spontaneous clearance of the virus.

In multivariate logistic regression analysis pregnant women with multiple sexual partners were about 17 times at higher risk of HBV infection compared to those with no multiple sexual partners (AOR 16.92; 95% CI 5.3 - 54.3, P = 0.000). This is consistent with study done at Ethiopia [2,14,19,23] and hospital-based study in Nigeria [35]. This could be because of hepatitis B is blood born virus; blood, semen and other body fluids are common source of infection that sexual contacts serve as a mode of transmission. That means; women with more than one partner could have had more sexual contacts.

Likewise, HBsAg positivity was previously reported to be significantly higher in pregnant women who had a previous history of abortion [5,8,31]. However it was no significant association between previous history of abortion and HBsAg positivity was observed in our study with multivariate logistic regression. This may be due to the implementation of policies aimed at reducing the incidence of unsafe abortions, health education related to HIV, and the promotion of the use of barriers as contraception. In this study, history of surgical procedure and blood transfusion were not statistically associated with HBV infection. Similar results were reported in Ethiopia [8,9]. But, other reports were contradicted with our findings [7,11,29]. The difference could be attributed to variations in sample size, study period and poor practices of infection prevention strategies. Interestingly we found that factors such as mutilation, tooth extraction, tattooing, home delivery were not statistically associated with HBV infection that are consistent with the findings reported in Ethiopia [7,8,11] but inconsistent with other study [9]. These differences could be due to variations in sample size, duration of study and safety precautions being taken.

In this study all HCV positive pregnant women had no significant association with socio-demographic characteristics and possible risk factors. This finding is disagreeing with studies reported from Cameroon and Benin [32,33]. These difference might be due to the small sample size and few numbers of cases (positive for HCV) in our study. Other possible causes for these huge statistical results such as confounding effects, multi-collinearity and the validity of regression model were addressed at the stage of study design and during data analysis. Likewise, similar numerical problems were reported in other comparable studies [9,27].

## Conclusion and Recommendations

The overall prevalence of HBV and HCV infection among pregnant women in Tenta Adjibar health center, Northeast Ethiopia is intermediate (3.4%) and low (1.3%) prevalence according to the WHO classification criteria respectively. History of multiple sexual partners was significantly associated with HBV infection. Health education programs on the mode of HBV and HCV transmission, high-risk behaviors and methods of preventions should be instituted at antenatal care clinics to raise the awareness of mothers. Furthermore, all pregnant women should be screened for HBV and HCV, and treated and/or vaccinated if necessary to reduce their viral loads and its transmission from mother-to-child.

## Limitation

Detection of HBsAg using ELISA was not performed and other markers of HBV like HBeAg and DNA were not detected. Screening of HBsAg using ELISA may increases the prevalence of HBV since ELISA has high detection rate than rapid HBsAg test kit and HBeAg indicates the infectivity of infected individuals. In general, a person is considered very infectious when the test is positive and less infectious when the test is negative.

## Authors' Contributions

YM: Contributed to the inception, design, data collection, analyses, and writeup of this manuscript. EK: Contributed to design, data collection and write-up of this manuscript. DT: Contribute in writing and revising the manuscript. AS: Contributed to design, analysis and write-up of this manuscript. All authors critically reviewed and approved the final version of the manuscript.

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## Bibliography

1. WHO. "Global Hepatitis Report, 2017" (2017).

2. Hepatitis B Foundation Cause for a Cure. Understanding Hepatitis B Blood Tests (2018).

3. WHO. Hepatitis C Factsheet no 164 (2017).

4. Gasim GI., *et al*. "Regional Review of Hepatitis B and C virus infections among pregnant women in Arab and African countries". *Journal of Infection in Developing Countries* 7.8 (2013): 566 -578.

5. Tegegne D., *et al*. "Seroprevalence and transmission of hepatitis B virus among delivering women and their newborn in selected health facilities, Addis Ababa, Ethiopia". *BMC Research Notes* 7.1 (2014): 239.

6. Chernet A., *et al*. "Seroprevalence of Hepatitis B virus surface antigen and factors associated among pregnant women in Dawuro zone, SNNPR, Southwest Ethiopia: a cross sectional study". *BMC Research Notes* 10.1 (2017): 418.

7. Zenebe Y., *et al*. "Sero-prevalence and risk factors of hepatitis B virus and human immunodeficiency virus infection among pregnant women in Bahir Dar city, Northwest Ethiopia". *BMC Infectious Diseases* 14 (2014): 118.

8. Yohanes T., *et al*. "Seroprevalence and predictors of hepatitis B virus infection among pregnant women attending routine antenatal care in Arba Minch Hospital, South Ethiopia". *Hepatitis Research and Treatment* 2 (2016): 9290163.

9. Seid M., *et al*. "Sero-prevalence of HBV and HCV infections among pregnant women attending antenatal care clinic at dessie referral hospital. Ethiopia". *Advances in Life Sciences and Health* 1.2 (2014): 109-120.

10. Desalegn Z., *et al*. "Hepatitis B and human immunodeficiency irus co-infection among pregnant women in resource-limited high endemic setting, Addis Ababa, Ethiopia: implications for prevention and control measures". *European Journal of Medical Research* 21 (2016): 16.

11. Umare A., *et al*. "Hepatitis B Virus Infections and Associated Factors among Pregnant Women Attending Antenatal Care Clinic at Deder Hospital, Eastern Ethiopia". *PLoS ONE* 11.11 (2016): e0166936.

12. Metaferia Y., *et al*. "Seroprevalence and associated risk factors of hepatitis B virus among pregnant women in southern Ethiopia: a hospital-based cross-sectional study". *Epidemiology and Health* 38 (2016): e2016027.

13. Semaw A., *et al*. "Sero-Prevalence of hepatitis B surface antigen and associated factors among pregnant mothers attending antenatal care service, Mekelle, Ethiopia: evidence from institutional based quantitative cross-sectional study". *International Journal of Medical and Health Sciences* 9.9 (2015).

14. Safir A., *et al*. "Maternal hepatitis B virus or hepatitis C virus carrier status as an independent risk factor for adverse perinatal outcome". *Liver International* 30.5 (2010): 765-770.

15. Karoney MJ and Siika AM. "Hepatitis C virus (HCV) infection in Africa: A review". *Pan African Medical Journal* 14 (2013): 44.

16. Mohd HK., *et al*. "Global epidemiology of hepatitis C virus infection: New estimates of age-specific antibody to HCV seroprevalence". *Hepatology* 57.4 (2013): 1333-1342.

17. National centre for disease control India (NDCD). News Letter 3.1 (2014).

18. Pondei K and Isa I. "The sero-prevalence of hepatitis B surface antigen and anti-hepatitis C antibody among women attending antenatal clinic at a tertiary health facility in the Niger Delta of Nigeria". *Global Advanced Research Journal of Medicine and Medical Sciences* 2.1 (2013): 6-12.

19. Mirambo MM., *et al*. "Prevalence of hepatitis B surface antigen among pregnant women attending antenatal clinic at Nyamagana District Hospital Mwanza, Tanzania". *Tanzania Journal of Health Research* 18.1 (2016).

20. Walle F., *et al*. "Prevalence of hepatitis B surface antigen among pregnant women attending antenatal care service at Debre-Tabor hospital, Northwest Ethiopia". *Ethiopian Journal of Health Sciences* 17.1 (2008): 13-21.

21. Molla S., *et al*. "Seroprevalence of hepatitis B surface antigen and anti HCV antibody and its associated risk factors among pregnant women attending maternity ward of Felege Hiwot Referral Hospital, northwest Ethiopia: a cross-sectional study". *Virology Journal* 12 (2015): 204.

22. Ramos JM., *et al*. "Seroprevalence of HIV-1, HBV, HTLV-1 and Treponema pallidum among pregnant women in a rural hospital in southern Ethiopia". *Journal of Clinical Virology* 51.1 (2011): 83-85.

23. Cho Y., *et al*. "The Prevalence and Risk Factors for Hepatitis B Surface Ag Positivity in Pregnant Women in Eastern Region of Ghana". *Gut and Liver* 6.2 (2012): 235-240.

24. Dwivedi M., *et al*. "Seroprevalence of hepatitis B infection during pregnancy and risk of perinatal transmission". *Indian Journal of Gastroenterology* 30.2 (2011): 66-71.

25. Esan AJ., *et al*. "Sero-Prevalence of Hepatitis B and Hepatitis C virus Co-Infection among Pregnant Women in Nigeria". *American Journal of Biomedical Research* 2.1 (2014): 11-15.

26. Zenebe Y., *et al*. "Sero-prevalence and risk factors of hepatitis C virus infection among pregnant women in Bahir Dar city, Northwest Ethiopia: cross sectional study". *Pan African Medical Journal* 21 (2015): 158.

27. Nagababu P., *et al*. "Sero-prevalence of HCV infection among pregnant women in a rural teaching hospital, sangareddy". *International Journal of Research and Development in Pharmacy and Life Sciences* 5.4 (2016): 2251-2254.

28. Mortada ES., *et al*. "Prevalence of Hepatitis B Virus Infection among Egyptian Pregnant Women-A Single Center Study". *International Journal of Tropical Disease and Health* 3.2 (2013): 157-168.

29. Murad EA., *et al*. "Epidemiology of hepatitis B and hepatitis C virus infections in pregnant women in Sanaa, Yemen". *BMC Pregnancy and Childbirth* 13.1 (2013): 127.

30. Kolawole OM., *et al*. "Seroprevalence of hepatitis B surface antigenemia and its effects on hematological parameters in pregnant women in Osogbo, Nigeria". *Virology Journal* 9 (2012): 317.

31. Alegbeleye JO., *et al*. "Maternal and neonatal seroprevalence of hepatitis B surface antigen in a hospital based population in South-South, Nigeria". *International Journal of Medicine and Medical Sciences* 5.5 (2013): 241-246.

32. Noubiap JJ., *et al*. "Prevalence, infectivity and correlates of hepatitis B virus infection among pregnant women in a rural district of the Far North Region of Cameroon". *BMC Public Health* 15 (2015): 454.

33. Oladeinde B., *et al*. "Prevalence of HIV, HBV, and HCV infections among pregnant women receiving antenatal care in a traditional birth home in Benin City, Nigeria". *Prevalence* 2.2 (2013): 113-117.

34. Geberemicheal A., *et al*. "Seroprevalence of hepatitis B virus infections among health care workers at the Bulle Hora Woreda Governmental Health Institutions, Southern Oromia, Ethiopia". *Journal of Environmental and Occupational Science* 2.1 (2013): 9-14.

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