



## Sero-Prevalence and Associated Factors of Hepatitis B Virus Among Pregnant Women at Wolkite Health Center

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Hepatitis B virus, associated factors, pregnant women, Wolkite Ethiopia.

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### Abstract

**Introduction:** Hepatitis B virus (HBV) is a public health problem worldwide. It is highly endemic in Asia and Sub-Saharan Africa. Even though there was an introduction of universal infants HBV immunization in 2007, distribution of HBV remains a public health problem in Ethiopia.

**Objective:** To determine the sero-prevalence of HBs Ag among pregnant women and to identify Factors associated with the infection.

**Methods:** A cross-sectional study was conducted from June 1-August 1, 2021 among pregnant women attending the antenatal clinic (ANC) of Wolkite Health Center. After obtaining written and informed consent, blood sample was collected from 270 pregnant women using consecutive non-duplicative sampling method. Serum was separated from whole blood and tested for using Bioline strip test. Data was collected using pre-structured questionnaire and analyzed using SPSS version 20. Multiple logistic regression analysis was used to determine the association between explanatory variables and the outcome variables. The result was considered statistically significant at  $p < 0.05$ .

**Result:** In this study, 270 pregnant women were participated. The overall prevalence of sero-positive HBs Ag among pregnant women was 15(5.6%). The study participants having history of abortion [AOR=0.024; 95%CI (.003-.165),  $p=0.000$ ] and multiple sexual practice [AOR=0.013, 95%CI (.001-.154),  $p=0.001$ ] significantly predictor of Hepatitis B virus infection.

**Conclusion:** The sero prevalence of hepatitis B virus infection was increased among study participants. From assessed associated factor history of abortion and multiple sexual practice were significantly associated with sero-prevalence of HBV infection. Do to these reason routine screening of women for HBV infection during pregnancy and ANC follow up.

### Background

Hepatitis B virus (HBV) is an envelope virus with a viral genome of partially double stranded circular DNA which belongs to the family Hepadnaviridae [1,2]. HBV causes acute and chronic infections of the liver. It is a major cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma. Due to its largely asymptomatic nature, viral hepatitis is a silent epidemic; most people are unaware of their infection [3]. Infections by HBV in pregnancy come with its attendant effect on both mother and child [4].

It has been reported that 10-20% of HBs Ag positive pregnant women transmit the virus to their babies and women, who are positive for both HBs Ag and HBe Ag, have a chance of transmitting HBV to their newborns at birth nearly 100%. Up to 90% of the newborns born to these mothers go on to develop chronic hepatitis B if they do not receive hepatitis B immune globulin and hepatitis B vaccine at

birth [5]. Although this means of transmission has not been reported to be teratogenic, a higher incidence of low birth weight, low intelligence quotient, liver cirrhosis and hepatocellular carcinoma in young adulthood may result [2].

HBV is not directly cytotoxic to hepatocytes but severity of hepatocellular injury is modulated by the strength of host immune responses [6,7]. The dynamic balance between viral replication and host immune response plays a key role in the pathogenesis of liver disease from HBV infection [8]. There are three possible routes of transmission of HBV from infected mothers to infants: transplacental transmission of HBV in utero, natal transmission during delivery or postnatal transmission during care of infant or through breast milk. In patients with acute hepatitis B infection vertical transmission occurs in up to 10% of neonates when infection occurs in the first trimester and in 80 -90% of neonates when acute infection occurs in the third trimester

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[9].

Chronic HBV infection during pregnancy is usually mild but may flare after delivery or with discontinuing therapy [10]. The sero-markers and bio-markers associated with HBV infection include HBs Ag, anti-HBs, HBe Ag, anti-HBc, IgM-anti- HBc and IgG-anti- HBc. At least one serologic marker is present during the different phases of HBV infection. The presence of a confirmed HBs Ag result is indicative of ongoing HBV infection, so all HBs Ag positive persons should be considered infectious. In newly infected persons, HBs Ag is the only serologic marker detected during the first 3–5 weeks after infection, and it persists for variable periods at very low levels. The average time from exposure to detection of HBs Ag is 30 days (range: 6–60 days). Chronic HBV infection occurs when HBs Ag persists for > 6th months in the presence of HBe Ag or anti-HBc or detection of IgG-anti- HBc, whereas acute HBV infection occurs within 6th months of infection (detection of IgM-anti- HBc) [11].

Management of chronic HBV infection in pregnancy is mostly supportive with antiviral medications indicated in a small subset of HBV infected women with rapidly progressive chronic liver disease. Because of the high risk of developing chronic HBV among infant born to HBs Ag positive mother, administration of Hepatitis B Immunoglobulin (HBIG) in combination with hepatitis B vaccines as post exposure prophylaxis is very important [12].

## Materials and methods

### Study setting

Study was conducted at WHC, which is located in Wolkite city administration, Gurage Zone, SNNPR, Ethiopia. Wolkite has a total of an estimated population of 28,279 out of those 13,886 male and 14,393 female. It is found 158 Km southeast from the capital city, Addis Ababa.

### Study design and period

Cross sectional study was conducted among pregnant women who attending WHC ANC clinic from June 1 - August 1, 2021.G.C.

### Source population

All pregnant women who were visiting ANC clinic at WHC during the study period.

### Eligibility criteria

**Inclusion criteria:** - All pregnant women those who were in any gestational age, and those who were willing to participate in the study were included in the study.

**Exclusion criteria:** - pregnant women who were critically sick, unable to answer the questionnaire and on active labor during the study were excluded from the study.

### Variable of the study

**Dependent Variables:** - Sero-prevalence of Hepatitis B virus

**Independent Variables:** - Socio demographic data and related factors such as age, Occupation, Residence, Educational status , surgical procedure ,Place of previous delivery , Gestational age , Body tattooing ,Genital mutilation , History of blood transfusion, History of abortion, multiple sexual practices.

### Sample size determination and sampling technique

The sample size was determined using a single population proportion formula with the following

Assumptions: estimate prevalence rate (6.1%) taken from a previous study conducted in a rural hospital in Southern Ethiopia [18], with 95% confidence level, and 3% degree of precision. After considering 10% for the non-response rate, the final sample size was 270. To recruit study participants convenient sampling technique was used until the required sample size was obtained.

### Data collection

Socio-demographic data and related factors were collected using a pre-structured questionnaire by the trained BSC nurse through a face-to-face interview.

### Specimen Collection and Processing

After written informed consent was obtained approximately 5 ml venous blood samples were collected from each study participant. The collected blood samples were centrifuge at 2000-3000 rpm for 5 minutes to separate the serum part of the whole blood. The separated serum was tested for the presence of HBs Ag by using Rapid Test Cassette.

### Laboratory Testing Methods

Rapid HBs Ag screening test is a laboratory testing methods bioline rapid strip test has sensitivity of 99.7% and specificity of greater than 99.6 %. It is a qualitative, solid phase, two-site sandwich immunoassay for the detection of HBs Ag in serum or plasma. The membrane is pre-coated with anti-HBs Ag antibodies on the test band region and anti-mouse antibodies on the control band region. During testing, the serum sample reacts with the dye conjugate (mouse anti HBs Ag antibody colloidal gold conjugate) that will be coated in the test strip. The mixture then by capillary action reacts with anti-HBs Ag antibodies on the membrane and generates a red band. Presence of this red band indicates a positive result while its absence indicates a negative result.

### Data quality control

To ensure the quality of data, training was given for data collectors before starting data collection. Pre-tested was conducted on 5% of the sample size at Wolkite University Hospital to check its consistency, appropriateness, completeness and reliability of the questionnaire.

### Data processing and analysis

Data were coded, entered and analyzed by using SPSS version 21 software. Descriptive statistics were used to determine the prevalence of HBS AGE. The association between explanatory variables and the outcome variables was checked by using binary logistic regression model; Variables with a p-value of < 0.05 were considered as statistically significant.

## Results

### Socio-demographic data

In this study, 270 pregnant women were participated in the study with response rate of 100%. From the total study participants (53.7%) were in the age category of 24–28 years. One hundred ninety three (71.5%) were rural in residence. More than half of the study participants were (56.7%) educational

**Table 1.** Socio-demographic data and related factor of pregnant women attending antenatal care at WHC, from June 1-August 1, 2021 (N=270).

Variables	Categories	Number	Frequency (%)
Age (in year)	18-23	37	13.7
	24-28	145	53.7
	29-34	51	18.9
	>35	37	13.7
Residence	Urban	77	28.5
	Rural	193	71.5
Educational status	Illiterate	14	5.2
	01-Aug	153	56.7
	09-Dec	79	29.3
	Diploma and above	24	8.9
Occupation	Employed	45	16.7
	Housewife	148	54.8
	Merchant	77	28.5
Gestational age	1st trimester	45	16.7
	2nd trimester	154	57
	3rd trimester	71	26.3
Place of previous delivery	No birth	39	14.4
	Hospital	231	85.6
History of blood transfusion	Yes	29	10.7
	No	241	89.3
Multiple sexual	Yes	11	4.1
	No	259	95.9
History of abortion	Yes	34	12.6
	No	236	87.4
Body tattooing	Yes	5	1.9
	No	265	98.1
Genital mutilation	Yes	264	97.8
	No	6	2.2
History of surgical procedure	Yes	34	12.6
	No	236	87.4

level from 1-8 grades. The majority of the study participants were (54.8) housewife. (57%) of the study participants were gestational age under 2nd tri-minister, (85.6%) there Place of previous delivery at hospital. (Table 1).

**Sero-prevalence and associated factors**

In the current study a total of 270 study participants involved. The overall Sero prevalence of HBV infection was 15/270(5.6%). From associated factors assessed, in the current study history of abortion and multiple sexual practice were significantly associated with prevalence of HBV infection. (Tables 2).

**Discussion**

HBV infection during pregnancy can cause serious problems among the newborns. Several efforts have been made in Ethiopia to reduce transmission of HBV to newborns before and during

birth. In the current study, the overall sero-prevalence of HBs Age in pregnant women was 5.6%. This shows almost intermediate of HBV infection according to WHO criteria [14]. The current study finding was lower compared to the previous studies done in different region of Ethiopia in rural hospital in Southern Ethiopia (6.1%) [18], Mali (8.0%) [34], Nigeria (8.3%) [45] and Sierra Leone (6.2%) [46] and Hong Kong (10%) [47]. The finding of the current study was higher than study reported in Addis Ababa; central Ethiopia (3%) [20], Jimma; South west Ethiopia (3.7%) [21], Debre-Tabor Hospital (5.3%) [17] and Bahir Dar (3.8%) [19]. The finding was in agreement to similar study findings were reported in Sudan (5.6%) [37]. The difference in prevalence might be due to the difference in hepatitis epidemiology in the general population, study design, sample size and traditional practice.

**Table 2.** Sero prevalence of HBs Ag infection and Possible risk factors among pregnant women attending antenatal care at WHC June 1-August 1, 2021 (N=270).

Variables	Categories	HBS Status		Bivariate Analysis		Multivariate Analysis	
		Positive n	Negative n	COR(95% CI)	P-value	AOR(95%CI)	P-value
Age (in year)	18-23	2	12	1			
	24-28	4	149	1.99(.000-0.45)	0.998		
	29-34	5	74	1.74(.427-7.079)	0.440		
	>35	4	20	0.81(.181-3.63)	0.785		
Residence							
	Urban	9	68	1		1	
	Rural	6	187	0.242(.083-.706)	0.009*	0.208(.028-1.565)	0.127
Educational status							
	Illiterate	2	12	1			
	1-8	4	149	6.21(1.030-37.42)	0.046		
	9-12	5	74	2.47(.429-14.19)	0.312		
	Diploma and above	4	20	0.833(.132-5.26)	0.846		
Occupation							
	Housewife	9	139	1			
	Employed	4	41	0.664(.194-2.267)	0.513		
	Merchant	2	75	2.428(.511-11.528)	0.264		
Gestational age							
	1st trimester	1	44	5.59(.675-46.28)	0.111		
	2nd trimester	6	148	3.13(1.044-9.399)	0.042		
	3rd trimester	8	63	1			
Place of previous delivery							
	No birth	3	36	1			
	Hospital	12	219	1.521(.409-5.66)	0.532		
History of blood trans- fusion							
	Yes	9	20	0.057(.018-.176)	0.000*	0.151(.019-1.187)	0.072
	No	6	235	1		1	
Multiple sexual							
	Yes	7	4	0.018(.004-.075)	0.000*	0.013(.001-.154)	0.001**
	No	8	251	1		1	
History of abortion							
	Yes	10	24	0.052(.016-.165)	0.000*	0.024(.003-.165)	0.000**
	No	5	231	1		1	
Body tattooing							
	Yes	2	3	0.077(.012-.504)	0.007	0.051(.001-2.324)	0.127
	No	13	252	1		1	
Genital mutilation							
	Yes	13	251	9.65(1.617-57.62)	0.013	0.456(.016-13.28)	0.648
	No	2	4	1		1	
History of surgical procedure							
	Yes	3	31	0.554(.148-2.07)	0.380		
	No	12	224	1			

In the current study regarding socio-demographic status and related factors of the study participants revealed that HBV infection was higher among pregnant women have history of abortion and multiple sexual practice and had significant association with HBV infection. The odds of having HBs Age was 0.024 times higher risk among pregnant women who had a history of abortion compared to pregnant women who had no a history of abortion. The odds of having HBs Age was 0.013 times higher risk among pregnant women who had multiple sexual practice compared to pregnant women who had no multiple sexual practice. The finding was comparable to study reported from Nigeria [4], Addis Abeba [20], Bahir Dar [19], Jimma [21] and Debretabor [17]. The possible reason may be due to HBV might be found in blood and all body fluids that were transmitted during blood transfusion, unsafe any hospital procedure and unsafe sexual practice.

### Conclusion

Almost intermediate prevalence of hepatitis B infection was detected among pregnant women attending ANC at WHC. From associated factors assessed, in the current study history of abortion and multiple sexual practice were significantly associated with prevalence of HBV infection. So routine screening of pregnant women for HBV irrespective of basis of risk factor and intensified prevention targeting this group may reduce mother to child transmission of HBV infection.

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### Authors' contribution

**BDM** Conceived and designed the protocol, data analysis, writing the original draft, Manuscript preparation and review, **TN** Conceived and designed the protocol, Laboratory work, data collection, data analysis, writing the original draft, **TM** designed the protocol, Laboratory work, data collection, data analysis, writing the original draft, **AH** Conceived and designed the protocol, data analysis, writing the original draft.

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No funding was received for this study.

### Ethical Consideration

The study was approved by the institutional review board of Worksite University, College of Medicine and health sciences (Ref No IRB/101/13). Permission letter was obtained from the WHC Administration office. Before data collection, informed consent was obtained from study participants.

### Consent for publication

Not applicable.

### Data availability

All relevant data are available within the paper.

### Competing Interests

The authors have declared that no competing interests exist

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