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Research Article

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Prevalence of Hepatitis B Virus Infection and Associated Factors among Pregnant Women Attending Antenatal Care at Wolaita Sodo University Comprehensive and Specialized Hospital, Southern Ethiopia, 2024: an Institution Based Cross-Sectional Study

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Abstract

Background: *The hepatitis B virus is a DNA virus that specifically targets the liver, leading to the immune system destroying infected liver cells. Approximately 1.45 million people die each year due to hepatitis B virus infections. Earlier research on hepatitis B infections utilized focused antenatal care the four visits, whereas the World Health Organization now advises eight antenatal care visits. Furthermore, previous studies did not consider factors such as the number of antenatal care visits.*

Objectives: *The aim of this study was to assess prevalence of hepatitis B virus infection and associated factors among pregnant women attending antenatal care at Wolaita Sodo University Comprehensive and Specialized Hospital, Southern Ethiopia 2024.*

Methods: *An institutional-based cross-sectional study design was conducted from August 1 to 30, 2024. A systematic random sampling technique was used to select 393 study participants. Data was cleaned and entered to Epidata version 3.1 and were exported to SPSS version 26.0 software for analysis. Variables with p < 0.25 from the simple binary logistic regression were entered into a multivariable logistic regression model. P-value < 0.05 with 95% CI was considered to declare a result as a statistically significant association. Descriptive statistic was used to describe the data in form of text, tables, and charts.*

Results: *In this study the prevalence of hepatitis B virus infection among pregnant mothers was 5.9% in Wolaita Sodo University Comprehensive and Specialized Hospital. being unmarried [AOR (0.18), 95% CI (0.07, 0.48); p-value (0.001)], having history of abortion [AOR (4.8), 95% CI: 1.39, 16.23); p-value (0.013)], tattooing [AOR (11.9), 95% CI (3.42, 41.39); p-value (0.000)], and residence [AOR (7.6), 95% CI (1.36, 42.3); p-value (0.021)] had statistically significant association with positivity of HBV infection.*

Conclusions: *Sero-prevalence in study area among pregnant women shows intermediate endemicity. In this study tattooing and having abortion are modifiable factors associated with HBV. Interventions should be targeted on those modifiable and non- modifiable variables by all concerned bodies.*

Keywords: Hepatitis B Virus, Pregnancy, Prevalence, Ethiopia

Abbreviations and Acronym

AMHSC Arba Minch Health Science College
AOR Adjusted Odds Ratio
CI Confidence Interval
COR Crude Odds Ratio
HBsAg Hepatitis B surface antigen
HBV Hepatitis B virus
SPSS Statistical package for social sciences
WHO World Health Organization

1. Introduction

The hepatitis B virus is a significant public health issue worldwide. Approximately 65 million women of reproductive age are infected with the virus globally. According to a Global Burden of Disease report, around 1.45 million individuals die each year from hepatitis B infections [1]. This disease is caused by a hepatotropic DNA virus and results from immune-mediated damage to infected liver cells [2].

During pregnancy, hepatitis B is linked to a higher risk of maternal complications and an increased rate of vertical transmission. Hepatitis transmitted from mother to fetus can lead to cognitive and physical developmental issues in children later in life [3]. The virus is primarily spread through blood transfusions, blood products, bodily fluids (such as urine, semen, sweat, saliva, and tears), the use of contaminated needles, vertical transmission during childbirth, and sexual contact [4].

Several interventions have been suggested to address this issue, including the use of antiviral medications in the third trimester, perinatal HBV screening, immunoprophylaxis, and the administration of hepatitis B immunoglobulin (HBIG) along with hepatitis B vaccines as post-exposure prophylaxis [5]. Nevertheless, data from the past two decades indicate that the burden of the disease in this vulnerable population continues to rise [6].

Previous studies were conducted during the period of four antenatal care (ANC) visits, while the World Health Organization now suggests eight. To our knowledge, no research has been conducted in line with this updated guideline. This study seeks to address this gap by incorporating new variable, such as the number of ANC visits, and aims to assess the prevalence of hepatitis B virus infection and related factors among pregnant women receiving antenatal care at Wolaita Sodo University Comprehensive and Specialized Hospital in Southern Ethiopia.

2. Method and Material

2.1. Study Design and Period

This is an institutional-based cross-sectional study conducted in the Wolaita Sodo Univeresity Comprehensive and Specialized Hospital from August 1 to 30/2024.

2.2. Study Area

This study was done at Wolaita Sodo Univeresity Comprehensive and Specialized. The Hospital is found in Wolaita Sodo town, South Ethiopia. This Locality is one of 12 zones found in South Ethiopia at 385 km from Addis Ababa. The hospital is serving about three million people in the catchment area and people including in the neighboring zones. About 80,000 people visit output patient department annually. The Hospital has 250 beds and 423 staff including specialists, general practitioners, ANC clinic is one of the outpatient departments. The clinic contains six nurses, four general practitioners, five laboratory professionals, and three pharmacists. The clinic had scheduled follow up from Monday to Friday. It is estimated that the clinic serve 652 per month or about 163 per week pregnant mothers living in Wolaita Sodo town and a rounds were getting services in the clinic.

2.3. Source and Study Population

The source population was all pregnant women who follow antenatal care (ANC) in Wolaita Sodo University Comprehensive and Specialized Hospital. The study population was those pregnant women attending antenatal care at Wolaita Sodo University Comprehensive and Specialized Hospital who were selected systematically during study period.

2.4. Eligibility Criteria

Inclusion Criteria: Pregnant women attending ANC at Wolaita Sodo University Comprehensive and Specialized Hospital during the data collection period and willing to participate on this study.

Exclusion criteria: Pregnant women who previously tested positive for HBV, pregnant women who severely ill, pregnant women's with mental disorder and have been vaccinated against hepatitis B virus were excluded from the study.

2.5. Sample Size Determination and Sampling Procedure

The required sample size was determined by using the single population proportion formula $\frac{(\frac{Z\alpha}{2})^2 * P * (1-P)}{d^2}$. considering an estimated sero-prevalence of hepatitis B virus infection (9.2%) from the previous study in Gedeo Zone, Ethiopia [7]. In addition, by taking the margin of error (d) as 3% and 95% confidence interval, and adding a 10% non-response rate. Thus, the calculated final sample was 393. This study applied Systematic random sampling technique to select eligible study participants. Depending on the previous month average flow of 601 pregnant mothers for antenatal care in nursing registration book at Wolaita Sodo University Comprehensive and Specialized Hospital. Then the average client flow during the study period was divided for the calculated sample size to identify the sampling interval and it is two. To get K^{th} interval = (source population) N/sampled size (n_0) = 601/393 = 1.5 ≈ 2 Thus, every second pregnant mothers visiting the ANC clinic were enrolled in the study until the calculated sample size were achieved within 30 days of data collections period. Then the first pregnant mother was randomly selected by lottery method. Then study participants were interviewed every two interval until the sample size was completed through systematic random sampling technique.

2.6. Data Collection Tools and Procedures

Data collection was implemented both face to face interview through pretested structured questionnaire and chart review. A pre-tested structured questionnaire was consisting of socio-demographic and socioeconomic characteristics, risky socio cultural and behavioral factors, institution related factors and blood sample test was designed to collect clients serum hepatitis B surface antigen virus status by requesting laboratory investigation. It was adapted from a valid and reliability instrument used in previous studies done on similar topic [8-12]. One-day training was given for the supervisor and data collectors about data collection and sampling technique. There were two trained diploma midwives participated for data collection. Pre-test was done to assess the content and face validity of the questionnaires. The investigator and supervisor made spot checking and reviewing the completed questionnaires on daily basis to ensure completeness and consistency of the information collected.

2.7. Laboratory Method

Blood sample was obtained from 393 pregnant women. A standard procedure was used to collect blood and process them for testing. All sera were screened for hepatitis B surface antigen (HBsAg) using HBsAg antibody rapid test. HBsAg in serum HBV infection status was defined by a positive or negative result for HBsAg using HBsAg test strip.

2.8. Data Processing and Analysis

After declaring for completeness and consistency of the data, the data were entered into Epi Info version-7 and exported into SPSS version 23 statistical software for data cleaning, coded and analysis. Bivariate logistic regression analysis was done after dichotomizing the dependent variables. After checking associations of the variables, those with $p < 0.25$ in bivariate analysis were processed to multi-variable logistic regression analysis to control con founding factors. p value of < 0.05 was used to express the statistical significance of the variables.

3. Results

3.1. Socio-Demographic Characteristics of Study Participants

A total of 393 pregnant mothers attending ANC clinic of Wolaita Sodo University Comprehensive and Specialized Hospital were participated in this study with response rate of 100%. The mean age was 25.53years (SD ± 5.092) with the minimum and maximum age of 16 and 39 years, respectively.

As shown in Table 1 below, majority 169 (43.0%) of pregnant mothers were in the age group of 25 to 30 years and less than three-fourth 30 (7.6%) were in the age of 18 years and less. About 272 (69.2%) were urban dwellers, 54 (13.7%) were no have formal education and 146 (37.2%) had Diploma and above. Regarding marital status and occupation of the study participants, majority 365 (92.9%) are married, 194 (49.4%) are housewife and 115 (29.3%) was merchants (Table 1 below).

Variable	Response category	Frequency (f)	Percentage (%)
Age	≤18 years	30	7.6
	19- 24years	109	27.7
	25- 30 years	169	43.0
	31- 40 year	85	21.7
Educational level	No formal education	54	13.7
	Primary	76	19.3
	Secondary	117	29.8
	Diploma and above	146	37.2
Marital status	Single	21	5.3
	Married	357	90.8
	Windowed	4	1.1
	Divorced	11	2.8
Residence	Urban	272	69.2
	Rural	121	30.8
Occupation	House wife	194	49.4
	Merchant	115	29.3
	Governmental employee	71	18.1
	Private employee	13	3.3

Table 1: Socio-Demographic Characteristics of Pregnant Mothers Attending ANC Clinic in Wolaita Sodo University Comprehensive and Specialized Hospital, Southern-Ethiopia, 2024, (n = 393).

3.2. Sero-Prevalence of HBV Infection

As displayed in Figure 2 below out of 393 study participants, sero positivity for HBsAg was detected among 23 pregnant mothers, making the overall prevalence of HBV infections 5.9%.

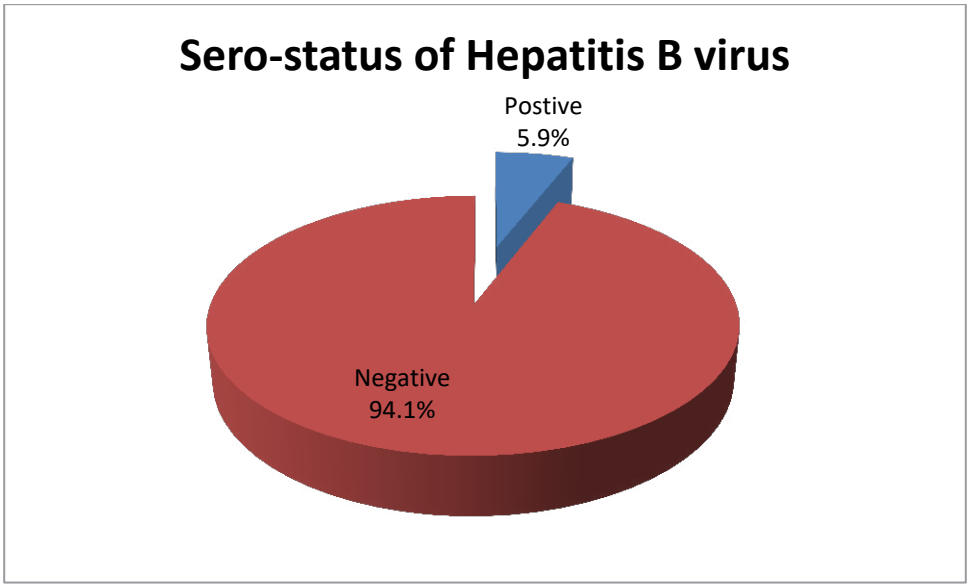

Figure 1: Sero- Status of Hepatitis B Virus Among Pregnant Mothers Attending ANC Clinic in Wolaita Sodo University Comprehensive and Specialized Hospital, Southern-Ethiopia, 2024, (n = 393).

3.3. Health, Behaviors and Practice Variables

A total of 43 (10.9%) of study participants had been experienced unprotected multiple sexual partners, while 97 (24.7%) had been hospitalized at some time during their lives. Among respondents 64 (16.3%) had a history of abortion. More than half of study participants 302 (76.8%) had history of ear piercing. Majority of participants 360 (91.6%) had no history of blood transfusion. More than one- fifth 80 (20.4%) had history of drinking alcohol (Table 2 below).

Variables	Response category	Frequency (f)	Percentage (%)
Admission history	Yes	97	24.7
	No	296	75.3
Tattoo	Yes	52	13.2
	No	341	86.8
Multiple sexual partners	Yes	43	10.9
	No	350	89.1
Drinking alcohol	Yes	80	20.4
	No	313	79.6
History of abortion	Yes	64	16.3
	No	329	83.7
History of contact with liver disease person	Yes	25	6.4
	No	368	93.6
History of surgical procedure	Yes	52	13.2
	No	341	86.8
History of blood transfusion	Yes	33	8.4
	No	360	91.6

History of dental procedure	Yes	77	19.6
	No	316	80.4
History of ear piercing	Yes	302	76.8
	No	47	23.2

Table 2: Health, Behavior and Practice related Characteristics of Pregnant Mothers Attending ANC Clinic in Wolaita Sodo University Comprehensive and Specialized Hospital, Southern-Ethiopia, 2024, (n = 393).

3.4. Bivariate and Multivariate Analysis of Possible Factors of HBV Infection

In bivariate analysis ten variables such as; educational status, marital status, residence, history of admission to the health facility, tattooing, history of drinking alcohol, history of dental extraction, history of multiple sexual partners, history of abortion, and history of surgical procedure were candidate variables for multivariate analysis (P<0.25).

However, when these variables were adjusted in multivariate analysis, being unmarried are protective measures against HBV infection [AOR (0.18), 95% CI (0.07, 0.48); p-value (0.001)], having history of abortion [AOR (4.8), 95% CI: 1.39, 16.23); p-value (0.013)], tattooing [AOR (11.9), 95% CI (3.42, 41.39); p-value (0.000)], and residence [AOR (7.6), 95% CI (1.36, 42.3); p-value (0.021)] had statistically significant association with positivity of HBV infection (Table 3 below).

Variables	Category	Sero-status of Hepatitis B virus		COR (95%CI)	AOR (95%CI)	P-value
		Positive	Negative			
Residence	Urban	21 (7.7%)	251 (97.8%)	4.9(1.15, 21.58)	7.6(1.36, 42.3)	0.021
	Rural	2 (1.7%)	119 (98.3%)	1	1	
History of multiple sexual partners	Yes	5 (11.6%)	38 (88.4%)	2.43 (0.85, 6.90)	1.9 (0.53, 11.15)	0.069
	No	18 (5.1%)	332 (94.9%)	1	1	
History of admission to health facilities	Yes	12 (12.4%)	85 (87.6%)	3.7 (1.56, 8.58)	1.1(0.30, 3.69)	0.918
	No	11 (3.7%)	285 (96.3%)	1	1	
Tattoo	Yes	12 (23.1%)	40 (76.9%)	9.0 (3.73, 21.73)	11.9(3.42, 41.39)	0.000
	No	11 (3.2%)	330 (96.8%)	1	1	
History of abortion	Yes	9 (14.1%)	55 (85.9%)	3.7 (1.52, 8.92)	4.8 (1.39, 16.23)	0.013
	No	14 (4.3%)	315 (95.7%)	1	1	
History of surgical procedure	Yes	6 (11.5%)	46 (88.5%)	2.5 (0.93, 6.62)	0.7 (0.17, 2.77)	0.599
	No	17 (5.0%)	324 (95.0%)	1	1	
History of dental procedure	Yes	8 (10.4%)	69 (89.6%)	2.3 (0.95, 5.71)	2.0 (0.52, 7.37)	0.298
	No	15 (3.9%)	301 (95.3%)	1	1	
History of drinking alcohol	Yes	10 (12.5%)	70 (87.5%)	3.3 (1.39, 7. 83)	1.3(0.40, 4.01)	0.689
	No	13 (4.2%)	300 (95.8%)	1	1	
Marital status	Unmarried	1 (0.3%)	25 (99.7%)	0.6(0.13, 1.07)	0.18 (0.07, 0.48)	0.001
	Married	22 (5.5%)	345 (94.5%)	1	1	

1= Reference category, COR = Crude Odds Ratio, AOR = Adjusted Odds ratio, CI = Confidence Interval.

Table 3: Bivariate and Multivariable Logistic Regression analysis for Factors Associated with Hepatitis B Virus Infection Among Pregnant Mothers Attending ANC Clinic in Wolaita Sodo University Comprehensive and Specialized Hospital, Southern-Ethiopia, 2024, (n = 393).

4. Discussion

This study aimed to fill a research gap in Ethiopia by assessing the sero-prevalence of HBV among pregnant mother attending ANC clinic. This study added a new variable; numbers of ANC contact/ visits were unfortunately the variable wa not associated with the HBV infection among pregnant mothers.

The result of this study showed that the prevalence of HBV among pregnant women attending ANC was 5.9%. According to WHO criteria which classify endemicity of HBV infection; low endemicity areas (less than 2% sero positive), intermediate endemicity area (2% to 7% sero positive) and high endemicity area (≥8% sero positive), the result showed intermediate endemicity area (5.9%) [13].

This finding is in line with different studies done in Debre Tabor General Hospital with a proportion of 5.3%, 5.4% in Bishoftu and 5.5% in Tigray, This might be due to the study design used, the sampling method, risky socio cultural and risky behavioral practice and methods used to screen HBsAg infection were the same [9,14,10].

But, the finding of this study is relatively low compared to the study conducted in 13.8% in Australia, 10.8% in Yemen, 9.7% in Cameroon, 11.8% in Uganda, 6.9% in Rwanda, 8% in Mali, 6.3% in Addis Ababa [15-20,11]. This could be due to the difference in timing, sample size and the use of standard procedures.

On other hand the finding of this study were higher compared to studies conducted previously in 2.26% in Bulgaria, 2.78% in Pakistan, 2.04% in India, 3.9% in Dares Salaam Tanzania, 4.2% in Lagos Nigeria, 3.8% in Bahir Dar, and 4.9% in Dessie, and 4.3% in Arba Minch [21-25,12,26,8]. These differences might be due to the methods used to screen highly sensitive and specific and due to differences in cultural and behavioral characteristics of the pregnant women.

The current study showed that those pregnant women lived in urban area has 7.6 times more prone to infected to HBV than those pregnant women living in rural area. The significant association of living in urban area with HBV infection was also documented by other investigators [26]. In contrast, some studies have shown that there was no significant association between living in urban area and sero-positivity of HBsAg among pregnant mothers [8,23,27]. Justification for the observed high prevalence of HBV positivity among urban pregnant mothers could be defined with the high probability of exposure for high risk health behavior.

The odd of having HBV infection is 11.9 times more likely among pregnant women who has tattoo than their counter part. This implies that tattooing, tattoo procedures are highly risky for HBV infection. This finding was in line with study conducted in among pregnant women attending antenatal care in Ambo Hospital [8,27]. The possible justification could be due to sharing of infected needles and materials during tattooing.

Those pregnant women who had history of Abortion is 4.8 times more likely to be infected than their counter parts. This finding was in line with study conducted among pregnant women attending antenatal care in Ambo Hospital and Arba Minch General Hospital In contrast this variable was no significant association with HBV infection in study conducted in Dire Dawa and Felegehiwot referral hospital, Northwest Ethiopia [27,28].

5. Conclusion

This study showed that sero-prevalence of HBV infection among pregnant women in Wolaita Sodo University Comprehensive and Specialized Hospital is intermediate endemicity. Abortion, marital status, tattooing, and residence are significantly associated with HBV infection among pregnant women.

Recommendations

The following recommendations are forwarded based on the findings of this study

To the Governmental, non-Governmental and other Stakeholders

• Intervention should be targeted on reduction of modifiable factors associated with HBV, such as: abortion and tattooing habits in the study area.

To Researchers

• Since higher prevalence of HBV is observed in pregnant mothers, we recommend further community-based study will be conducted to determine the prevalence of HBV among the general population in the study area.

• In this study private hospitals were not included and the result couldn‟t represent them. We recommend future researchers to include private hospitals to enhance the generalizability of the results in the study area.

Limitation

This study was the inability to use more sensitive diagnostic methods like polymerase chain reactions, which would have help detecting occult HBV infection.

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Data Availability

All relevant data are within the manuscript. Please contact Mr. Addisu Urmale to obtain access to the raw data analyzed. Email address addisuurmale7@gmail.com

Declarations

Ethical Approval and Consent to Participate

Ethical clearance was obtained from the Institution Review Board of Arba Minch College of Health Science, before conducting the study. Supportive letter from the department of Medical laboratory with reference number, AMHSC/01/18/394 and written permission was obtained from the Hospital before starting data collection. Written informed consent to the respondents was obtained from each participant before interview began. To keep the confidentiality of the study participant's information, personal identifiers was not be included in the data collection format and all recorded data were kept in a very secure area where only group members can access to it.

Clinical Trial Number

Not applicable.

Competing Interests

The authors have declared that no competing interests exist.

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