



**SERO-PREVALENCE OF HEPATITIS B SURFACE ANTIGEN
POSITIVITY AND ASSOCIATED RISK FACTORS AMONG PREGNANT
WOMEN ATTENDING ANC AT SAINT PAUL'S HOSPITAL
MILLENNIUM MEDICAL COLLEGE, ADDIS ABABA ETHIOPIA**

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ADDIS ABABA, ETHIOPIA

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SUMMARY

BACKGROUND: Hepatitis B virus belongs to the family of hepadna viruses, with double stranded Deoxyribonucleic Acid. Infections by hepatitis B virus (HBV) during pregnancy have high rate of vertical transmission and the predominant modes of transmissions are mother to child in high prevalence areas. Certain practices like acupuncture, tattooing, and body piercing have also been associated with transmission of hepatitis BV. HBV can be acquired as nosocomial infection via using unscreened blood and blood products, contaminated sharp needles and equipment and unsterilized surgical instruments. Center for disease control and prevention, recommended testing of all pregnant women born in areas where the prevalence of HBsAg is $\geq 2\%$. This study is aimed to determine the sero-prevalence of Hepatitis B surface antigen positivity and associated risk factors in pregnant mothers who are attending ANC care at Saint Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

Methods: A cross-sectional study and a simple random sampling method was used to determine the sero-prevalence of HBsAg positivity and associated risk factors among 201 pregnant mothers who were seen at SPHMMC ANC clinic from 1st November 2018 to 30th January 2019. A pre-structured questionnaire was used to collect socio-demographic data and associated risk factors. Obtained data were evaluated by frequency, logistic regression analyses, and a significance level of 5 % ($\alpha = 0.05$) was established

Results: The overall seroprevalence of HBsAg in this study was 4.5%. HBsAg seroprevalence was significantly higher among patients who had history of unsafe abortion (OR 7.8; 95% CI,P=0.001) and among HIV positives (OR 6.1;95% CI,P=0.012)

Conclusion and recommendation: This study showed high prevalence of HBsAg Seroprevalence among pregnant women. History of unsafe abortion and being HIV positive were found to be significant predictor of prevalence of HBsAg positivity. Increasing awareness on unsafe abortion as a risk factor of HBV and Universal screening of pregnant women for hepatitis B viruses is recommend

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ABBREVIATIONS

ACOG	---American College of Obstetricians and Gynecologists
ANC	-----Antenatal care
CDC	-----Center for disease control & prevention
CI	-----Confidence Interval
CBE	-----Community Based Education
DCT	-----Data Collecting Team
DNA	-----Deoxyribonucleic Acid
EIA	Enzyme immuno assays
EDHS	-----Ethiopian demographic health survey
EGOPD	Emergency Gynecology and obstetrics Out Patient Department
HBcAg	-----Hepatitis B core antigen
HBeAg	-----Hepatitis B e antigen
HBIG	-----Hepatitis B immunoglobulin
HBsAg	-----Hepatitis B surface antigen
HBV	-----Hepatitis B virus
HCC	-----Hepatocellular carcinoma
IgG	Immunoglobulin G
IgM	Immunoglobulin M
LNMP	-----Last Normal Menstrual Period
NIH	-----National Institute of Health
MDG	-----Millennium Development Goals
OR	-----Odds Ratio
PI	-----Principal Investigator
RIA	Radio immuno assays
RR	-----Risk Ratio
SD	-----Standard Deviation
SPHMMC	Saint paul hospital millennium medical college
SPSS	-----Statistical Package of Social Sciences
WHO	-----World Health Organization

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CHAPTER ONE: INTRODUCTION

1.1 Background

HBV is a double-stranded DNA virus of the Hepadnaviridae family. Hepatitis B virus contains three principal antigens. Hepatitis B surface antigen (HBsAg) is present on the surface of the virus and also circulates freely in the serum in spherical and filamentous forms. The middle portion contains hepatitis B core antigen (HBcAg). The core antigen is present only in hepatocytes and does not circulate in the serum. Hepatitis B e antigen (HBeAg) is encoded by the same portion of the viral genome that codes for the core antigen. The presence of HBeAg indicates an extremely high viral inoculum and active virus replication (1, 2, 3).

HBV is found world wide and the prevalence of chronic HBV infection is categorized as high ($\geq 8\%$), intermediate (2–7%), and low ($< 2\%$) prevalence area with predominant mode of transmission being sexual, percutaneous and mother to child in low, intermediate and high prevalence areas respectively. Certain practices like acupuncture, tattooing, and body piercing have also been associated with transmission of Hepatitis B Virus. HBV can be acquired as nosocomial infection via using unscreened blood and blood products, contaminated sharp needles and equipment and unsterilized surgical instruments (3).

Prevention of perinatal transmission is an important component of global efforts to reduce the burden of chronic HBV since vertical transmission is responsible for approximately one half of chronic infection worldwide. The high protective efficacy (95%) of neonatal vaccination suggests that most infections occur predominantly at or before birth and only 3.7% of babies tested positive for HBsAg at birth were from in utero infection. The infection rate among infants born to HBeAg positive mothers is as high as 90% and in all HBsAg positive mothers to be 40-50% (3, 4, 5, 6).

The first serological marker to be detected is the HBsAg, often preceding the increase in aminotransferase levels. As HBsAg disappears, antibodies to the surface antigen develop (anti-HBs), marking complete resolution of disease. Hepatitis B core antigen is an intracellular antigen and not detectable in serum. However, anti-HBc is detectable within weeks of HBsAg appearance. The HBeAg is present during times of high viral replication and often correlates with detectable HBV DNA. The proportion of patients progressing to chronic infection is much higher in neonates (up to 90%) compared with 5-10% in adults and 50% in young children. In

the acute stage of hepatitis B virus infection, the diagnosis is confirmed by the identification of the surface antigen and the IgM antibody to the core antigen. The presence of HBeAg is indicative of an exceptionally high viral inoculum and active virus replication, and implies a high degree of infectivity. Chronic hepatitis B virus infection is characterized by the persistence of the HBsAg in the liver and serum. The time of infection can be evaluated by measuring IgG and IgM antibodies to HBcAg. Typically, the IgG to HBcAg appears 6 months or more after infection, with the IgM moiety being predominant prior to that time (7, 8).

CDC and ACOG recommend testing of all pregnant women's. Testing for HBsAg should be performed on all women's at the first prenatal visit and repeated late in pregnancy in those at high risk for HBV infection (9, 10).

1.2 Statement of the Problem

Timely screening for HBV in all pregnant women is of paramount importance in obstetric practice but in Ethiopia, only 62% and 32% of pregnant mothers had at least once and four or more ANC visits for their most recent live birth respectively (15). Only about 3.7% of fetuses acquire HBV transplacentally. Treatment of HBV during pregnancy with anti retroviral drugs are not recommended as a universal option of treatment and most of infection acquired during labor and postpartum. The main goal of screening pregnant women for HBsAg is to prevent perinatal transmission. The high rate of transmission which is as high as 90% in those exposed at birth can be reduced by hepatitis B vaccination and HBIG prophylaxis which significantly reduce mother to child transmission to as low as 5-10%. Although several serologic diagnostic methods are available for HBV infection, HBsAg is the serologic hallmark of HBV infection. It can be detected by radioimmunoassays (RIA) or enzyme immunoassays (EIA)(16,17). The overall risk of perinatal transmission in all HBsAg positive mothers to be 40-50% and perinatal transmission rate among infants born to HBeAg positive mother is as high as 90% . Maternal infant transmission may occur in utero, at the time of birth, or after birth but most infections occur predominantly at or before birth which is evidenced by high protective efficacy (95%) of neonatal vaccination. Acute viral hepatitis ends up with increased incidence of low birth weight and prematurity. The risk of developing chronic HBV infection is inversely proportional to the age at time of exposure. The risk is as high as 90% in those exposed at birth, while the risk is 50% in those exposed during childhood. Maternal screening programs and universal vaccination have significantly reduced transmission rates. Identification of at risk mothers permits

prophylaxis against transmission, which can reduce transmission rates from 90% to as low as 5-10%. The sequelae of chronic HBV infection vary from an inactive carrier state to the development of cirrhosis, hepatic decompensation, hepatocellular carcinoma (HCC), extrahepatic manifestations such as polyarthritis nodosa and glomerular disease and maternal death which is about 1% (11-13).

One of Millennium Development Goals (MDGs) was decreasing maternal death and neonatal mortality and morbidity, in Ethiopian, additional investigation such as HBsAg will be recommended when available and affordable and MOH management protocol mentioned HBsAg screening as basic investigation (13,14).

1.3 Significance of the study

The prevalence of HBV infection among antenatal population may give some indication on prevalence in the general population. Hence, screening antenatal women for HBsAg can give clue to estimate prevalence of the disease in a population and provide an avenue for preventing mother to child transmission of the virus.

screening of all pregnant mothers is critical and If we screen, knowing the burden of the problem is vital for its value for policy makers and it should continuously be updated.

In Ethiopia there are only few studies on the prevalence of HBV during pregnancy and associated factors

From this study we will have an updated data on the prevalence of HBsAg positivity among pregnant mothers attending ANC at SPHMMC, Addis Ababa and try to identify associated factors. we will try to look also for strategies to decrease vertical transmission

And the results of these study will be another valuable reference on seroprevalence and associated risk factors of HBV in pregnancy not only for our country but also for other low income countries world wide.

It also opens door for further research to be done on such kinds of women in the future.

CHAPTER TWO

Literature Review

2.1 Seroprevalence of HBsAg in pregnancy

Overall, approximately 45% of the global populations live in areas of high chronic HBV prevalence and lifetime risk of infection >60%. The prevalence of hepatitis B in pregnant women varies widely, averaging around 10% (16,17).

North America, southern Europe and the Oceania region are areas with low prevalence approximately 0.1% of the population. Australia and New Zealand are low prevalence areas for viral hepatitis; but, particularly with inward migration from high prevalence regions, a significant number of women with viral hepatitis in pregnancy are likely to be encountered in clinical practice. In North America, hospital based retrospective research done on seroprevalence of HBsAg in pregnant mother showed 0.9% (16,17,18). In Kingdom of Saudi Arabia, Jazan general Hospital and randomly selected primary health care centers in Jazan region, a cross-sectional survey at ANC was done with serologic markers by using HBsAg Rapid Test Device (ACON), prevalence of HBV infection in pregnant ladies was 4.1%. As the finding in Jazan general hospital; found in intermediate range they recommended universal screening of pregnant mother for HBsAg during pregnancy (19, 20, 21).

In Africa there are multiple studies on the prevalence of HBsAg during pregnancy . The main method used for the diagnosis of HBsAg in the pregnant mothers is ELISA. The prevalence of HBsAg during pregnancy in Africa ranges from 6.4% to 25%. Study done in Ekiti State University Teaching Hospital, Southwest Nigeria showed a seroprevalence of HBsAg in pregnant women attending ANC was 3.9% (22). In Koutiala, Mali, pregnant women attending a non-governmental hospital screened for HBV and the seroprevalence of HBsAg was 8.0% (23). In Tanzania, Muhimbili National Hospital, 3.9% of the pregnant women had positive HBsAg test results (24). Some of the literature review in Africa, on prevalence of HBV in pregnancy was summarized in table 2.1 below (22-26) .

S. N°	Author Year	Country	Study design	Setting sampling frame	Sample size	Prevalence HBsAg
1	Madzime 1997	Zimbabwe	C S	Hospital	984	25%
2	Nacro 2000	Burkina Faso	C S	Hospital	917	10.7%
3	Rouet 2004	Ivory Coast	C S	Hospital	1002	9%
4	Sidibe 2001	Mali	C S	Hospital	829	15.5%
5	Ahmed 1995	Malawi	C S	Hospital	253	13%
6	Oshitani 1995	Zambia	C S	Hospital	2098	6.5%
7	Itoua 1995	Congo brazza	C S	Hospital	292	6.5%
8	Ndumbe 1992	Cameroon	C S	Hospital	1014	25%
9	Acquaye 1994	Ghana	C S	Hospital	692	6.4%
10	Marinier 1985	Senegal	C S	Hospital	1442	9.8%

Table 2.1. Prevalence rates of HBsAg in pregnant women in Africa

In Ethiopian setting there are different literature on seroprevalence of HBsAg which is done at ANC clinic of different Hospitals of different region of the country. In Debra-Tabor Hospital, North west Ethiopia, a cross sectional study was done on 209 pregnant mothers at ANC clinic follow up and all pregnant mothers in the first, second and third trimester involved in the research, by using ELISA, based on one step "sandwich method using a commercial kit and the seroprevalence of HBsAg in pregnant mothers were found to be 5.3% (27). Another study at

Dessie Referral Hospital ANC clinic which is cross sectional study and rapid test kits to test for HBsAg on 385 pregnant mothers and seroprevalence of HBsAg were found to be 4.9% (28). A study done in Arba Minch Hospital, South Ethiopia, on 232 pregnant mothers at ANC clinic with cross sectional study and using ELISA test kit to test for HBsAg, the sero prevalence of HBsAg of pregnant mothers of this hospital was 4.3% (29). A research done in Addis Ababa, in 3 teaching Hospitals on 530 pregnant mothers at ANC clinic by using a cross sectional study and ELISA to test for HBsAg, the seroprevalence of HBsAg in these pregnant mothers were found to be 4.5% (30, 31). A study done in Jimma, Southwest Ethiopia, in Jimma University Specialized Hospital now JUMC and its four training health centers which is a cross sectional study on 493 pregnant mothers at ANC clinic by using Bioline Strip, which is a qualitative, solid phase two site sandwich immunoassay (Pacific Biotech, Thailand) to test for the presence of HBsAg, the seroprevalence at Jimma University Specialized Hospital was 6.4% (32). Last year in the same place, JUSH, study done on 281 mothers who gave birth during the study period and the prevalence of seropositivity for HBsAg was 9.6% (34).

2.1.2 Associated factors for HBsAg positivity in pregnancy

The predominant mode of transmission of HBV varies in different geographical areas. Some of risk factors for transmission include: Maternal infant transmission, Paternal transmission, Transfusion, Sexual transmission, Percutaneous inoculation including-sharing syringes and needles, sharing of razors or tooth brushes, tattooing, body piercing and nosocomial infections (1-6, 8, 9).

There are many literature throughout the world and in Ethiopia setting on associated risk factors with hepatitis B virus during pregnancy. One of the research done in Jazan Region- Kingdom of Saudi Arabia, showed hospitalization and history of jaundice had significant association with seropositivity during pregnancy, but according to this research there is no significant association with seropositivity and dental procedure, blood transfusion and surgical procedure (20, 21).

A study for associated Risk factors for HBV on 385 Pregnant Women Attending Antenatal care Clinic at Dessie Referral Hospital showed history of abortion, multiple sexual practice, nose piercing and history of home delivery by traditional birth attendants had statistically significant association with the HBsAg seropositivity. On the other hand, there was no statistically significant association between age, residence, marital status, occupational status, ear piercing,

history of surgical procedures, history of blood transfusion and parity status with that of HBV infection among these pregnant women (27). A facility based cross-sectional study done in Debra Tabor Hospital, North west Ethiopia, on 209 pregnant mother at ANC clinic showed history of using sharp materials and tattoo for cosmetics had statistically significant association with the HBsAg seropositivity. Other risk factors included in the study such as socio demographic data, blood transfusion and history of multiple sexual practices had no statistically significant association (28). A research done in Arba Minch Hospital, South Ethiopia, on 232 pregnant mother at ANC clinic for predictors of HBV infection by facility based cross-sectional study showed having history of abortion and multiple sexual partners had statistically significant association with the HBsAg sero positivity (31). Study done in Jimma, Southwest Ethiopia, in Jimma University Specialized hospital and its four training health centers; which is a cross sectional study on 493 pregnant mother at ANC clinic to know associated risk factors for HBV among pregnant women in Jimma showed statistically significant association with the HBsAg seropositivity only for abortion but risk factors, including blood transfusion, surgery, liver disease, dental and surgical procedures, and tattooing were not associated with HBV infection in this study. But when pregnant women of Jimma town were separately analyzed, those with history of cesarean section, dental procedure and tattooing had association with HBV infection (32). Moreover, study on laboring mothers at JUSH L/W on 2017 GC, from the socio-demographic risk factors for HBsAg only monthly income less than 500 birr was statistically significant ($p=0.03$) and from other risk factors for HBsAg only unsafe abortion was statistically significantly (0.001 , $OR=5.45$, $CI=2.6-11.3$) associated with HBsAg seropositivity; of which pregnant mothers included in the research 14 (5%) had previous history of unsafe abortion out of which 6 (2.1%) Seropositive for HBsAg. Moreover, none of the socio-demographic, medical, surgical and obstetrics potential risk factors under this study was statistically significantly associated with HBsAg seropositivity(34)

Generally, throughout my literature search, sub-Saharan Africa is in high prevalence areas for HBV. Even if, published information's on the sero epidemiology of HBV infection among pregnant women in Ethiopia are sparse, average seroprevalence during pregnancy in Ethiopia were range from 2-6%. All of the researches recommend a routine pregnant women screening for hepatitis B virus. With my literature review for associated risk factors for seroprevalence of HBV in pregnant mothers most of the study showed statistically significant association of

HBsAg seropositivity with history of abortion and multiple sexual partners, but none of study's identify type of abortion as safe and unsafe abortion. On the other hand, there was no similar report on , ear piercing, history of home delivery by traditional birth attendants, history of surgical procedures, history of blood transfusion, dental procedure and tattooing with HBsAg seropositivity. But none of the study's in Ethiopia showed statistically significant association of HBsAg seropositivity with age, residence, marital status, occupational status, income and parity.

2.2 Conceptual frame work

The concepts in this conceptual frame work are developed after review of different literatures, standard books, and protocols and organized according to the major categories, in areas where the gaps point outed while review of literatures

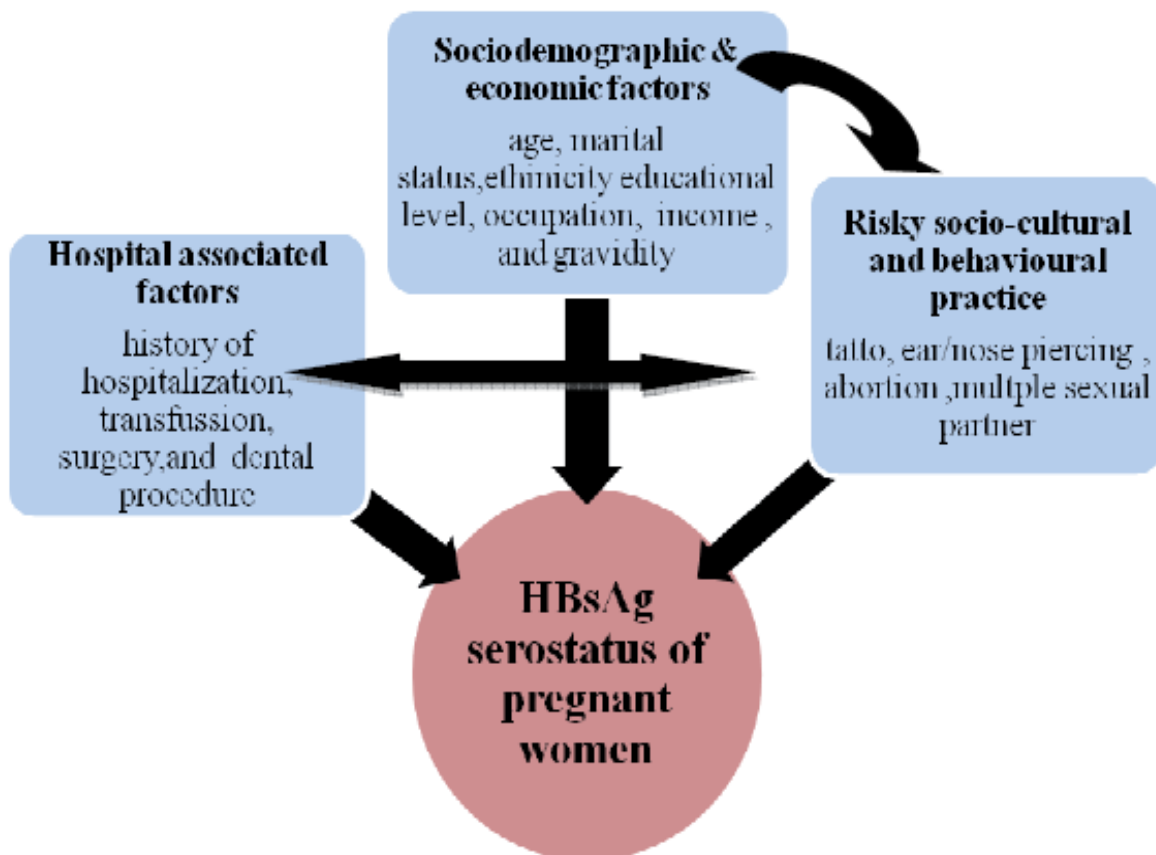


Fig. 2.1: Conceptual frame work showing the relationship between the dependent variable and independent variables (*designed following review of literatures*)

CHAPTER THREE: OBJECTIVES

3.1 General Objective

3.1.1. To determine the seroprevalence of HBsAg positivity and to identify associated factors among pregnant women attending ANC follow up at SPHMMC, Addis Ababa, Ethiopia by 2018/19

3.2 Specific Objectives

3.2.1 To determine seroprevalence of HBsAg positivity in pregnant women

3.2.2 To determine associated factors with seropositivity of HBsAg

CHAPTER FOUR: METHODOLOGY

4.1 Study Area and Period

The study was conducted at SPHMMC ANC clinic from 1st November 2018 to 30th January 2019. SPHMMC is one of the tertiary referral hospitals directly under the federal ministry of health. It is also a teaching hospital for the Millennium Medical College with high number of deliveries per month with patients coming from all over the country and all over the city. It is the largest hospital in the country with multiple specialties and departments working together for the best advantage of the patients. It gives service to 200,000 people annually who are referred from all corners of the country

Department of Obstetrics and Gynecology has wards and opds: Gynecology, Maternity ,procedure room, Emergency OPD, one MCH clinic, one Gynecologic OPD, one Family planning clinic and referral clinics.

On average 116 mothers visit ANC clinic for routine check up daily. There are around 26 deliveries daily and 780 monthly on average.

4.2 Study Design

A cross sectional study design was used

4.3 Population

4.3.1 Source population

All pregnant women attending ANC at SPHMMC

4.3.2. Study population

The study population were those mothers attending ANC clinic of SPHMMC who fulfilled the eligibility criteria

4.3.3 Inclusion and exclusion criteria

Inclusion criteria:

All Pregnant mothers who come to SPHMMC ANC clinic for follow up and screened for HBsAg

Exclusion criteria:

Pregnant women attending ANC but not screened for HBsAg, unwilling to participate in the study and severely ill

4.4 Sample size determination

4.4.1 Sample size

Sample size was calculated with Single proportion formula and is based on 4.5% prevalence of HBsAg during pregnancy from studies at Addis Ababa, with 3% error of margin and 10% non response rate (15).

$$n = \frac{\left(Z_{1-\alpha/2} \right)^2 P (1 - P)}{d^2}$$

$$n = \frac{(1.96)^2 \times (0.045 \times 0.955)}{0.0009} = \frac{3.8416 \times (0.042975)}{0.0009} = 183$$

10% - non-response rate added(18)=201

Where n = sample size

P= 0.045 (6) d = 0.03(3% error of margin)

$Z_{1-\alpha/2} = 1.96$ (standard normal probability for 95% CI).

4.4.2 Sampling Technique

A simple random sampling method will be used. On average, 116 pregnant women per day are seen at ANC clinic for routine check- up. It is functional for 22 working days. Considering three months study period, 7656 pregnant women were expected to be seen during the study period. Hence, the sampling interval was found to be thirty eight. Of the first thirty eight subjects, one

woman was randomly selected by lottery method, which was found to be the ninth mother and then every 38th woman was selected to participate in the study. If she was not screened, the next mother was being selected.

After informed and written consent obtained, information concerning sociodemographic and possible risk factors was collected through face to face interview using a pre-tested questionnaire

4.5 Variables

4.5.1 Independent Variables

4.5.1.1 Maternal socio-demographic factors

Previous admission

4.5.1.2 Obstetric factors

Caesarean section and home delivery

4.5.1.3 Gynecologic, and surgical history

Abortion, multiple sexual partner, dental procedure, tattooing and Ear or Nose piercing

4.5.2 Dependent Variables

HBsAg Serostatus

4.6 Operational Definitions

Tattooing: Is the process of injection of pigments in to dermal layer of skin by puncturing the skin.

Dental procedure: Procedure of removing teeth for medical indication or replacing teeth for ornament purpose

Ear or Nose Piercing: Is process of cutting through ear for the purpose of beauty.

Multiple sexual partner: Having more than one partner currently or previously.

Associated factors of HBsAg seropositivity: are factors positively associated with the risk of developing HBsAg; includes, history of previous admission to Hospital, history of home delivery, caesarean section, history of abortion, history of multiple sexual partner, history tattooing, history of Ear or Nose piercing and dental procedures.

4.7 Data Collection

4.7.1 Data collection tool

The demographic characteristics and associated factors of interest was recorded in customized data extraction proforma designed for the study, which was developed from WHO pre-existing tools.

4.7.2 Data collection technique

It was by record review and face-to-face interview. For this Three Bsc nurses were trained for half a day on the questionnaire and the proceedings. After the quality and simplicity of the questionnaire was assured, the data collectors were given the questionnaire. The data collectors collected the data in the waiting area before the mothers contact with their service provider after confirming presence of test result for HBsAg from her chart. The data collectors introduced themselves and explained to patients the objective of the study stressing on the benefits of being tested for HBsAg during pregnancy and what will be done if the mother is Seropositive. The data collectors also explained to the patients that no names will be written on the questionnaire and confidentiality will be kept .Once the pregnant woman agreed to participate in the study, data were filled in the questionnaire starting from identification of the woman but not her names and continued by stating her past obstetrics history and risk factors for HBV. After this, the data collectors have been revising the patients' card for the socio demography of the patient.

4.8 Data Quality Control

A 10% of the data was checked for accuracy and completeness. Regular supervision by the principal data collector was made whenever the Bsc nurses had any queries.

4.9 Data Processing and Analysis

After checking for completeness and consistency of the collected information, all data was summarized, coded and was fed to computer to make ready for analysis. After the data was entered into EPI-info software, it was exported to excel sheet and finally to SPSS. Then, the data was analyzed using statistical package for social scientists (SPSS) version 20 software. Descriptive statistics was performed to describe demographic profile of the study participants and seroprevalence of HBsAg. The presence of any association between socio-demographic

characteristics and exposure to risk factors was determined. For these variables, potential confounders were controlled by running a binary logistic regression model. Mean differences and tests of association had a 95% Confidence Intervals as an indicator of statistical significance and precision. A P value ≤ 0.05 was be a cut point to determine the statistical significance of the tests. Values less than or equal to 0.05 were considered statistically significant.

4.10 Ethical Consideration

Ethical clearance was obtained from SPHMMC Research and Graduate studies coordinating office and then an official letter was obtained from the same office and submitted to the responsible clinic where the study is going to be conducted. Verbal and written consent was obtained from respondents and data was collected confidentially. No name was written on the questionnaire.

4.11 Limitations

A small sample size and study period was limited to 3months. It is also limited only to those who are already screened and at different institutions.

4.12 Dissemination Plan

The final results of this study will be submitted to advisors, SPHMMC research and graduate studies coordinating office, CBE coordinating office. A valuable recommendation was made based on the result obtained at the end of the study and is going to be implemented during the clinical practice in these segments of the population throughout the country.

CHAPTER FIVE: RESULTS

5.1 Socio-demographic Characteristics.

A total of 201 pregnant Women who were seen at SPHMMC ANC clinic from 1st November 2018 to 30th January 2019 were included in the study. The mean age of the participants was 28 years, the minimum age was 18 years and the maximum age was 42 years. Most of the study participants were in the age range of 25–29 years and standard deviation (SD) was 4.56. Higher proportions of the subjects were Amhara, married, Orthodox and from Addis Ababa town. Majority of the participants were housewives and had studied up to primary level of education.

Table 5.1: Socio-demographic characteristics and seroprevalence of HBsAg positivity among pregnant women attending ANC at SPHMMC, from 1st November 2018 to 30th January 2019.

Socio-demographic characteristics	Count N(%)	HBsAg +ve N(%)
Age		
15-19	3(1.5%)	0
20-24	40(19.9%)	2(1.0%)
25-29	87(43.3%)	4(2.0%)
30-34	50(24.9%)	0
35-39	18(9.0%)	3(1.5%)
>39	3(1.5%)	0
total	201(100%)	9(4.5%)
Residence		
AA	135(67.2%)	6(3.0%)
Out of AA	66(32.8%)	3(1.5%)
Total	201(100%)	9(4.5%)
Orthodox	110(54.7%)	5(2.5%)

Muslim	64(31.8%)	3(1.5%)
Protestant	27(13.4%)	1(.5%)
Total	201(100%)	9(4.5%)
Ethnicity		
Oromo	58(28.9%)	1(.5%)
Amhara	78(38.8%)	4(2.0%)
Gurage	61(30.3%)	3(1.5%)
Tigre	3(1.5%)	1(.5%)
Others	1(.5%)	0
Total	201(100%)	9(4.5%)
Marital status		
Single	0	0
Married	197(98%)	9(4.5%)
Divorced	2(1.0%)	0
Widowed	0	0
Others	2(1.0%)	0
Total	201(100%)	9(4.5%)
Education		
Can't read and write	24(11.9%)	3(1.5%)
Primary	72(35.8%)	1(.5%)
Secondary	48(23.9%)	4(2%)
10+	26(12.9%)	0
College and above	31(15.4%)	1(.5%)
Total	201(100%)	9(4.5%)
Occupation		
Farmer	1(.5%)	0

House wife	131(65.1%)	5(2.5%)
Government employee	30(14.9%)	0
Student	1(.5%)	0
Merchant	14(7.0%)	1(.5%)
Daily laborer	13(6.5%)	2(1.0%)
No job	1(.5%)	0
others	10(5.0%)	1(.5%)
Total	201(100%)	9(4.5%)
Income		
<1000	5(2.5%)	1(.5%)
1000-3000	83(41.3%)	5(2.5%)
>3000	113(56.2%)	3(1.5%)
Total	201(100%)	9(4.5%)

5.2. Sero prevalence and Associated Factors of HBV Infection.

Of 201 pregnant women studied, 9(4.5%) were found to be seropositive, giving the overall seroprevalence of 4.5%. Pregnant women of age group of 20–24 years comprised 40(19.9%) of the total study participants, of which 2 (1.0%) were seropositive and age group of 25–29 years comprised 87 (43.3%) of the total study participants and 4(2.0%) were seropositive for HBsAg. HBsAg seropositivity was observed to be higher in 3rd TMS of pregnancy and lowest seropositivity observed in 1st TMR of pregnancies (Table 5.1).

Moreover, from the socio-demographic risk factors for HBsAg positivity, none were statistically significant but from other risk factors for HBsAg unsafe abortion, HIV positivity and ear/nose piercing were statistically significantly (0.001, OR=5.45, CI=2.6-11.3) associated with HBsAg seropositivity; of which pregnant mothers included in the research 12 (6%) had previous history of unsafe abortion out of which 3(1.5%) were seropositive for HBsAg (Table5.2). Moreover, none of the socio-demographic, medical, surgical and obstetrics potential risk factors under this

study other than mentioned above were statistically significantly associated with HBsAg seropositivity (Table 5.1, Table 5.2).

Table 5.2 Obstetric and gynecologic history and associated risk factors for HBsAg positivity and sero-prevalence of HBsAg positivity among pregnant women attending antenatal clinic of SPHMMC, AA, 2018/19(n=201).

Gravidity	Count N(%)	HBsAg +ve N(%)
1	45(22.4%)	3(1.5%)
2	64(31.8%)	2(1%)
3	49(24.4%)	1(.5%)
4	25(12.4%)	2(1%)
≥5	18(8.9%)	1(.5%)
Total	201(100%)	9(4.5%)
Parity		
0	60(29.9%)	4(2%)
1	76(37.8%)	2(1.0%)
2	39(19.3%)	2(1.0%)
3	18(9.0%)	0
4	4(2.0%)	1(.5%)
≥5	4(2.0%)	0
Total	201(100%)	9(4.5%)
Abortion		
0	141(70.1%)	5(2.5%)
1	48(23.1%)	4(2.0%)
2	9(4.5%)	0
≥3	3(1.5%)	0

Total	201(100%)	9(4.5%)
Type of abortion		
No abortion	141(70.1%)	5(2.5%)
Safe	48(23.9%)	1(.5%)
Unsafe	12(6.0%)	3(1.5%)
Total	201(100%)	9(4.5%)
Gestational age		
<14wks	6(3.0%)	0
14-28	39(19.4%)	3(1.5%)
>28	156(77.6)	6(3%)
Total	201(100%)	9(4.5%)
PICT		
Not done	1(.5%)	0
NR	191(95.0%)	7(3.5%)
R	9(4.5%)	2(1.0%)
Total	201(100%)	9(4.5%)
Number of lifetime sexual partner		
1	194(96.5%)	9(4.5%)
>=2	7(3.5%)	0
Total	201(100%)	9(4.5%)
Previous place of delivery		
Didn't delivered	60(29.9%)	4(2.0%)
Health facility	129(64.1%)	4(2.0%)
Home delivery	10(5.0%)	1(.5%)
Both home & health facility	2(1.0%)	0
Total	201(100%)	9(4.5%)

Previous mode of delivery		
Didn't delivered	60(29.9%)	4(2.0%)
VD	72(35.8%)	4(2.0%)
C/S	48(23.9%)	0
Both c/s and vd	21(10.4%)	1(.5%)
Total	201(100%)	9(4.5%)
Previous admission to hospital		
Yes	49(24.4%)	1(.5%)
No	152(75.6%)	8(4.0%)
Total	201(100%)	9(4.5%)
History of Ear or Nose piercing		
Yes	193(96.0%)	7(3.5%)
No	8(4%)	2(1.0%)
Total	201(100%)	9(4.5%)
Dental procedure		
Yes	54(26.9%)	2(1.0%)
No	147(73.1%)	7(3.5%)
Total	201(100%)	9(4.5%)
Tattooing		
Yes	29(14.4%)	2(1.0%)
No	172(85.6%)	7(3.5%)
Total	201(100%)	9(4.5%)
History of blood transfusion		
Yes	7(3.5%)	0
No	194(96.5%)	9(4.5%)
Total	201(100%)	9(4.5%)

Table 5.3 Association of selected explanatory variables and HBV infection among pregnant mothers in SPHMMC, Addis Ababa, 2018/19, n=201.

Risk factors	HBsAg +ve N(%)	HBsAg-ve N (%)	RR(OR)	CI (95%)	P-V
Parity					
Multiparity	4(44.4%)	136(70.9%)	0.35	0.09-1.25	0.106
Null parity	5(55.6%)	56(29.1%)			
Abortion					
Unsafe abortion	3(33.3%)	9(4.7%)	7.87	2.24-27.68	0.001
No abortion	6(66.7%)	183(95.3%)			
HIV +ve					
yes	2(22.2%)	7(3.6%)	6.1	1.47-25.27	0.012
No	7(77.8%)	185(96.4%)			
Multiple sexual partner					
Yes	0	7(3.6%)	1.28	0.08-20.26	0.864
No	9(100%)	185(96.4%)			
Admission to hospital					
Yes	1(11.1%)	48(25.0%)	0.39	0.05-3.02	0.372
No	8(88.9%)	144(75.0%)			
Dental procedure					
Yes	2(22.2%)	52(27.1%)	0.78	0.17-3.63	0.778
No	7(77.8%)	140(72.9%)			
Tattooing					
Yes	2(22.2%)	27(14.1%)	1.67	0.37-7.76	0.497
No	7(77.8%)	165(85.9%)			
Blood transfusion					
Yes	0	7(3.6%)	1.28	0.08-20.16	0.859
No	9(100%)	185(96.4%)			

CHAPTER SIX: DISCUSSION

Overall, approximately 45% of the global populations live in areas of high chronic HBV prevalence and lifetime risk of infection >60% (1-7). The prevalence of hepatitis B in pregnant women varies widely; averaging around 10% [8, 9]. North America, southern Europe and the Oceania region are areas with low prevalence (approximately 0.1% of the population). In North America, Hospital based retrospective research was done on seroprevalence of HBsAg in pregnant mother was 0.9% [10, 11].

The prevalence of HBsAg during pregnancy in Africa ranges from 6.4%-25%. Generally; most of literature reviews in Africa, on seroprevalence of HBsAg were done at ante-natal clinics with seroprevalence in high risk and intermediate prevalence area [22-26]. In Ethiopian setting there are different literatures on seroprevalence of HBsAg which was done at ANC clinics of different hospitals of different regions of the country [27-32].

The seroprevalence of HBsAg among pregnant women attending ANC at SPHMMC was 4.5%. According to WHO classification, this prevalence of HBsAg was categorized as intermediate (2-8%). This prevalence of HBsAg among pregnant women's attending ANC care of SPHMMC was comparable to most studies conducted in Ethiopian hospitals at ANC clinics; Addis Ababa BLH 4.5%, Debre Tabor Hospital 5.3%, in Dessie Hospital 4.9%, in Arba Minch General Hospital 4.3%, and in Jimma hospital 6.4% (27, 28, 29, 32). But higher to our study, prevalence was reported in Zimbabwe 25%, Burkina Faso 10.7%, Mali 15.5%, Cameroon 25% and in Malawi 13% (22,23, 24, 25, 26, 30).

When age specific prevalence is considered, age group 25-29yrs have a higher prevalence of 2.0% with proportion of 44 % and the lowest prevalence was in age group of 15-19,30-34 & in those who are above 39 yrs with no pregnant mother found to be seropositive for HBsAg. In agreement with other studies HBsAg seropositivity was not significantly different by age as most seropositive pregnant mothers found in age less than 30yrs except study in Jimma hospital which shows highest prevalence in the age group of >40 but statistically it is not significant (32).

The socio-demographic status of the study population shows that a high proportion of HBsAg positivity was among those with secondary education (44.4%) and those whose income was between 1000-3000 Birr/month (55.5%). However, the overall prevalence of HBsAg among secondary education ($p > 0.05$) when compared with other educational status. The seroprevalence

of HBsAg in relation to monthly income; also has no statistically significant association with those getting 1000-3000birr/month ($p=0.07$)

The predominant mode of transmission of HBV varies in different geographical areas. Some of risk factors for transmission include: Maternal-infant transmission, paternal transmission, transfusion, sexual transmission, percutaneous inoculation including-sharing syringes and needles, sharing of razors or tooth brushes, tattooing, body piercing and nosocomial infections.

There are many literatures throughout the world and in Ethiopia setting on associated risk factors with hepatitis B virus during pregnancy. One of the researches done in Saudi Arabia, showed hospitalization and history of jaundice had significant association with seropositivity during pregnancy (20). A facility based cross-sectional study done in Debra-Tabor Hospital, on 209 pregnant mothers at ANC clinic showed history of use of sharp materials and tattoo for cosmetics had statistically significant association with the HBsAg seropositivity (27). A study at Dessie Referral Hospital showed history of abortion, multiple sexual practice, nose piercing and history of home delivery by traditional birth attendants had statistically significant association with the HBsAg seropositivity (28). A research done in Arba Minch Hospital showed history of abortion and multiple sexual partners had statistically significant association with the HBsAg seropositivity (29). One of the study done in Jimma hospital, showed history of caesarian section, dental procedure and tattooing had association with HBV infection (32). But according to this research which is done also at ANC clinic; having previous history of unsafe abortion (OR 7.8;95% CI 2.24-27.68, $P=0.001$) and being HIV positive (OR= 6.1,95% CI 1.47-25.27, $P=0.012$) had statistically significant association with HBsAg seropositivity and pregnant mothers with history of unsafe abortions are 7.8 times more likely to have HBsAg seropositivity than those with no history of abortion (Table 5.2). In agreement with other studies, there was statistical significant association with HBsAg seropositivity and abortion but there is different report for other risk factors.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATION

In conclusion, as in developing countries including Ethiopia where there is limited access to medical care and low percentage of ANC follow up, for which most of previous studies done on seroprevalence of HBsAg were at ANC clinic of some hospitals and health center with most research outcome being in intermediate range of HBsAg seroprevalence. In this research also, the prevalence of HBsAg among pregnant mothers attending ANC care at SPHMMC was in an intermediate risk area of HBsAg seroprevalence. Moreover, being HIV positive and having unsafe abortion may play significant role in the acquisition of the virus from infected person to healthy women of childbearing age as it was statistically significantly associated with HBsAg seroprevalence. Therefore, screening of all pregnant women for HBV infection should be part of the routine investigation for pregnant mothers at ANC clinic and preparations should be made for “at birth dose” vaccination and HBIG administration to new born babies of mothers found to be HBsAg positive. In addition, awareness on mode of transmission of HBsAg and availability of safe abortion services in most of the health facilities is paramount important for the community. Health facilities working on abortion should also strictly follow the aseptic techniques in order to prevent HBV transmission.

The study was limited by the fact that it is a time bounded hospital-based study and relied on HBV tests done at different institutions. Furthermore, due to the small sample size, although most point estimates were comparable to other published data, it was difficult to conclude the age specific prevalence, hence, a further study is required, preferably with large sample size. However, the current study findings have shed light into the problem of HBV infection among pregnant mothers of the local settings.

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ANNEXES

SAINT PAUL'S HOSPITAL MILLENNIUM MEDICAL COLLEGE, SCHOOL OF GRADUATE STUDIES, DEPARTMENT OF OBSTETRICS AND GYNECOLOGY

A RESEARCH ON SEROPREVALENCE OF HEPATITIS B SURFACE ANTIGEN POSITIVITY AND ASSOCIATED RISK FACTORS IN PREGNANT WOMEN ATTENDING ANC CLINIC OF SPHMMC, ADDIS ABABA FOR THE PREPARATION OF A SENIOR PAPER AS A PARTIAL FULFILLMENT FOR THE REQUIREMENT OF SPECIALITY IN GYNAECOLOGY AND OBSTETRICS.

BY: FEKI KEDIR MD [P.N:0911061312]

PART1. INFORMATION SHEET

We are studying on the seroprevalence of HBsAg and risk factors associated with the HBV infection. The implementation of universal maternal HBV screening and universal vaccination of newborns regardless of maternal HBV status has significantly reduced transmission rates. Prophylactic administration of HBIG at birth followed by the routine three series HBV recombinant vaccination within the first six months of life has reduced transmission rates to approximately 5 to 10%.

The infection rate among infants born to HbeAg positive mothers who do not receive any form of prophylaxis is as high as 90 percent. Maternal-infant transmission can occur in-utero, at birth, or after birth. The high protective efficacy (95 percent) of neonatal vaccination suggests that most infections occur at birth when maternal secretions in the birth canal come in contact with the infant's mucosal membranes.

Our study aims at knowing seroprevalence of HBsAg and associated risk factors. This study is expected to last for 3 months we intend to enroll up to 201 pregnant women. With your permission, we would like to include you in this study. We will gather all necessary data from your medical record but will not include any information relating to your personality e.g. your name or where you live.

You do not have to take part in this study; your participation is voluntary. If you decide not to take part, you will still get all the available health care from the facility. If you decide to take part and then change your mind later, you may do so, at any time, without losing any of your rights as

a patient. If you agree to participate in the study, we will ask you to read and sign the consent form. Do you have any questions?

PART 2: CONSENT FORM`

I, the undersigned, confirm that, as I give consent to participate in the study, it is with a clear understanding of the objectives and conditions of the study and with the recognition of my right to withdraw from the study if I change my mind. I have also been assured that I can withdraw my consent at any time without penalty or loss of the benefit of treatment. The study has been explained to me in the language I understand.

Name of patient:

Patient's signature:

Date:.....

Name of data collector:.....

Signature of the data collector:.....

Date:.....

PART 3. DATA EXTRACTION PROFORMA

This Designed proforma is prepared for data retrieval to study seroprevalence of HBsAg positivity and associated factors on pregnant mothers attending ANC clinic of SPHMMC from 1st November, 2018. These women shouldn't fulfill none of the exclusion criteria and refused informed consent for data collection and encircle the selected item or put the number of the selected items in the empty box provided. You kindly requested to answer all questions genuinely.

PART I Socio demographic Information [Q1-4 From card, Q5-9 direct from patient]

1. Age in years _____
2. Medical Record Number _____
3. Phone number _____
4. Residence 1. In Addis Ababa 2. Outside Addis Ababa (specify) _____
5. Religion 1. Orthodox 2. Muslim 3. Protestant 4. Other (specify) _____
6. Ethnicity 1. Oromo 2. Amhara 3. Gurage 4. Tigre 5. Other (specify) _____
7. Marital status 1. Single 2. married 3. divorced 4. widowed 5. other (specify) _____
8. Education 1. Can't read and write 2. Primary 3. Secondary 4. 10+ 5. College and above
9. Occupational Status 1. Farmer 2. House wife 3. Government Employee 4. Student 5. merchant
6. Daily laborer 7. No job 8. Other (Specify) _____
10. Monthly income of family _____ Ethiopian Birr (estimate)

PART II – Baseline Obstetric Information [From patient card]

11. Gravidity-Parity (number of previous live and still births) _____
12. Gestational age (in weeks, from LNMP or early U/S) on admission _____
13. ANC visits? A. Yes B. No
14. What is the result of screening? A. positive B. negative
15. Is PIHCT done? A. Yes B. No
16. If PIHCT were done, what is the result? A. Non-Reactive B. Reactive

PART III Past obstetric & Gynecologic History [Q19-28 from the patient]

17. Is she have history of abortion A. Yes B. No
18. If the answer for Q-19 is YES, number of abortion? A. 1 B. 2 c. ≥ 3
19. If the answer for Q-20 is YES, which type of abortion? A. safe B. unsafe

20. Number of life-time sexual Partners ? A. one B. $\geq$ Two
21. Where is her previous place of delivery? A. health facility B. home delivery
22. What is her previous mode of delivery? A.Vaginal B. C/S C. both C/S and vaginal
23. History of previous admission to hospital? A. Yes B. No

PART IV Past Medical and Surgical History

24. History of Ear/Nose piercing. A. yes B. No
- 25 History of dental procedure. A. Yes B. No
26. History of Tattooing. A. Yes B. No
- 27.history of blood transfusion A. yes B.No

Name of data collector.....

Signature.....

Date of data collection.....

Thank you for your time!