



**SAINT PAUL'S HOSPITAL MILLENIUM MEDICAL
COLLEGE (SPHMMC) DEPARTMENT OF PUBLIC HEALTH
SERO-PREVALENCE AND RISK FACTORS OF HEPATITIS B AND C
VIRUSES AMONG PREGNANT WOMEN ATTENDING ANTENATAL
CARE IN DURAME GENERAL HOSPITAL KEMBATA TEMBARO
ZONE, ETHIOPIA**

BY

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**A THESIS TO BE SUBMITTED TO SAINT PAUL'S HOSPITAL
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ADDIS ABABA

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I, the under signed, declared that this is my bona fide original work, has never been presented in this or any other University, and that all the resources and materials used for the body of work with thesis, have been fully acknowledged.

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This body of work with thesis has been submitted for examination with our approval as **Candidate's advisors.**

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Final body of work with thesis approval form

As members of the board of examiners of the final body of work with thesis open defense, we certify that we have read and evaluated the body of work with thesis prepared by Wogayehu Workneh under the thesis entitled "Sero-prevalence and risk factors of hepatitis B and hepatitis C viruses among pregnant women following antenatal care in Durame general hospital" and recommendation for the degree of masters of public health in field epidemiology.

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Acronyms

ANC	Ante Natal Care
AOR	Adjusted Odds Ratio
CI	Confidence Interval
COR	Crude Odds Ratio
ELISA	Enzyme Linked Immuno Sorbent Assay
EPI Info	Epidemiological Information
HAV	Hepatitis A Virus
HBV	Hepatitis B virus
HBsAg	Hepatitis B Surface Antigen
HCV	Hepatitis C Virus
HIV	Human Immunodeficiency Virus
IDU	Intravenous Drug Use
KT	Kembata Tembaro
MTCT	Mother to Child Transmission
SD	Standard Deviation
SNNPR	South Nations Nationalities and People Region
SOP	Standard Operating Procedure
SPHMMC	Saint Paul Hospital Millennium Medical Collage
TBA	Traditional Birth Attendants
WHO	World Health Organization

Abstract

Background: Hepatitis is the inflammation of liver caused by viral infections. Viral hepatitis is a leading cause of maternal complication and vertical transmission that cause fetal and neonatal hepatitis which can have serious effects on the neonate, leading to impaired mental and physical health later in life. This study was carried out to determine the seroprevalence and risk factors of hepatitis B and C viruses among pregnant women attending Antenatal care in Durame general hospital, Kembata Tembaro zone Ethiopia.

Methods; A hospital based cross sectional study design was conducted from September to October 2017. Epi info stat calc formula was used to calculate sample size. Data on socio-demographic characteristics and potential factors was collected using pre-designed questionnaire. By using simple random sampling method blood samples were collected from 342 pregnant women. Serologic test kits were used to detect the presence of hepatitis B surface antigen and anti-hepatitis C virus antibody in serum samples. The collected data was entered in to EPI info and analyzed using SPSS software. Logistic regression analysis was conducted to assess statistically significant association between associated factors and hepatitis B Virus and hepatitis C Virus status and p value less than 0.05 was considered as significant.

Result; Sero-prevalence of hepatitis B and C virus infections was found to be 5.8% and 2.9% respectively. No pregnant women were co infected with these viruses. There was no statistically significant association between socio-demographic variables and hepatitis B and C virus infection. Among potential risk factors blood donation (AOR=2.89, 95% CI=1.12-7.48), history of previous surgery (AOR= 2.98 95%CI=1.15-7.73) and multiple sexual exposure (AOR=3.707 95% CI=1.41-9.72) were significantly associated with hepatitis B virus infection. History of hospital admission (AOR= 4.214 95% CI=1.059-16.76) and family history of liver disease (AOR=3.91 95% CI=1.066-14.343) were significantly associated with hepatitis C virus infection.

Conclusion and Recommendation; this study demonstrated intermediate prevalence of hepatitis B and C viruses. No co infection with these viruses and statistically significant association was observed between socio-demographic variables and hepatitis B and C virus infection. Blood transfusion, history of previous surgery and multiple sexual exposures were potential risk factors for hepatitis B and history of hospital admission and family history of liver disease were risk factors for hepatitis C virus infection. Hence screening pregnant women for hepatitis B and C virus infection and provision of health education about the risk factors, mode of transmission and prevention was recommended.

Key words; Hepatitis B Virus, Hepatitis C virus, Antenatal care, Pregnancy, Seroprevalence, Risk factor

1. Introduction

1.1 Background

Hepatitis is the inflammation of liver caused by viral infections. Five hepatotropic viruses (A to E) are known to cause hepatitis. Of these, hepatitis B virus (HBV) and hepatitis C virus (HCV) are of greater importance and among the most frequent viral infections in humans (1). HBV and HCV were discovered in 1963 and 1975 respectively (2). Viral hepatitis is a leading cause of maternal complication and vertical transmission that cause fetal and neonatal hepatitis which can have serious effects on the neonate, leading to impaired mental and physical health later in life (3). Viral hepatitis B and C are often discovered after several years of evolution at the stage of complications, hence the name of silent killer (4). The hepatitis B and C viruses cause chronic viral hepatitis, a major global health problem responsible for 57 % of liver cirrhosis and 75 % of primary liver cancer cases, respectively (5).

Worldwide 350 to 400 million people are infected with HBV, accounting for 1 million deaths per year. Between 130 and 170 million people are infected with HCV, causing over 350,000 deaths per year (6).

The World Health Organization (WHO) estimates the burden of HBV infection to be approximately 2 billion, >350 million chronically infected with HBV, and 500,000–700,000 patients die annually as a result of HBV-related liver disease, such as liver cirrhosis, end-stage liver disease, or hepatocellular carcinoma, with most of these deaths in developing countries. Hepatitis C virus (HCV) infection is another major worldwide public health concern. The WHO estimates that around 3% of the world's population has chronic HCV infection, with more than one million new cases annually, the majority of which occurring in Africa(7).

Hepatitis B virus (HBV) is a major blood-borne and sexually transmitted infectious agent and approximately 100 times more contagious than human immunodeficiency virus (HIV) (8). HBV account for a substantial portion of liver diseases worldwide and infected individuals can remain asymptomatic for decades. However, more than 80% of them become chronic carriers which result in an increased risk of liver cirrhosis, liver cancer and liver failure 20 - 30 years later (9).

Transmission of the hepatitis B virus from asymptomatic carrier mothers to their off springs during the perinatal period is believed to be a major mode of transmission of HBV (10). Pregnant mothers who test positive for both hepatitis B surface antigen (HBsAg) and hepatitis B e antigen (HBeAg) have 70– 90% risk of transmitting infection to their newborn infants and about 10–40% risk if they test positive for only HBsAg (11).

Hepatitis C virus (HCV) was first referred to as “non-A, non-B hepatitis,” and was discovered during the late 1980s. It was uncovered when a team of doctors was studying hepatitis A and B infections (HAV and HBV respectively) in patients who had received blood transfusions (12). Most acute and chronic HCV infections remain asymptomatic for years and, except with expensive screening tests, carriers are usually not identified. Liver cirrhosis develops in 20% of HCV infected patients after 10-20 years, while liver cancer usually appears after 20-40 years post infection. Treatment is limited, very costly, and only partly effective. No vaccine is available or expected in the near future ((2), (13)).

Therefore, the burden of hepatitis B and C viruses and possible risk factors should be known and appropriate prevention and control methods should be taken. Thus this study aims to investigate the prevalence and possible risk factors for HBV and HCV infection among pregnant women in kembata Tembaro zone.

1.2 statement of the problem

Despite the existence of a safe and effective vaccine, HBV continues to be a substantial and devastating health problem whose new cases are still being reported throughout the world(14). Globally, there are about 240 million people with chronic HBV infection and 130 to 150 million people with chronic HCV infection, reaching endemic proportions in sub Saharan Africa. HBV is estimated to result in 780,000 deaths and HCV in 350,000 to 500,000 deaths annually (1).

Although it is difficult to assess the exact burden of HBV in Africa, between 56% and 98% of the adult population show evidence of past exposure to HBV infection, and the seroprevalence of hepatitis B surface antigen (HBsAg) has been estimated to range from 6% to 20% (8). The overall prevalence of HCV in Sub-Saharan Africa is 3.0%. The central African region has the highest estimated prevalence of 6%, west Africa has an estimated prevalence of 2.4%, and southern and east Africa with the lowest estimated prevalence of 1.6% (13). As part of other sub-Saharan Africa countries, the prevalence of HIV and liver disease is high and posing a great public health problem in Ethiopia. Apart from its significant prevalence, liver disease contributes approximately 12 % of the hospital admissions and 31 % of the mortality in medical wards of Ethiopian Hospitals (3).

In Ethiopia, studies among pregnant women have shown moderate endemicity, with the prevalence of HBsAg positivity ranging from 3% to 6.1% (8) and the overall seroprevalence of hepatitis C is estimated to be around 2 %, and infection is most commonly associated with contaminated medical instruments (5).

In Ethiopia only few Hospital based cross sectional studies on seroprevalence of Hepatitis B and C have been previously done shown that hepatitis B and C are endemic in Ethiopia and the prevalence varies from region to region. However in kembata Tembaro zone institution based studies were not conducted on the prevalence of HBV and HCV among pregnant women attending ante natal care. The aim of current study was to measure the prevalence of hepatitis B and C viruses and possible associated risk factors among pregnant women attending ANC in Durame general Hospital.

1.3 Significance of the study

Maternal death surveillance is one of immediately reportable public health emergency condition in Ethiopia. Hepatitis B virus is one of public health problems leading to maternal and neonatal health complications and lastly death. Preventing mother to child transmission of hepatitis B virus is fundamental for decreasing the burden of disease in sub-Saharan Africa countries including Ethiopia where it is endemic. An effective strategy for reducing the incidence of viral infections is screening pregnant mothers during ANC follow up and post exposure prophylaxis consisting of HBV vaccination immediately after delivery in infants born to HBsAg positive mothers, jointly with immunoglobulin prophylaxis. Therefore the finding of this study have the following Significances.

- It will provide information on prevalence of HBV and HCV infection in pregnant women.
- It will give clues for means of prevention and control activities.
- It can be used as base line information to those who are interested for further study in the same area.
- It can be used by those who are responsible for planning health development activity.

2. Literature review

2.1 prevalence of HBV and HCV

Studies on prevalence of HBV and HCV conducted in different countries have shown varied result. These differences in prevalence is due to variation in respective populations under study, and the performance of the health systems in terms of how well the control and prevention programs are implemented in the respective countries. It is estimated that worldwide 2 billion and 130 to 170 million people are infected with HBV and HCV respectively and 350 million are carriers of HBV According to the global estimates (15),(4)). Estimates indicate that globally three to four million persons are newly infected with HCV each year (16).

In Europe, estimates of antenatal HBsAg prevalence were found for 11 countries, ranging from 0.1% to 4.4%. Estimates of antenatal anti-HCV-Antibody prevalence were found for 6 countries, ranging from 0% to 1.7%. The antenatal HBsAg prevalence was on average 3 times higher than the general population prevalence. In Italy and the United Kingdom, the antenatal anti-HCV-Antibody prevalence was lower than the general population prevalence. In Germany and Greece, it was higher (6).

In sub-Saharan Africa, chronic infection with the hepatitis B virus is a profoundly important public health issue characterized by high prevalence, frequent co-infection with HIV, and sub optimally applied prevention and control strategies. Hepatitis B virus is endemic in Africa next to Asia, with a seroprevalence rate of between 8 and 20 %. West Africa is particularly affected, with 95 % of the adult population showing indicators of previous hepatitis B virus infection while the regional hepatitis C prevalence is lower than hepatitis B at 5.3 % of the general population. The world's highest prevalence is in Egypt (17.5 %), followed by Cameroon (13.8 %) and Burundi (11.3 %). Africa also has the highest hepatocellular carcinoma incidence rate in the world, partly due to a 5–25 % co-infection rate with HIV, which accelerates the progression to cirrhosis and hepatocellular carcinoma (5). The mean prevalence of Hepatitis B surface antigen is 10.3% in Sub Sahara Africa with the general carrier rate ranging from 9-20% (17).

Study conducted in Uganda on prevalence of Hepatitis B virus infection among pregnant women revealed the overall prevalence of HBsAg positivity 11.8%. HBsAg was positive in 7 of the 47 HBsAg positive women (14.9%). HBsAg-positive mothers were significantly younger than HBsAg-negative mothers ($p=0.002$;). The antibody test for HIV infection was positive among 9.3% ($n=37$) of participants, but there was no statistically significant association between HIV infection status and hepatitis B prevalence, OR 0.89 (CI 0.30 to 2.65, $p=0.839$)(11)

In Ethiopia, there is a lack of nationwide representative data on hepatitis B and hepatitis C infections. It is, therefore, difficult to present the incidence, prevalence, and mortality rates accurately. A national survey conducted and regional estimates have shown wide geographic and socioeconomic variation in hepatitis B prevalence, ranging between 5.7 and 10.8 % (5). Hospital based cross sectional study conducted on the prevalence of HBV and HCV in Felege Hiwot Referral Hospital, northwest Ethiopia shown the prevalence of 4.4 and 0.26 %, respectively. None of the pregnant women were co-infected by HBV and HCV (1). Another study conducted in Addis Ababa revealed the overall prevalence of hepatitis B virus infection of 6 % (3). In Ethiopia, Hepatitis B is endemic with an average prevalence of 10.8 %, and the prevalence of Hepatitis C is 2 % (5).

In South nations, nationalities and people region only one hospital based cross sectional study has been done to measure the prevalence of HBV infection and its associated risk factors. In this study the prevalence of HBV is 7.8% (8).

2.5 Risk factors of HBV and HCV

Studies conducted on assessment of risk factors of HBV shown that HBV is transmitted through parenteral or mucosal exposure to infected blood and body fluids, usually either by a vertical or horizontal route early in life in highly endemic areas, resulting in a high rate of chronic infections (8).

In study conducted in Addis Ababa multivariate analysis of different variables indicated that those having a history of abortion had a 19 times more chance of positivity for HBsAg than those without [AOR = 19 (CI 2.78–130.367); $p = 0.003$]. Similarly, those with a history of previous surgery had a 9.8 times more chance of positivity for HBsAg compared to their counterparts [AOR = 9.8 (CI 1.392–69.610); $p = 0.022$]. Moreover, the odds of having HBsAg positivity was 7.7 times more likely among those who were with experience of tattoo [OR = 7.7 (CI 1.185–50.28); $p = 0.033$](18)

Earlier studies have found an association between the prevalence of HCV infection and the known risk factors of this infection i.e., blood transfusion, intravenous drug abuse, multiple sexual partners, and homosexuality. In a study from northern Italy, the principal risk factors were history of intravenous drug abuse (32%) and exposure to blood products (24%).(18)

Several studies carried out on transmission channels of HCV revealed that the major channels for HCV transmission are all related to exposure to infected blood and blood products: intravenous drug use (IDU), transfusion of untested blood, unsterile medical and dental procedures, and traditional medical and cosmetic procedures like scarification and tattoos involving blood exposure. Controversy continues about whether to attribute more than a small fraction of HCV infections to sexual contact or mother-to-child transmission (MTCT). Transmission is estimated to be less than 5% for both. Other risk factors involving household exposures like eating utensils, shaving razors, and toothbrushes are felt to be minimum risk factors for HCV acquisition (13).

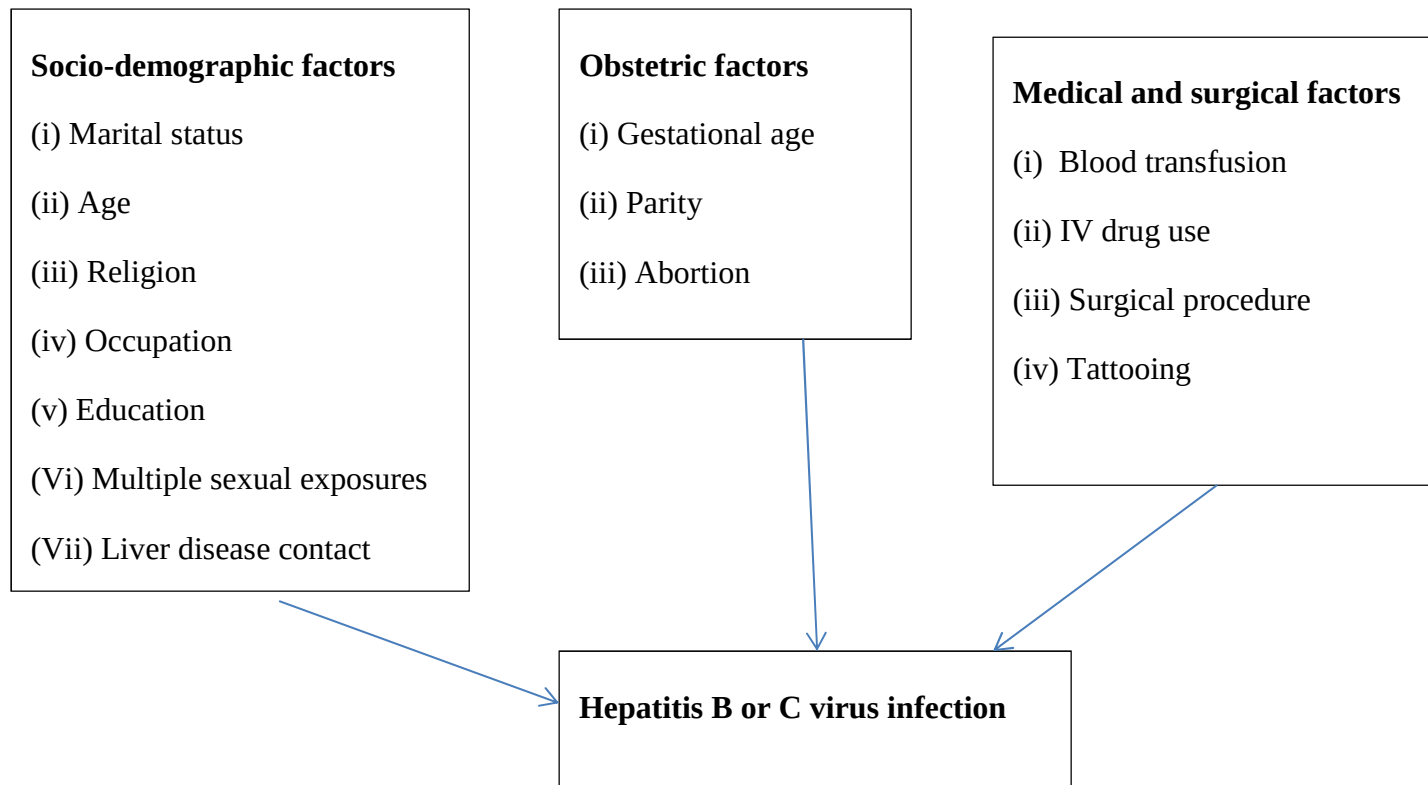


Figure 1: Conceptual framework adapted from review of literatures on hepatitis B and C viruses and associated factors

3. Objectives

3.1 General objective

- To determine the seroprevalence and risk factors of hepatitis B and C viruses among pregnant women attending ANC in Durame general hospital, KT zone Ethiopia.

3.2 Specific Objectives

- To determine the prevalence of HBV and HCV among pregnant women
- To identify associated risk factors of HBV
- To identify associated risk factors of HCV

4. Methods and Materials

4.1 Study Area

The study was conducted in kembata Tembaro zone Durame general hospital. It is one of the 62 hospitals in Southern Nations Nationalities and Peoples region (SNNPR) in Ethiopia. In kembata tembaro zone one general hospital 31 health centers, 136 health posts, 10 medium clinics, 46 primary clinics and 12 drug stores were providing health service. The hospital is located in Durame, the capital city of the kembata Tembaro zone, 335 km south from the capital of Ethiopia, Addis Ababa, and is a secondary-level general hospital that provides health services to over 898,921 inhabitants in the zone. The hospital ANC clinic provides routine antenatal screening services, such as HIV testing, hemoglobin determination, blood group testing, rapid plasma reagin testing, and urinalysis (for glucose, proteins, and infection) for more than 48 pregnant women per day.

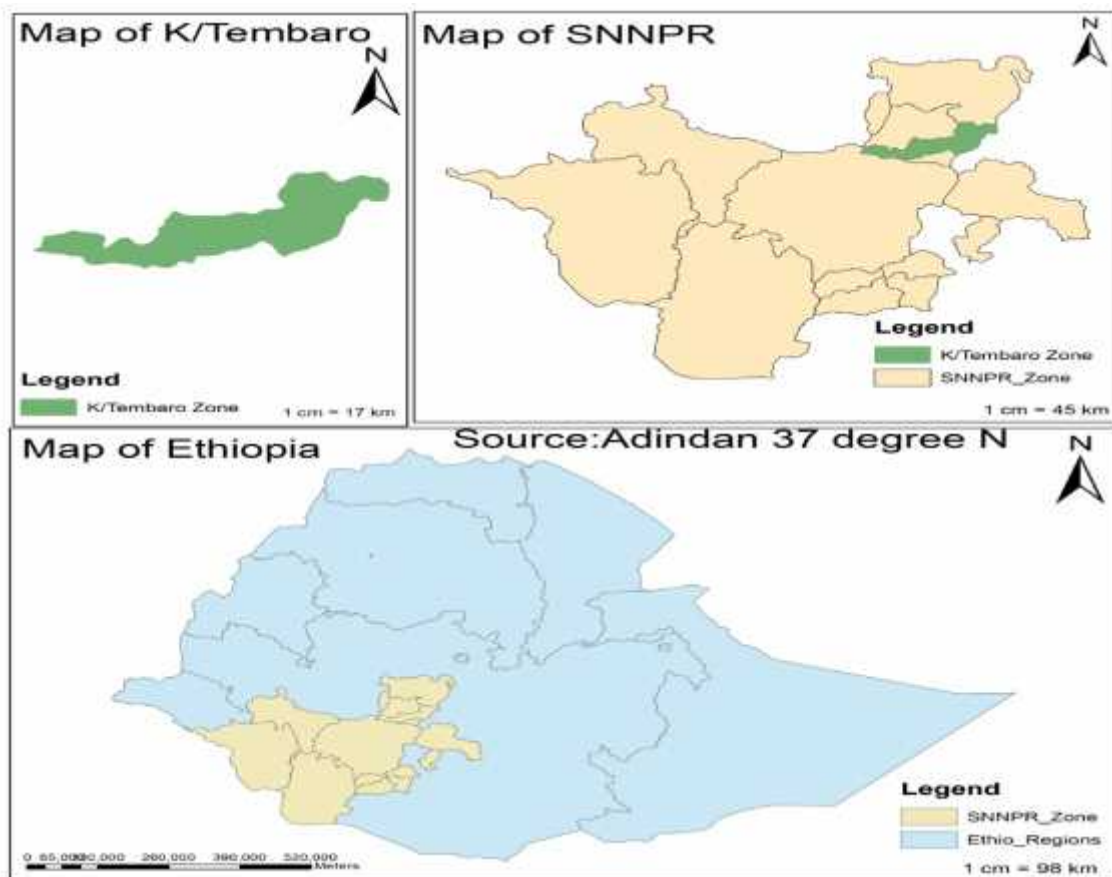


Figure: 2 Map of Kembata Tembaro zone

4.2 Study design and period

A hospital based cross sectional study design was conducted from October to December 2017 to determine the Sero-prevalence of hepatitis B and C viruses and associated risk factors among pregnant women attending ANC in Durame general hospital.

4.3 Source population

The source population was all pregnant women following ANC in Durame general hospital.

4.4 Study population

The study population was pregnant women who followed ANC in Durame general hospital from October to December 2017.

4.5 Operational definitions

Ante natal care follow up: follow up of antenatal care at least once during the current pregnancy in Durame general hospital from October to December 2017.

Abortion: terminated pregnancy by any of surgical methods in previous pregnancies in women attending ANC in Durame general hospital.

Multiple sexual exposures: sexual exposure in which women attending antenatal care in Durame general hospital was exposed for two or more sexual partners.

Blood transfusion: the transferred blood or blood component from donor to pregnant women attending antenatal care in Durame general hospital in here previous life.

Hepatitis B virus infection: the status in which laboratory test result of pregnant women attending antenatal care in Durame general hospital is positive for hepatitis B virus surface antigen.

Hepatitis C virus infection: the status in which laboratory test result of pregnant women attending antenatal care in Durame general hospital is positive for anti-hepatitis C virus antibody.

Intravenous drug use: medication given by administration of any injectable drug through venous route in her previous life to women attending antenatal care in Durame general hospital.

Surgical procedure: a medical procedure involving an incision with instruments performed to repair damage or arrest disease in women attending ANC in Durame hospital.

Tattoo: marked skin with indelible patterns, pictures, and legends in to dermis layer of the skin in women attending ANC in Durame general hospital.

4.6 Inclusion and exclusion criteria

Pregnant women following ANC in the study period in Durame general hospital, volunteer to participate and give consent were included in the study. Pregnant women who were vaccinated against HBV were excluded from the study.

4.7 Study variables

4.7.1 Dependent variable

- Sero status of HBV or HCV of pregnant women

4.7.2 Independent variables

- Age
- Residence
- Educational status
- Occupational status
- Income
- marital status
- History of blood transfusion
- History of abortion
- History of households contact
- Multiple Sexual exposures
- Surgical procedures
- Dental surgery
- intravenous drug use and
- Tattooing was examined as possible associated factors for hepatitis B and C viruses.

4.8 Sampling technique

The study participants were selected by systematic random sampling method. Every third woman was selected until a total of 16 women were enrolled per day. If the third woman was not consent to participate in the study then was replaced by the next woman.

4.9 Sample size determination

The sample size was calculated using stat calc function of Epi-info using the confidence level of 95%, power of 80%. In the study conducted in southern Ethiopia the prevalence of hepatitis B is 7.8% (8) and this prevalence was used to calculate sample size for prevalence. But for analytic study two population proportion formulas was used. odds ratio and history of multiple sexual exposure were taken from the study conducted in Felege Hiwot hospital northern Ethiopia (1) was used to calculate sample size for associated factors.

Two sided level of significant (1-alpha):95%

Power (1-beta, % chance of detecting):80

Ratio of sample size: 1

Percent of not exposed to multiple sexual partners with outcome: 1.9.

Percent of exposed to multiple sexual partners with outcome: 9.5.

Odds ratio: 5.04.

$$N = \frac{Z_{\alpha/2}^2 p Q}{d^2}$$

Where:

N = sample size;

$Z_{\alpha/2}$ = standard normal distribution abscissa corresponding to 95% confidence interval (1.96);

P = proportion of HBsAg reported in similar study noted above (7.8%)

Q = (1-P); and

d = desired level of precision (5%).

$$n = \frac{(1.96)^2 \times 0.078(1-0.078)}{(0.05)^2} = 110$$

was the sample size required for the prevalence study.

Using EPI info, calculated sample size for analytic study was 342+10%= 376 and sample size for prevalence study was 110+10%= 121. The larger sample size 376 was used for the study.

4.10 Data collection tool

Data was collected by using pre-designed questionnaire and laboratory diagnosis

4.11 Data collection and processing

4.11.1 Socio-demographic characteristics and potential risk factors

Study participants who fulfilled eligibility criteria were interviewed by experienced midwife nurses to get relevant information using pre designed questionnaire. The questionnaires included independent variables like age, area of residence, level of education, occupational status, income, marital status, parity status, and gestational age and potential risk factors like history of dental and surgical procedures, tattooing, history of delivery at traditional birth attendants, abortion, history of house hold contacts, blood transfusion and ear piercing in jewelries were assessed.

4.11.2 Blood sample collection and processing

Five milliliters of blood was collected by medical laboratory technicians and left for 30 minutes to facilitate clotting. Then the clotted sample was centrifuged to separate serum from blood cells. The serum was divided in to two aliquots for HBsAg and HCV antibody screening.

4.12 Laboratory Diagnosis

4.12.1 Blood sample and Serological test

After written informed consent obtained, 5 ml of blood sample collected for routine ANC follow up tests using disposable EDTA tubes under aseptic condition was used. The tubes were numbered and processed at the time of Blood sample collection. The blood sample taken was centrifuged for 5 minutes at speed of 3000rpm and the serum was separated. All serum samples were tested for HBsAg and anti-HCV using rapid screening method according to the manufacturer's instruction (Zhejiang Orient Gene Biotech Co., Ltd, China). The kit has a sensitivity of 98.9% and specificity of 98.57%.

HBsAg and anti-HCV Tests:

One step tests, rapid, self-performing, qualitative, immunochromatographic techniques that detect presence of HBsAg and anti-HCV in serum/plasma specimens, qualitatively, at concentrations as low as 0.5 ng/ ml.

Principles

a) For HBsAg: one step test that utilizes the principle of immuno-chromathography, a unique two site immunoassay on a membrane. As the test sample flows through the membrane assembly of the dipstick, the colored monoclonal anti-HBsAg colloidal gold conjugate complexes move with HBsAg in the sample. This complex moves further on the membrane to the test region where it is immobilized by another monoclonal anti-HBsAg antiserum coated on the membrane leading to formation of a pink-purple colored band which confirms a positive test result. Absence of this colored band in the test region indicates a negative test result. The unreacted conjugate and unbound complex, if any moves further on the membrane and are subsequently immobilized by the anti-rabbit antibodies coated on the membrane at the control region, forming a pink/purple colored band. This control band serves to validate the test result (19).

b) For anti-HCV: one step test that utilizes the principle of immuno-chromathography, a unique two site immunoassay on a membrane. As the test sample flows through the membrane assembly of the dipstick, the colored HCV antigen colloidal gold conjugate complexes move with anti-HCV in the sample. This complex moves further on the membrane to the test region where it is immobilized by another HCV antigen coated on the membrane leading to formation of a pink-purple colored band which confirms a positive test result. Absence of this colored band in the test region indicates a negative test result. The unreacted conjugate and unbound complexes, if any moves further on the membrane and are subsequently immobilized by the anti-HCV coated on the membrane at the control region, forming a pink/purple colored band. This control band serves to validate the test result(20).

4.13 Data quality control

The quality of data was controlled starting from the time of questionnaires preparation. Training was given for supervisor and data collectors on the purpose of study and procedures of data collection for 1 day prior to study. During data collection, the supervisor received questionnaires from data collectors and review for completeness, accuracy, and consistency.

Standard operating procedure (SOPs) was followed during laboratory analysis and known

Positive and negative sera for HBV and HCV were used to check the validity of the test kits.

4.14 Data analysis and interpretation

The collected data was entered and analyzed using SPSS software (version 21). Data was analyzed and summarized in terms of frequencies and the result of the study was presented in tables. Descriptive statistics and binary logistic regression analyses were carried out to describe the variables and to identify factors associated with HBV and HCV infection, respectively. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated, and p-values <0.05 were considered to indicate statistical significance.

4.15 Ethical consideration

Ethical clearance was obtained from ethical review board of SPHMMC. After explaining the objective of the study verbal informed consent and written consent was obtained from each of the study participants to collect blood sample and socio-demographic data. Study participants whose laboratory result was positive for HBsAg and HCV antibody were linked to clinicians for possible follow up and treatment. Information gathered during the study period was kept confidential.

5. Result

5.1 General characteristics of the study participants

A total of 342 pregnant women were included in this study conducted from October to December 2017. The mean age of the study participants was 25.9 years ($SD \pm 4.9$) with majority of the pregnant women falling within age group of 19-24 years. This age group composed 137(40%) of the total pregnant women and age group 40 and above composed of the least number of pregnant women. Majority of the study subjects were married 308(90.1%) followed by divorced 23(6.7%) and cohabiting 11(3.2%). Of the study participants 83(24.3%) did not attend formal education, 119(34.8%) attended primary school, 80(23.4%) attended secondary school and 60(17.5%) certified with diploma and above certificate. Of the total majority 207(60.5%) were protestant religion followers followed by orthodox 47(13.7%) and Muslim 45(13.2%) religion followers. Regarding occupational status majority 130(38%) of the study participants were housewife, 73(21.3%) were daily laborers, 55(16.1%) were government employees, 52(15.2%) were merchants and 20(5.8%) were students. Majority 162(47.4%) of the pregnant women have monthly income of <500 Ethiopian Birr. 110(32.2%) of the study participants were gave birth only once, 123(36%) were gave birth two times and 109(31.9%) of them were gave birth three and more times. Of the study participants 182 (53.2%) were delivered their previous birth at health institution, 110(32.2%) were not delivered 34(9.9%) were delivered at home and the rest 16(4.7%) were delivered with traditional birth attendants. Among 342 pregnant women 184(53.8%) were urban residents and 158(46.2%) were from rural settings (Table 1).

Table 1: Socio- demographic characteristics of the study participants, Durame hospital, SNNP region, Ethiopia, 2018

parameter	level	Frequency	percent
		n=342	%
Age (years)	15-18	13	3.8
	19-24	137	40.1
	25-29	109	31.9
	30-34	65	19
	35-39	16	4.7
	40+	2	0.6
marital status	Married	308	90.1
	Single	0	0
	Cohabiting	11	3.2
	Divorced	23	6.7
residence	Urban	184	53.8
	Rural	158	46.2
educational status	no formal education	83	24.3
	Primary	119	34.8
	Secondary	80	23.4
	Diploma & above	60	17.5
occupation	Housewife	130	38
	Daily labor	74	21.3
	Private employee	11	3.2
	Government employee	55	16.1
	Student	20	5.8
	Merchant	52	15.2
monthly income	<500	162	47.4
	500-1000	109	31.9
	>1000	71	20.8
parity status	Para I	110	32.2
	Para II	123	36
	Para III	109	31.9
gestational age	1 st trimester	79	23.1
	2 nd trimester	146	42.7
	3 rd trimester	117	33.9
previous delivery	Not delivered	110	32.2
	Home	34	9.9
	Health institute	182	53.2
	TBA	16	4.7
history of abortion	No	273	79.8
	Yes	69	20.2

5.2 HBV and HCV seroprevalence

In this study 30 pregnant women (8.7%) had serological evidence of infection with both hepatitis B and hepatitis C virus infection. Of these the seroprevalence of HBsAg and anti HCV antibody was 20(5.8%) and 10(2.9%) respectively (Table 2).

There was no serological evidence of co-infection with both HBV and HCV among pregnant women.

Table 2: Seroprevalence of hepatitis B and C infections among the study subjects, Durame hospital, SNNP region, Ethiopia, 2018.

Variables	Status	Total (%)	Remark
HBsAg	positive	20(5.8)	
	Negative	322(94.2)	
Anti HCV Antibody	positive	10(2.9)	
	Negative	332(97.1)	
Co infection (HBV &HCV)	positive	0(0)	
	Negative	342(100)	
Total		342(100)	

5.3 Associations of HBsAg Sero-prevalence and socio-demographic characteristics

The prevalence of HBV infection in relation to residence setting showed that of the total 184 urban and 158 rural residents was 5% and 6.5% respectively, tested positive for HBsAg. However no statistically significant association was determined between seroprevalence of HBsAg and residence. HBsAg Sero-positivity was detected in age groups of 19-24, 25-29 and 30-34 years old. In the age group 19-24 the highest age specific prevalence was identified. From 137 pregnant women screened in this age group 11(8%) tested positive for HBsAg. There was no statistically significant association between distribution of HBsAg Sero-prevalence and age categories.

Majority of the study participants 308(90%) were married of which 20(6.5%) were tested positive for HBsAg. None of cohabiting or divorced pregnant women were tested positive for HBsAg. There was no statistically significant association between HBsAg Sero-positivity and the marital status of the study subjects. Occupation wise the highest prevalence 9.1% Sero-positivity of HBsAg was detected among pregnant women who are privately employed followed by housewife (8.5%). However there was no statistically significant association was observed between HBsAg and occupation of the study participants. The highest (10.8%) frequency of HBsAg Sero-positivity was detected among pregnant women who did not attend formal education followed by pregnant women who attended secondary (5%) and primary (4.2%) school respectively. There was no statistically significant association between HBsAg Sero-positivity and educational status of the study subjects. The highest Sero-prevalence (8.6%) of HBsAg was observed among pregnant women who earn monthly income of less than 500 Ethiopian Birr. There was no statistically significant association between HBsAg Sero-positivity and monthly income of the study subjects. The prevalence of HBV infection among pregnant women who delivered birth three times and more was 7.3% whereas it was 6.4% and 4.1% among delivered for the first time and two times respectively. However there was no statistically significant association between HBsAg Sero-positivity and parity status of the study participants. The highest (7.6%) frequency of HBsAg Sero-positivity was detected in women who are in first trimester followed by third (6%) and second (4.8%) trimesters. There was no statistically significant association between HBsAg Sero-positivity and gestational age of the study subjects. Regarding place of previous birth attended, 2(12.5%) of HBsAg Sero-positivity was detected among women attended birth at TBA, while 6.4% and 5.5% Sero-positivity was detected among pregnant women not attended birth and at health institutions respectively. There was no statistically significant association between HBsAg Sero-positivity and place of previous delivery attended.

Table 3 Sero-prevalence of HBsAg Association with socio-demographic characteristics Durame hospital, SNNP region, Ethiopia, 2018

Parameter	Level	HCV		Df	Chi-square	P value
		Negative	Positive			
		Count (%)	Count (%)			
Age (years)	15-18	13(100)	0(0)	5	3.331	0.652
	19-24	126(92)	11(8)			
	25-29	103(94.5)	6(5.5)			
	30-34	62(95.4)	3(4.6)			
	35-39	16(100)	0(0)			
	40+	2(100)	0(0)			
Marital status	Married	288(93.5)	20(6.5)	2	2.34	0.310
	Cohabiting	11(100)	0(0)			
	Divorced	23(100)	0(0)			
Educational status	No formal education	74(89.2)	9(10.8)	3	5.14	0.162
	Primary	114(95.8)	5(4.2)			
	Secondary	76(95)	4(5)			
	Diploma & above	58(96.7)	2(3.3)			
Occupation	Housewife	119(91.5)	11(8.5)	5	5.68	0.339
	Daily labor	70(94.5)	4(5.5)			
	Private employee	10(90.9)	1(9.1)			
	Government employee	53(96.4)	2(3.6)			
	Student	19(95)	1(5)			
	Merchant	52(100)	0(0)			
Monthly income	<500	148(91.4)	14(8.6)	2	5.98	0.050
	500-1000	103(94.5)	6(5.5)			
	>1000	71(100)	0(0)			
Parity status	Para I	103(93.6)	7(6.4)	2	1.20	0.548
	Para II	118(95.9)	5(4.1)			
	Para III	101(92.7)	8(7.3)			
Gestational age	1 st trimester	73(92.4)	6(7.6)	2	0.737	0.692
	2 nd trimester	139(95.2)	7(4.8)			
	3 rd trimester	110(94)	7(6)			
Previous delivery	Not delivered	103(97.1)	7(6.4)	3	1.86	0.603
	Home	33(100)	1(2.9)			
	Health institute	172(94.5)	10(5.5)			
	TBA	14(87.5)	2(12.5)			

5.4 Association of Anti HCV Antibody Sero-positivity and socio-demographic characteristics

Anti HCV antibody Sero-positivity was detected in age groups 19-24, 25-29, 30-34 and 35-39. In the age group 35-39 the highest age specific prevalence was detected. There was no statistically significant association between anti HCV antibody Sero-positivity and age of the study subjects. The prevalence of anti HCV antibody Sero-positivity in relation to residence showed that of the 184 urban and 158 rural residents was 3.3% and 2.5% respectively, tested positive for anti HCV antibody. There was no statistically significant association between anti HCV antibody Sero-positivity and residence of the study participants. The highest 4.3% frequency of anti HCV antibody Sero-positivity was observed in women who are divorced followed by married (2.9%). However there was no statistically significant association between anti HCV antibody Sero-positivity and marital status of the study participants. Occupation wise the highest (9.1%) Sero-positivity of anti HCV antibody was detected among pregnant women who are private employee followed by daily laborers (5.4%). There was no statistically significant association between anti HCV antibody Sero-positivity and occupation of the study subjects. The highest (3.4%) Sero-positivity of anti HCV antibody was detected among pregnant women who attended primary school followed by who certified with diploma and above (3.3%). There was no statistically significant association between anti HCV antibody Sero-positivity and educational status of the study participants. The prevalence of anti HCV antibody Sero-positivity among pregnant women who earn monthly income of greater than 1000 Ethiopian Birr was 4.3% whereas it was 3.1% and 1.8% among women who earn less than 500 and 500-1000 Ethiopian Birr respectively. There was no statistically significant association between anti HCV antibody Sero-positivity and monthly income of the study participants. The prevalence of anti HCV antibody Sero-positivity among women who delivered birth for the first time was 2.7% whereas it was 4.1% and 1.8% among delivered twice and three times and more respectively. However there was no statistically significant association between Sero-prevalence of anti HCV antibody and parity status of the study subjects. The highest serop-positivity of anti HCV antibody (5.1%) was detected among pregnant women who are in the first trimester followed by second trimester (2.7%). There was no statistically significant association between gestational age of the study participants and anti HCV antibody seropositive. Sero-positivity of anti HCV antibody among pregnant women who attended their previous birth at TBA was 6.2% while it was 5.7% for pregnant women who delivered birth at home. There was no statistically significant association between Sero-positivity of anti HCV antibody and place of previous birth attended.

Table 4 Sero-prevalence of Anti-HCV Antibody Association with socio-demographic characteristics Durame hospital, SNNP region, Ethiopia, 2018

Parameter	Level	HBV		Df	Chi-square	P value
		Negative	Positive			
		Count (%)	Count (%)			
Age (years)	15-18	13(100)	0(0)	5	1.55	0.905
	19-24	134(97.8)	3(2.2)			
	25-29	105(96.3)	4(3.7)			
	30-34	63(96.9)	2(3.1)			
	35-39	15(93.8)	1(6.2)			
	40+	2(100)	0(0)			
Marital status	Married	299(97.1)	9(2.9)	2	0.49	0.781
	Cohabiting	11(100)	0(0)			
	Divorced	22(95.7)	1(4.3)			
Educational status	No formal education	81(97.6)	2(2.4)	3	0.25	0.970
	Primary	115(96.6)	4(3.4)			
	Secondary	78(97.5)	2(2.5)			
	Diploma & above	58(96.7)	2(3.3)			
Occupation	Housewife	128(98.5)	2(1.5)	5	5.93	0.313
	Daily labor	70(94.6)	4(5.4)			
	Private employee	10(90.9)	1(9.1)			
	Government employee	53(96.4)	2(3.6)			
	Student	19(95)	1(5)			
	Merchant	52(100)	0(0)			
Monthly income	<500	157(96.9)	5(3.1)	2	0.93	0.630
	500-1000	107(98.2)	2(1.8)			
	>1000	67(95.7)	3(4.3)			
Parity status	Para I	107(97.3)	3(2.7)	2	1.04	0.596
	Para II	118(95.9)	5(4.1)			
	Para III	107(98.2)	2(1.8)			
Gestational age	1 st trimester	75(94.9)	4(5.1)	2	1.87	0.392
	2 nd trimester	142(97.3)	4(2.7)			
	3 rd trimester	115(98.3)	2(1.7)			
Previous delivery	Not delivered	108(98.1)	2(1.9)	3	1.99	0.574
	Home	32(94.1)	2(5.7)			
	Health institute	177(97.1)	5(2.8)			
	TBA	15(93.8)	1(6.2)			

5.5 Potential Risk Factors of HBV and HCV among the study subjects

Potential risk factors (history of previous surgical procedure, blood transfusion, hospital admission, tattooing, history of multiple sexual exposure and family history of liver disease) were found to be associated with HBV infection in the univariate analysis. These factors were entered into the multivariate binary logistic regression model. Risk factors history of previous surgical procedure, history of multiple sexual exposure and blood transfusion were found to be associated with HBV infection (Table 5).

In relation to history of previous surgical procedure 30.7% of the study participants replied that they had history of previous surgical procedure, of which 10.5% were found to be positive for HBsAg. Statistically significant association was observed between history of previous surgical procedure and HBV infection ($p=0.024$). Study participants having history of previous surgery were 2.98 times more likely to have hepatitis B virus infection than those without history of previous surgery (AOR=2.98 95% CI 1.15-7.73).

Among 342 pregnant women, 24.3% had history of blood transfusion, of these 12% were positive for HBsAg. Statistically significant association was observed between HBsAg Sero-positivity and blood transfusion ($p=0.029$). Those pregnant women with history of blood transfusion were 2.89 times more likely to have HBV infection than those without history of blood transfusion (AOR=2.89 95% CI=1.12-7.49). The proportion of pregnant women who had multiple sexual partners was 27.2%, of which 11.8% were positive for HBsAg. There was statistically significant association between HBV infection and history of multiple sexual partners ($p=0.008$). Pregnant women who have history of multiple sexual partner were 3.7 times at increased risk of getting HBV infection than those without history of multiple sexual partners (AOR=3.707 95% CI 1.414-9.722).

In relation to history of hospital admission 35.8% of the study participants had history of previous hospital admission, and 5.9% were positive for anti HCV antibody. Statistically significant association was observed between history of hospital admission and anti HCV antibody Sero-positivity ($p=0.042$). Study participants having history of previous surgery were 4.2 times more likely to have hepatitis C virus infection than those without history of previous surgery (AOR=4.192 95% CI 1.059-16.759).

Regarding family history of liver disease contact 95(27.8%) of the study subjects were exposed to family history of liver disease contact, of which 6(6.3%) were positive for anti HCV antibody. There was statistically significant association between family history of liver disease contact and anti HCV antibody Sero-positivity ($p=0.038$). Those pregnant women who have family history of liver disease contact were 3.9 times more likely to have hepatitis C virus infection than those without family history of liver disease contact (AOR=3.943 95% CI 1.066-14.343).

Table 5 Association of potential risk factors of HBV infection among study participants Durame hospital, SNNP region, Ethiopia, 2018

HBV status						
variables		positive	Negative	COR(CI)	AOR(CI)	P value
		Count (%)	Count (%)			
History of sharp injury						
	yes	11(6.9)	149(93.1)	1.419(0.572-3.518)	1.07(0.401-2.860)	0.891
	no	9(4.9)	173(95.1)	1	1	0.00
History of previous surgery						
	yes	11(10.5)	94(89.5)	2.96(1.19-7.388)	2.98(1.153-7.727)	*0.024
	no	9(3.8)	228(96.2)	1	1	0.00
Blood transfusion						
	yes	10(12)	73(88)	3.411(1.367-8.512)	2.89(1.116-7.484)	*0.029
	no	10(3.9)	249(96.1)	1	1	0.00
Hospital admission						
	yes	11(9)	111(91)	2.312(0.930-5.747)	1.912(0.716-5.10)	0.196
	no	9(4.1)	210(95.9)	1	1	0.00
Parenteral /IV drug use						
	yes	11(7.3)	140(92.7)	1.589(0.641-3.940)	1.184(0.429-3.27)	0.745
	no	9(4.7)	182(95.3)	1	1	0.00
History of dental extraction						
	yes	8(7.7)	96(92.3)	1.569(0.622-3.962)	0.658(0.464-3.37)	0.658
	no	12(5)	226(95)	1	1	0.00
Circumcision						
	yes	10(5.5)	172(94.5)	0.872(0.353-2.152)	0.62(0.421-5.03)	0.767
	no	10(6.2)	150(93.8)	1	1	0.00
scare/tattooing						
	yes	13(8.3)	143(91.7)	2.312(0.899-5.947)	2.594(0.95-7.086)	0.082
	no	7(3.8)	178(96.2)	1	1	0.00
Multiple sexual exposure						
	yes	11(11.8)	82(88.2)	3.577(1.431-8.940)	3.707(1.41-9.72)	*0.008
	no	9(3.6)	240(96.4)	1	1	0.00
Family history of liver disease						
	yes	10(10.5)	85(89.5)	2.788(1.121-6.933)	2.43(0.983-6.628)	0.072
	no	10(4)	237(96)	1	1	0.00
Ear piercing						
	yes	12(6.4)	175(93.6)	1.260 (0.502-3.165)	1.278(0.467-3.50)	0.633
	no	8(5.2)	147(94.8)	1	1	0.00

Table 6 Association of potential risk factors of Hepatitis C virus among study participants, Durame hospital, SNNP region, Ethiopia, 2018

	HCV status				
Variables	positive	Negative	COR(CI)	AOR(CI)	P value
	Count (%)	Count (%)			
History of sharp injury					
Yes	5(3.1)	155(96.9)	1.142(0.324-4.019)	2.476(0.66-9.250)	0.178
No	5(2.7)	177(97.3)	1	1	0.00
History of previous surgery					
Yes	6(5.7)	99(94.3)	3.53(0.975-12.784)	2.44(0.65-9.186)	0.186
No	4(1.7)	233(98.3)	1	1	0.00
Blood transfusion					
Yes	3(3.6)	80(96.4)	1.350(0.341-5.343)	1.55(0.368-6.557)	0.549
No	7(2.7)	253(97.3)	1	1	0.00
Hospital admission					
Yes	7(5.7)	116(94.6)	4.383(1.112-17.269)	4.192(1.054-16.673)	*0.042
No	3(1.4)	216(98.6)	1	1	0.00
Parenteral /IV drug use					
Yes	6(4)	145(96)	1.934(0.536-6.983)	1.168(0.289-4.720)	0.827
No	4(2.1)	187(97.9)	1	1	0.00
History of dental extraction					
Yes	4(3.8)	100(96.2)	1.547(0.427-5.600)	1.014(0.257-4.00)	0.984
No	6(2.5)	232(97.5)	1	1	0.00
Circumcision					
Yes	4(2.2)	178(97.8)	0.577(0.160-2.082)	0.652(0.172-2.47)	0.529
No	6(3.8)	154(96.2)	1	1	0.00
Scare /tattooing					
Yes	5(3.2)	151(96.8)	1.192(0.339-4.195)	0.993(0.258-3.824)	0.992
No	5(2.7)	181(97.3)	1	1	0.00
Multiple sexual exposure					
Yes	2(2.2)	91(97.8)	0.662(0.138-3.177)	0.497(0.099-2.498)	0.396
No	8(3.2)	241(96.8)	1	1	0.00
Family history of liver disease					
Yes	6(6.3)	89(93.7)	4.096(1.129-14.852)	3.943(1.075-14.460)	*0.038
No	4(1.6)	243(98.4)	1	1	0.00
Ear piercing					
Yes	4(2.1)	183(97.9)	0.29(0.19-3.77)	0.726(0.183-2.875)	0.649
No	6(3.9)	149(96.1)	1	1	0.00

6. Discussion

Hepatitis B and C infections are significant health problems worldwide. These infections are associated with a wide range clinical presentations ranging from acute hepatitis to chronic hepatitis and liver cirrhosis (21).

In this study the overall prevalence of HBsAg and anti HCV antibody Sero-positivity in pregnant women was 5.8% and 2.9% respectively. According to the WHO classification criteria of global epidemiology of HBV infection, the prevalence of HBV among pregnant women in this study was intermediate (2-7%) (22). The finding of this study was comparable to reports from the study conducted in Calabar, Nigeria(4.7%) (10) and Addis Ababa, Ethiopia (6%) (3). However the prevalence of HBV infection was higher than the study conducted in Benin city, Nigeria(2.2%),(23), in India(2.9%) (24), in Makurdi, Nigeria(3.3%) (4), in Bahrdar city, Ethiopia(3.8%) (25) in Abeokuta, Nigeria(4%) (9)) and in Jazan, kingdom of Saudi Arabia(4.1%) (26). In contrast the prevalence was lower than the study carried out in southern Ethiopia (7.8%) (8),In Koutiala, Mali(8%) (27), in southern Nigeria(8.3%) (28), in Yaonde, Cameroon(9.4%),(15), in northwest Ethiopia(7.9%) (1), in Hainan province, china(9.5%) (29) and in Buea health district, Cameron(9.7%) (30). Likewise in countries where regular screening and vaccination for HBV are performed low prevalence rate (<2%) have been documented in pregnant women such as 0.34% in Pakistan (2) and 0.36% in India (18). These differences might be attributable to differences in the methods used for screening, behavioral and cultural variations in relation to possible risk factors of HBV infection.

Comparable studies carried out in different countries have reported infection of pregnant women with both HBV and HCV (31). However no infection was determined in pregnant women with both HBV and HCV in this study, which is similar with studies conducted in north west Ethiopia (1), in Sana'a, Yemen (32) and in India (24).

The Sero-prevalence of anti HCV antibody in this study was found to be 2.9%. this finding was nearly comparable with the study carried out in Yaonde, Cameroon(1.7%) (7) and in Nigeria(1.39%) (31). Similarly the finding of this study was much higher than studies conducted in countries like 0.13% in Slovenia (33), 0.19% in India (24), 0.26% in northwest Ethiopia (1) and 0.8% in Benin city Nigeria (23). In contrast the finding of this study was lower than anti HCV antibody seroprevalence of 8.5% observed in Sana'a (32). The lower Sero-positivity of anti HCV antibody in this study might be due to the differences in cultural and behavioral exposure to potential risk factors to HCV infection.

In current study, socio-demographic variables such as age, occupational and educational status, monthly income, marital status, residence, gravidity, parity and history of abortion were not statistically associated with HBV and HCV infection. this finding is in line with study conducted in northwest Ethiopia (1), in Bahrdar city, Ethiopia (25), in Buea health district, Cameroon (30) and in Eastern region of Ghana (34). In contrast the finding of this study was different from the result of study carried out in southern Ethiopia in which socio-demographic variables have significant association with HBV and HCV infection (18). However it is difficult to rule out the association of these socio-demographic variables totally with HBV and HCV infection.

In this study history of blood transfusion was found to be significantly associated with HBV infection. This finding is in agreement with different studies conducted in Nigeria (35), in Arab and African countries (7), in Pakistan (2), in Rawalpindi(36) and in Sana'a, Yemen (32). However studies conducted in northern Uganda (11), in southern Ethiopia (8) and in northwest Ethiopia (1) were found no association between HBV infection and blood donating. Donating blood and blood products without performing screening tests for HBV might be responsible for HBV through blood transfusion.

In the current study statistically significant association was observed between history of multiple sexual exposure and HBV infection ($p=0.029$). Pregnant women who had multiple sexual partners were 2.9 times at elevated risk of getting HBV infection than those without history of multiple sexual partners. this finding is in line with studies carried out in northwest Ethiopia (1), in Sana'a, Yemen (32), in calabar, Nigeria (10) and in Yaonde, Cameron (15). However studies conducted in northern Uganda (11) and in northern India (18) were found no association between HBV infection and multiple sexual exposure. The transmission of HBV from asymptomatic carriers to pregnant women who have practiced sexual intercourse with multiple partners might be due to the fact that HBV is one of known sexually transmitted diseases (37).

In this study history of previous surgical operation was found to be statistically associated with HBV infection ($p= 0.024$). this finding is in line with report of studies conducted in, calabar, Nigeria (10) and Jazan, kingdom of Saudi Arabia(26). In contrast report of studies conducted in southern Ethiopia (8) and in northwest Ethiopia (1) found no association between previous surgical application and HBV infection. This difference might be due to differences in sterility of medical instruments used for surgical procedure. Repeated use of old and unsterilized instruments used during surgical procedures may account for the observation.

In this study history of hospital admission was found to be a potential risk factor for HCV infection. This finding is consistent with the report of study carried out in Karachi, Pakistan (29). But studies conducted in northern India (18) and in Yaonde, Cameron (15) found no association between history of hospital admission and HCV infection .Hospitalization as a risk factor flags the need for the universal precautions in the hospital to prevent the nosocomial exposure to HCV. Poor infection prevention practice and non-adherence to universal precautions in the hospital may account for the observation.

Furthermore family history of liver disease contact was found to be a potential risk factor for HCV infection in this study. This finding is consistent with the report of study carried out in north west Ethiopia (29). The habit of sharing different personal items with in home is important mechanism for the transfer of HCV from asymptomatic carriers to other family members and this may account for the observed finding.

7. Limitation of the study

This study has some important limitations, majority of limitations of serological test were also considerable to the test kit used by this study. Those test kits may not completely detect pregnant women with HCV infection at the window period. Additional laboratory tests of interest including anti-hepatitis B core antigen (anti-HBc), confirmatory testing for anti-HCV antibodies and HBsAg positive samples were not performed, and HCV-RNA was also not determined in any of the anti-HCV antibody positive mothers in order to differentiate between active and resolved infection. The presence of anti-HBc antibody is a lifelong marker of HBV infection, irrespective of whether a mother has recovered from or has an ongoing chronic infection.

The number of positives for HBsAg and anti-HCV antibody was too small to do multivariate analysis.

The absence of association between various risk factors and HBV and HCV infection may have been due to small sample size.

8. Conclusion

This study demonstrated the intermediate prevalence of HBV and HCV infections in pregnant women followed ANC in Durame general hospital.

Infection with both HBV and HCV was not detected.

Statistically significant association was not observed in acquisition of hepatitis B and C viruses and socio-demographic variables.

Blood transfusion, history of previous surgical procedure and multiple sexual exposures were found to be potential risk factors for HBV infection. Similarly history of hospital admission and family history of liver disease contact were found to be potential risk factors for HCV infection.

9. Recommendation

Durame general hospital should strengthen routine screening of pregnant women for hepatitis B and C virus infection as part of ANC service.

Zonal health department and Durame general hospital should give health education on potential risk factors mentioned above in particular and mode of transmission and prevention of HBV and HCV in general.

Molecular detection and characterization of the other markers of HBV and HCV should be performed to determine the exact prevalence for further study.

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10 Annex

Annex I Informed Consent Form English version

General information of the study

Principal investigator: Mr. Wogayehu Workneh

Advisors: Misrach Ayalewu /SPHMMC/ and Dr Elias Senbeto/SPHMMC/

Study area and Period: kembata Tembaro zone SNNP region from September to December 2017

My name is Wogayehu Workneh. I am MPH candidate in field epidemiology at SPHMMC. My study is on seroprevalence of hepatitis B and C viruses and their associated risk factors in pregnant women attending ANC follow up in Durame General Hospital. Viral hepatitis is a leading cause of maternal complication and vertical transmission that cause fetal and neonatal hepatitis which can have serious effects on the neonate, leading to impaired mental and physical health later in life. The disease can affect every part of the population although the most vulnerable groups are pregnant women. Pregnant women who visit the above health facility for their regular ANC follow up will be included in the study. Thus Data will be collected by laboratory diagnosis and by using a questionnaire. Codes will be used and any information extract will not bear the identity of the participant. Therefore it is confidential. In addition to this there will be no any side effect. All the information will be used only for study purpose. If you agreed to participate in this study, your laboratory, socio-demographic and risk factors data will be used and you are kindly requested to put your signature on the following form.

Date_____ Code_____ The objective of this study is to know the prevalence and associated risk factors of hepatitis B and C viruses in pregnant women attending ANC follow up. I have been briefed that my identity would be kept confidential and the information will be used for the intended purpose only. As my information is important to the study, I agreed to participate in the study.

Participant's signature_____ Researcher's signature _____ .

For more information, you can contact me at the following address.

Annex II: Informed Consent Form (Amharic version)

የጥናቱ አጠቃላይ መረጃ

ጥናቱን የሚያካሂደው፡ አቶ ወጋየሁ ወረቅነህ

የጥናቱ አማካሪ፡ ምስራች አያሌዉ (ቅ/ጳ/ሆ/ሚ/ሜ/ኮ) እና ዶ/ር ኤልያስ ሰንበቶ (ቅ/ጳ/ሆ/ሚ/ሜ/ኮ)

ጥናቱ የሚካሄድበት ቦታ እና ጊዜ፡ ከምባታ ጠምባሮ ዞን ዱራሜ ሆስፒታል ከመስከረም እስከ ጥቅምት 2010

አቶ ወጋየሁ ወረቅነህ እባላለሁ በቅ/ጳ/ሆ/ሚ/ሜ/ኮ/ጤ/ትምህርት ክፍል የሁለተኛ ዲግሪ ተማሪ ነኝ። ዱራሜ አጠቃላይ ሆስፒታል ለቅድመ ወሊድ ክትትል በሚመጡ ነፍሰ ጡር እናቶች ላይ የጉበት በሽታ መጠን ምን እንደሚመስልና ተዛማጅ ችግሮችን ለማወቅ ምርምር ለማካሄድ አስቤያለሁ። የጉበት በሽታ ከእናት ወደ ልጅ በመተላለፍ በእናትና ከእርስዋ በሚወለደው ልጅ ላይ ውስብስብ የሆኑ የጤና ችግሮችን የሚያስከትል ሲሆን በጉበት በሽታ ከተያዘችው እናት የሚወለዱ ጨቅላ ህጻናትን ለአካላዊና ለስነልቦናዊ ችግሮች ያጋልጣል። በሽታው ሁሉንም የህብረተሰብ ክፍሎችን የሚያጠቃ ቢሆንም ጤናዊ የሚበዘወደው በነፍሰጡር እናቶች ላይ ነው። የዚህ ጥናት ዓላማ በዱራሜ አጠቃላይ ሆስፒታል የቅድመ-ወሊድ አገልግሎት በሚከታተሉ ነፍሰጡር እናቶች ላይ የበሽታው ስርጭት መጠን ምን ያህል እንደሆነ ማወቅና ለበሽታው የሚያጋልጡ ሁኔታዎችን መለየት ይሆናል።

ስለዚህ ቅድመ-ወሊድ ክትትል ምርምራ ለማድረግ ሲባል ከተወሰደው የደም ናሙና የቀረውን ለጥናቱ የሚንጠቀም ይሆናል። በዚህ ጥናት የእናንተ ውጤት ፍጹም ሚስጥራዊነቱን በጠበቀ መልኩ ስለሚያዝ ለሌላ ወገን ተላልፎ አይሰጥም። እያንዳንዱ መረጃ በኩድ ስለሚያዝና ስማችሁ ስለማይፃፍበት ማንም ሊያውቀው አይችልም። በተጨማሪም የሚያስከትለው የጎንዮሽ ጉዳት የለም። በጥናቱ ለመሳተፍ ከተስማሙ የላብራቶሪ ውጤቶችን ለመረጃነት እጠቀምበታለሁ። በመሆኑም ከዚህ በታች ያለውን ስምምነት አንብበው በፈርማዎ ያረጋግጡልኝ።

የስምምነት ቅጽ

ኮድ ----- ቀን -----

ይህጥናት በጉበት በሽታ ስርጭትና ለበሽታዉ በሚያጋልጡ ሁኔታዎች ላይ ያተኮረ ነው። በጥናቱ ብሳተፍ ሁሉም መረጃ ሚስጥራዊነቱን የጠበቀ እንደሚሆን ተገልጿል። በመሆኑም ለጥናቱ አስፈላጊ እስከሆነ ድረስ የእኔን መረጃ ለመስጠት ተስማምቻለሁ።

ፊርማ -----

Annex III Questionnaire English version

Questionnaire for investigation of HBV and HCV viral infections and risk factors in pregnant women attending ante natal care in Durame general hospital, kembata Tembaro zone, Ethiopia

Direction: - Please circle on the answer among choices or write on the space provided

Part I. Socio demographic characteristics

Serial number: _____

Date of interview: ____/____/____ DD MM YYYY

Identification

1. Age ____

2. Marital status 1 Single 2 Co-habiting 3 Married

3. Religion 1.Orthodox Christian 2.Muslim 3.Catholic 4.Protestant 5. Other ____

4. Residence 1 rural 2 .urban

5. Education status 1.No formal education 2. Primary 3.Secondary 4. Diploma and above

6.Occupation status 1 housewife 2 daily labor 3 merchant 4 student
5 private employee 6 government employee

7. Monthly Income 1. <500 2.500-1000 3.>1000

8. Parity status 1. para 0 2. para I 3. para II 4.para III

9. Gestational age 1.1st trimester 2 .2nd trimester 3. 3rd trimester

10 place of previous delivery 1 not delivered 2 home 3. Health institution

11. History of abortion 1. NO 2. Yes

Part II Risk assessment

12. History of sharp injury (cut) 1. No 2. Yes
13. If yes how many times 1. Once 2 Twice 3 Three times 4. Several times.
14. History of previous surgery 1 No 2. Yes
15. History of blood transfusion 1. No 2. Yes
16. History of hospital admission 1. No 2. Yes
17. parenteral/intravenous drug use 1. No 2. Yes
18. History of tooth extraction 1. No 2. Yes
19. Ear piercing 1. No 2. Yes
20. Are you circumcised 1. No 2. Yes
21. History of dental extraction 1. No 2. Yes
22. History of scar or tattooing 1. No 2. Yes
23. When was the last time you had sexual intercourse? 1. Days ago 2. Weeks ago
3. Months ago 4. Years ago
24. What was your relationship to this person with whom you had sexual intercourse 1. Husband
2. Other than husband
25. If your answer for question 24 is other than husband, with how many partners you had sexual intercourse? 1. One 2. Two 3. Three 4. >four
26. Have you ever practiced needle recapping? 1. Never 2. Sometimes 3. Most of the time 4. All the time
27. Family history of liver disease 1. No 2. Yes
-

Part III Lab. Result

28. HBsAg test result 1. Reactive 2. Non-reactive 3. Invalid

29. Anti HC antibody test result 1. Reactive 2.Non-reactive 3. Invalid

Annex IV Questionnaire kembatigna version

HBV na HCV afaale mossina aphant yoo hawa maqqobeluta amma allen illisaduhaan seereketi qixaante xaamakata, Durame Hoosipitaalani kambata Tembaro Zone, Thopeeni

Awaansuti kaanichi woorodin yoo xaamaka garrita ikaa faanqashuta xalla xaaxi tee koodaan wienshiyee.

I. Minaadabina minnagaadii duhaati

Malaalo wollut-----

Xaamuti winto baaru-----

1. Umuuru

2. Gaalitiiti 1. Galtumbuta 2. Meexomaani he'ataa 3. Galteetaa

3. Amanaato duhaat 1. Orthodoxa 2. Islamaa 3. Caatolika 4. Amanachua 5. Wolloti

4. Gaalitee beechu 1. Gaaxara 2. Kaatama

5. Rooshaha duhaatii 1. Rossumbuta 2. Woonaa gardabaa 3. Laaniki gardabaa 4. Diplomaha hikannich allin

6. Heechchati/aphut/yoo duhaati 1. Miinni amaata 2. Hujaati galiteta 3. Zaazalanchuta

4. Rosaanchta 5. Gaaginini hujaati galitetaa 6. Mangistaan hujaatata

7. Agaananii aggaa aphphutii 1. 500 xibeechi woorodin 2. 500 chii 1000 illaniqaxechii
3. 1000 chi alluddinni

8. Illaa duhaatii 1. Mexxura illitumbuta 2. Matu illiteeta 3. Laamu illitetaa 4. Saasuhaa saasichi alluding

9. Maaqeebelloma duhaatii 1. Woonaa gaaridabaa 2. Laankii gaaridabaa 3. Saakii gaaridabaa

10. Kaanichi birren illito maaniti/beechu 1. illitubuta 2. Miinne illiteta 3. Faayimaa minnen illiteta

11. Kaanichi barren zaazo maqeebello duhaati 1.yoo 2. yobaa'a

II.Aphaantii waalita duhaaka taanee

12. Muraano biratin ille haawu 1. Yoo 2. yooba'a

13. Yoodaa meeita koodata 1. Matita 2. Laamita 3. Saasita 4. Hollemmita koodata

14. Kaanich bireen assame zaareen kallema hikimin duhaati 1. Yoo 2. Yoobaa

15. Qeegu aqqi duhaatii 1. Yoo 2. Yoobaa

16. Faayima miineeni ossaenii akaamami duhaatii 1. Yoo 2. Yoobaa

17. Qeegi nigaani assame zaabi duhaat 1. Yoo 2. Yoobaa

18. Kannichi birren inquuta buqqisi duhaat 1. Yoo 2. Yoobaa

19. Kannichi birren maachataa raqqaami duhaatii 1. Yoo 2. Yoobaa

20. Nuguusaa duhaat 1. Nugusaanteta 2. Nugusantumbuta

21. Alleen qoonicheesenaani maalata fusheno duhaatii 1. Yoo 2. Yoobaa

22. Meegoma daaqanicha attntichii haabaka ikkehu 1. Baarakata 2. Heezetu 3. Agaana
4. Wogaa

23. Meegoma daqancha assitontii manchi duhaatii 1. Minni gashanchua 2. Minni gashanichich
hadaani

24. Fanqashut minni manchich haadaan ikkeeda meo maannin daqqaanteentii 1. Maatiin
2. Laamin 3. Saasin 4. Shooliich alludinni

25. Qassema marriifii iffissanchu angaani keeissi dagaani? 1. Heenaani 2. Mamaatee 3. Hoorata
jaata

26. Minni abaarossi azeen affalle mossin affaamme maanu yooindo? 1. Yoo 2. Yoobaa

III. Laboratore seereketii laalishatii

27. Afaale mossi B hee laalishaatii 1. Laaliteta 2. Laalitumbuta 3. Daagamumbua

28. Affale mossi C hee laalishaatii 1. Laaliteta 2. Laalitumbuta 3. Daagamumbua
