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Magnitude of hepatitis B and C virus infections and risk factor among police personnel in Addis Ababa Police Commission residence camp, Addis Ababa, Ethiopia

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This is to certify that the thesis prepared by Solomon Mesfin, entitled:

Magnitude of hepatitis B and C virus infections and Risk factor among Police personnel in Addis Ababa Police Commission Camp, Addis Ababa, Ethiopia and submitted in partial fulfillment of the requirements for Master of Science degree in Clinical Laboratory Sciences (Diagnostic Public Health Microbiology). Complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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List of Abbreviations

AA	Addis Ababa
AIDS	Acquired Immune Deficiency Syndrome
AOR	Adjusted odd ratio
COR	Crude Odd Ratio
DNA	Deoxy- Nucleic Acid
ELISA	Enzyme-Linked Immuno-Sorbent Assay
HBV	Hepatitis B Virus
HBcIgM	Hepatitis B Core Antigen Immunoglobulin M
HBsAg	Hepatitis B Surface Antigen
HCC	Hepatocellular carcinoma
HCV	Hepatitis C Virus
HIV	Human Immune Deficiency Virus
HRP	Horseradish peroxidase
RNA	Ribo- Nucleic Acid
STIs	Sexually transmitted infections
TBA	Traditional Birth Attendants
US	United State
WHO	World Health Organization

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Abstract

Background: Hepatitis B and C viruses (HBV & HCV) are viruses causing viral hepatitis. Its infections are still major public health problems around the globe. Police personnel are high-risk people for parenteral and sexually transmitted diseases such as hepatitis B virus and hepatitis C virus. Therefore a dual infection of these viruses can occur and even persists in the same patient. Data regarding magnitude of HBV and HCV among police officers in Ethiopia is limited.
Objective: The objective of this study was to determine magnitude and risk factor of HBV and HCV among Police personnel at Addis Ababa Police Commission residence camp.
Methods: Institutional based cross-sectional survey was conducted from March - July 2021 on Addis Ababa Police commission camp personnel's. By using simple random sampling method ten police camps selected and then calculated sample size was distribute to each camp by population proportion to size applying proportional allocation formula and collect basic demographic and other data for risk factor analysis. Serum samples from each volunteering personnel's was screened for the presence of HBsAg and anti-HCV_{Ab} by using qualitative rapid and ELISA test kits. Data were entered into EPI-INFO version 7, then cleaned and verified. The data were analyzed by using SPSS version 25. A p-value of <0.05 was considered to be statistically significant.

Result: A total of 422 study participants were involved. The majorities (75 %) of them were males and the remaining quarters were females. The age distribution range form 18-57 years. The majority 58.8% were occupational activity in the organization as criminal defense. The overall prevalence of HBsAg and HCV were 4.3% and 0.7%, respectively. High prevalence of HBsAg and anti-HCV Ab was observed in age 28-37 years. History of contact with jaundiced patient (AOR (95%CI) 21.025(4.30; 104.71), p = 0.000), shaving (AOR (95%CI) 29.21.74(1.45; 587 .61), p = 0.028), alcohol consumption (AOR (95%CI) 5.36(1.10, 26.09), p = 0.038) and occupation of crime defense (AOR (95%CI) 0.027(.002, 0.403), p = 0.009) were significantly associated with hepatitis B virus.

Conclusion: Intermediate prevalence of HBV and low prevalence of HCV were observed among police officers.

Key words: Hepatitis B virus, Hepatitis C virus, Police personnel, Magnitude, Risk factor.

1. Introduction

1.1 Back ground

Hepatitis inflammation of liver it can be caused by infectious and non-infectious agents such as viruses, bacteria, fungi, parasites, alcohol, drugs, autoimmune diseases, and metabolic disease. In hemodialysis patients, hepatitis B and hepatitis C infections are the leading causes of illness and death (1).

The most common causes of hepatitis are viruses; namely hepatitis B, C, and D viruses. Among these, hepatitis B virus and hepatitis C virus are the most important causes of viral hepatitis. It can also cause acute and chronic forms of liver disease, which are characterized by hepatitis (2).

Viral hepatitis is a global public health challenge compared to other major infectious diseases, including HIV, tuberculosis, and malaria. Despite significant impact on communities in all regions of the world, hepatitis has until recently been neglected as a priority for health and development (3).

Worldwide, approximately 240 million people have chronic hepatitis B virus infection and 130–150 million have chronic hepatitis C virus infection. Without an expanded and accelerated response, the number of people living with hepatitis B virus is projected to remain at the current, high levels for the next 40–50 years, with a cumulative 20 million deaths occurring between 2015 and 2030. The number of people living with hepatitis C virus is actually increasing, despite the existence of an effective cure (3).

In Ethiopia, although nationwide survey report is lacking, an estimated prevalence of 10–15 % HBV infection and 2–5 % HCV infection were reported. More than 60 % of chronic liver disease and up to 80 % of hepato-cellular carcinoma were caused by HBV and HCV chronic infections (4).

Viral hepatitis B and C are blood-borne infections, with significant transmission occurring in early life and through unsafe injections and medical procedures, and less commonly through sexual contact. Hepatitis B virus prevalence is highest in sub-Saharan Africa and East Asia, where between 5–10% of the adult population is chronically infected. High rates of chronic infections are also found in the Amazon region of South America and the southern parts of

eastern and central Europe. In the Middle East and the Indian subcontinent, an estimated 2–5% of the general population is chronically infected. Immunization is the most effective strategy for prevention of hepatitis B virus infection. Hepatitis C virus is found worldwide. The most affected regions are central and east Asia and north and West Africa, where most infections are caused by unsafe medical injections and other medical procedures (5).

In most cases, military people live in military camps which may contribute to predispose them to HBV and HCV transmission through some common routes. The risk of sharing utensils such as hair-brushes, combs, razors and tooth brushes is common among people living in groups that can facilitate transmission of the viruses (6).

Moreover, usually soldieries travel from place to place for different professional reasons and stay longer apart from their family. This may force soldiers to have multiple sex partners that can expose them for different sexually transmitted infections (STIs) including HBV and HCV. Although several studies reported the prevalence of HBV and HCV infections among different risk groups, so far there is no published data about viral hepatitis prevalence among military people in the Addis Ababa police commission personnel Addis Ababa of Ethiopia. Thus, this study primarily aimed to determine the sero-prevalence of HBV and HCV infections and associated risk factors among military personnel at selected center of Addis Ababa Police Commission.

1.2 Statement of the problem

HBV and HCV cause serious mortality, morbidity and financial burden and is a serious global health problem. Worldwide, two billion people are infected by Hepatitis B virus (HBV) with about 400 million chronically infected cases (7). Chronic infection by these viruses leads to slow progressive liver disease that over a period of up to 30 years may result in cirrhosis, chronic liver failure and hepatocellular carcinoma (HCC) (8).

Viral hepatitis is a significant public health problem especially in resource-poor settings. Chronic hepatitis B virus infection represents a major global health problem, affecting an estimated 257–291 million persons worldwide and is associated with substantial morbidity and mortality because of clinical complications, such as liver cirrhosis and hepatocellular carcinoma (9). 70% of the carriers suffer from chronic persistent hepatitis B, most of who do not appear to be ill. The remaining 30 percent of carriers suffer from chronic liver disease. This condition usually develops into cirrhosis and then 30 to 40 years later, possibly to liver cancer (10).

Patients with acute hepatitis B and chronic hepatitis C had the most severe course, with HBV and HCV common infection being clearly associated with higher morbidity and mortality than both infections (11). Ethiopia is one of the high burden countries with high prevalence of HBsAg (35.8%) and anti-HCV (22.5%) among chronic liver disease (12). Many researchers have investigated prevalence rates of HBV and HCV infections in various groups (blood donors, health care workers, medical waste handlers, and others), however the studies conducted in Ethiopia on single and co-infection of HBV and HCV among chronic liver disease, are limited to a few case series (13).

The Addis Ababa Police Commission was selected due to the high risk group more exposed to HBV and HCV transmission because of sharing common utensils such as- hair-brushes, combs. There were no studies which focused on the magnitude about HBV and HCV infection among police personnel in Addis Ababa Police Commission residence camps.

1.3 Significance of the study

Representative sero-prevalence data is essential to estimate the distribution of viral hepatitis in the police personnel's residence camps. However information on the prevalence of HBV and/or HCV in Addis Ababa Police commission personnel in Ethiopia is sparse and no recent evaluation of HBV and HCV infection has been carried out. These viral infections still poses a major health problem in Ethiopia. It is against this background that the study was set to evaluate the presence of HBV surface antigen and antibodies to HCV diagnosed with police personal in Addis Ababa, Ethiopia. Association of age, gender and marital status with prevalence of these viruses in diagnosed for police person was investigated.

The study outcome will be vital for appropriate preventive strategies, particularly for the implementation and evaluation of vaccination strategies for hepatitis B. Therefore, markers for the two viral hepatitis infections will be determined in serum samples provided by voluntary diagnosed in Addis Ababa Police Commission personnel of Addis Ababa, Ethiopia.

The present research was prepared since there were no studies which focused on the magnitude about HBV and HCV infection among police personnel in Addis Ababa Police Commission residence camps. The Addis Ababa Police Commission was selected due to the high risk group in this area population size 19,057, most police member live in camp, police departments has total of 50 police camps in 10 Sub city. The output from the research could help to guide policy makers, NGOs and others to design community health education programs aimed to prevent, control or treat HBV and HCV effectively. The output could also encourage further research to be planned and conducted on this issue.

2. Literature review

Several studies conducted in diverse locations of world, the hepatitis B and C virus causes incurable diseases and death worldwide. Outbreaks of HBV appear to be exacerbated during long-term travel, with 25 to 420 transmissions per 100,000 travelers. HBV B vaccine is administered with caution and with antiviral levels achieved in 90% of recipients. There is little information about the risk of HCV recovery and until recently medical reports were limited to the following case reports. HBV vaccination should be considered in all travelers to countries with a moderate to high HBV prevalence (HBsAg≥2%) (14).

A study conducted amongyoung men presenting to the Brazilian Army A STROBE-compliant national survey-based cross-sectional, the estimated HBsAg and anti-HCV prevalence rates were 0.22% and 0.28%, respectively. Among the anti-HCV positive conscripts, 53% (n=51, 0.56%, P=.049) reported that they had never had sexual intercourse. Regarding self-reported STI status, most of the positive anti-HCV (n=100, 0.29%, P<.01) and positive HBsAg (n=76, 0.22%, P=.205) conscripts reported not having a STI. From those who tested positive for HBsAg, 89% (n=42, 0.28%, P=.005) reported not making consistent use of condoms with steady partners. History of STIs, higher number of partners, inconsistent use of condoms, and lack of awareness of routes of transmission were significantly associated with HBV and HCV infections (15).

On study done in US Chronic hepatitis B virus (HBV) infection represents a major global health problem, affecting an estimated 257–291 million persons worldwide and is associated with substantial morbidity and mortality because of clinical complications, The panel proposed an overall estimated prevalence for chronic HBV infection in the US of 1.59 million persons (range 1.25–2.49 million) (16).

Another study conducted at the Brazilian military personnel used a cross-sectional study was conducted. All individuals completed a questionnaire to assess their risk of exposure and provided a blood sample to HBV and HCV testing. None of the participants presented HBsAg or anti-HBcIgM, 18 (4.1%) were positive for total anti-HBc, 247 (57.0%) were positive for anti-HBs, and 3 (0.7%) were anti- HCV reactive. The majority of military personnel with past HBV infection (anti-HBc reactive) and HBV immunity (anti-HBs reactive) had a history of prior dental procedures (88.9% and 77.3%), consumption of alcohol at least once a week (50% and

55.9%), and practiced oral sex (61.1%and58.3%, respectively). In addition, anti-HBc positivity was common among individuals with a history of surgery (44.4%) and practice of anal sex (50%). At univariate analysis, age group was associated to anti-HBc andante-HBs positivity (17).

On a study by Saleh Mohammed Abdullah titled Prevalence of Hepatitis B and C virus infection and their co-relation with hematological and hepatic parameters in subjects undergoing the premarital screening centre located in King Fahd Central Hospital, Jazan, and Kingdom of Saudi Arabia. A total of 7,826, Saudi couples undertaking premarital screening from Jazan region, Complete blood counts and hepatic profile were carried out for individuals who were Hepatitis B and or C virus positive. A higher prevalence of hepatitis virus infection in male participants (HBV 1.9%; HCV 0.4%) than in females (HBV 1.43%; HCV 0.2%) was seen. The concentration of hepatic enzymes showed a statistically significant increase in sero-positive individuals. The levels of albumin were significantly decreased in individuals with hepatitis B and C when compared with the control group. The prevalence of HBV infection was higher than the prevalence of HCV infection, and both HBV and HCV were higher in men than in women (18).

HCV and HBV-sero positivity was documented in 1.58% and 1.81% out of 41269 and 23578 participants respectively from the general population in Morocco. The anti-HCV prevalence was not different among males and females ($P = 0.3$). It increased with age; the highest prevalence was observed among subjects with >50 years old (3.12%). Various risk factors for acquiring HCV infection were identified; age, dental treatment, use of glass syringes and surgical history. In addition to these factors, gender and sexual risk behaviors were found to be associated with higher prevalence of hepatitis B. The HBV positivity was significantly higher among males than females participants in all age groups ($P < 0.01$). The peak was noticed among males aged 30–49 years (2.4%) (19).

In a study carried out in Colombia, Prevalence of HBV and HCV in the general population was 0.15% and 0.27%, respectively; 0.27% and 2.09% in men who have had sex with men; 0.37% and 2.17% amongst homeless individuals; 0.26% and 0.0% amongst sex workers; 0.39% and 0.0% amongst vulnerable youth; and 5.94% and 45.54 amongst injecting drug users. In the multivariate HBV model, the explanatory variables included the study group, city of origin and the type of health affiliation; for HCV they were group, origin, sex, age group, health affiliation,

use of drugs and hallucinogen use during sexual intercourse. A high prevalence of HBV and HCV were evidenced for both viral infections, which was, consequently, much higher within the key groups. The main associated factors that were identified related to origin and type of health affiliation and demonstrated a double vulnerability, that is, belonging to groups that are discriminated and excluded from many health policies and living under unfavorable socioeconomic conditions that prevent proper affiliation and health care (20).

In Rwanda, the prevalence of viral hepatitis (HCV) is poorly understood. A total of 324 patients attending Rwanda Military Hospital were randomly selected and a questionnaire was administered to determine the risk factors. Anti-HCV antibody and active HCV infection were found in 16.0% and 9.6% of total participants, respectively. Prevalence was highest (28.4%; 19/67) among participants above 55 years and least (2.4%; 3/123) among younger participants (18–35 years). There was a significant (P=0.031) relationship between place of residence and HCV infection with residents of Southern Province having significantly higher prevalence (21).

On study done in Burera district, Rwanda, a cross sectional study was conducted on Risk factors associated with hepatitis B and C in rural population. Blood samples were collected and hepatitis B surface antigen (HBsAg) and an antibody against hepatitis C (Anti-HCV) were detected using an Enzyme-Linked Immuno-Sorbent Assay (ELISA). The associated factors were identified using a structured questionnaire and the data was analyzed. The prevalence of HBV and HCV infection was 6.4% and 9.4%, respectively, with 0.3% co-infection rate. Age, social economic level, history of blood transfusion, history of never using a condom, as well as a history of injury with a used sharp material were significantly associated with HCV infection (22).

Another study conducted in six districts at Rwanda from April to May 2019. Ten health centres per district were selected according to population size and distance. Participants the campaign collected information from 156 499 participants (51 496 males and 104 953 females) on sociodemographic, clinical and behavioural characteristics. The outcomes of interest included chronic hepatitis C virus (HCV) infection, chronic hepatitis B virus (HBV) infection, HIV infection, co- infection HIV/HBV, co- infection HIV/HCV, co- infection HBV/ HCV and co-infection HCV/HBV/HIV. Multivariable logistic regressions were used to assess factors associated with HBV, HCV and HIV, mono and co- infections. results Of 156 499 individuals

screened, 2.2% were hepatitis B surface antigen positive and 83% of them had detectable HBV deoxy- nucleic acid (HBV DNA). 2.8% individuals were positive for antibody- HCV (anti-HCV) and 72.2% had detectable HCV ribo- nucleic acid (RNA) (23).

In a study carried out in Ethiopia at Bahir Dar Armed Forces General Hospital, The sero-prevalence of HBV and HCV infection were 4.2 and 0.2 %, respectively. Higher prevalence of HBV infection (11.3 %) was observed in the age group of 40 and above. Being at the age of 40 years and above (COR 7.6; 95 % CI 2.0–29.0, p = 0.003), history of nose piercing (COA 5.9; 95 % CI 1.2–29.9, p = 0.033) and sexually transmitted infection (COR 4.3; 95 % CI 1.1–16.4, p = 0.03) were significantly associated with these viral hepatitis infections (4).

The study conducted at Hawassa University comprehensive specialized Hospital, It was to assess the magnitude of HBV and HCV infection and its associated factors among surgical patients. In this study, the prevalence of HBsAg and Anti-HCV among patients scheduled for surgery was 9% and 5.5%, respectively, Patients who practiced multiple sexual partner (AOR = 2.58, CI 1.18–5.61), dental procedure (AOR = 4.20, CI 1.87–9.55) and blood transfusion (AOR = 3.84, CI 1.27–11.65) had higher odds of HBV infection and those who had history of surgical procedure (AOR = 6.05: 95% CI 1.59–23.04) and dental procedure (AOR = 3.70: 95% CI 1.40–9.77) had higher odds of HCV infection (12).

In study done, the prevalence of HBV and HCV infections in hemodialysis centers in Addis Ababa, Ethiopia was lower. 74.3% were men and the remaining 25.7% were females. HBsAg was positive in 1.2% (n=3/253) of the patients, antiHCV antibodies were detected in 2.8% (n=7/253), 4% of patients had markers of at least one viral infection markers and 0.4% (n=1) were positive for both HBV and HCV infection. Even if, history of blood transfusion and the number of blood units transfused might be a risk factor for HBV and HCV gaining, further studies are needed to assess the role of demographic and clinical risk factors in the Hemodialysis patients (24).

On a study in South Omo Zone, Southern Ethiopia.51.4% males, age 6–80 years, individuals participated in the study. The sero-prevalence for HBV infection was 8.0% as detected using one step HBsAg test strip, while it was 7.2% using Alere Determine TM HBsAg test. The sero-prevalence for HCV infection was 1.9%. Two (0.3%) of the participants were seropositive for

both HBV and HCV infections. High sero-prevalence for HBV infection was associated with weakness and fatigue (AOR = 5.20; 95% CI: 1.58, 17.15), while high seroprevalence of HCV infection was associated with age group between 46 and 65 years revealed a higher-intermediate HBV and a low to intermediate HCV infection endemicity levels. Those individuals having body weakness and fatigue and older individuals were at higher risk of acquiring HBV and HCV infections, respectively (25).

3. Objective of the study

2.1 General Objective

To determine the magnitude of HBV and HCV infection and risk factors among police personnel in Addis Ababa Police commission residence camps, Addis Ababa, Ethiopia.

2.2 Specific Objectives

To determine the magnitude of HBV sero- prevalence among police personnel

To determine HCV sero-prevalence among police personnel.

To determine the risk factors for HBV and HCV infection in police personnel

4. Methods and Materials

4.1 Study Area

The study was conducted in Addis Ababa police commission, Addis Ababa, Ethiopia. Addis Ababa is the capital city of Ethiopia which is administratively divided in to 11 sub cities. Addis Ababa Police Force is governed by the city government and structured as a Commission. Currently; the Police Force is structured under the police commission, which has 10 sub city police departments and total of 50 police residence camps. Addis Ababa police commission has about 19,057 police force, from which, about 11,150 police live in the police residence camps (26). All police personnel's get health service on 12 medium clinics structured under the police commission and one (01) federal police hospital. The study was conducted at Addis Ababa police commission on the police residence camps.

4.2 Study Design and Period

A cross-sectional study was conducted from March 2021 to July 2021 G.C. on police personnel's at Addis Ababa police commission residence camps.

4.3. Population

4.3.1 Source population

All Addis Ababa police personnel's, police families and administrative staffs living in residence camps in all sub-cities of Addis Ababa.

4.4.2 Study population

All police forces living in the police selected residence camps during the study period and who were volunteer and participated in the study.

4.5 Eligibility criteria

4.5.1. Inclusion criteria

- All voluntary police forces during the study period were included in the study.

4.5.2. Exclusion criteria

- Police forces that are not in camps or on duty during the study period were not included.

- Administrative and other supportive staffs of police commissions in the camps were not included.
- Police force who was absent during data collection period at different reason (annual rest, ill, out of Addis Ababa due to training or job purpose were excluded.
- Individuals who took Vaccine for Hepatitis B Virus.

4.6 Study Variable

4.6.1 Dependent Variable

Magnitude of Hepatitis HBV

Magnitude of Hepatitis HCV

4.6.2 Independent Variables

Socio demographic characteristics:

- Age
- Sex
- Rank (Constable, Commander, Sergeant, Commissioner, Inspector and other)
- Educational Status
- Marital Status
- Religion
- Risk factors for HBV and HCV (blood transfusion history, abortion, history of surgery, uvuloctomy, ear piercing, circumcision, contact with disabled patients, tooth extraction, tattooing, shaving by barbers).

4.7 Operational definition

- **Circumcision**- a surgical procedure performed on the foreskin of men and women.
- **Shaving - the** removal of hair, by using a razor or any other kind of bladed implement, to slice it down to the level of the skin or otherwise. Shaving is often practiced by men to lift their facial hair and women to remove their legs and armpits.
- **Venous body piercing for treatment** - The procedure is usually used to draw blood from a vein for laboratory testing. Veneration can also be given for treatment, injection to treat certain blood diseases.

4.8. Sample Size and Sampling Technique

4.8.1. Sample Size

The sample size was determined using the single proportion formula, with 95% confidence level (CI) and margin of error (tolerable error) of 0.05. The formula used to calculate the sample size (n) is as follows:

$$\boldsymbol{n = \frac{\left(Z\alpha_{/2}\right)^2 Xp(1-p)}{d^2}}$$

n = sample size

z α /2 = 1.96

p = prevalence of HBV and HCV 0.5

d = degree of precision 0.05 (5%)

The sample size was calculated by using the following formula.

n = ($\underline{z\ \alpha\ /2)^2\ .p\ (1-\ p)}$ = ($\underline{1.96)^2\ 0.5(1-\ 0.5}$) = 0.9604/0.0025 = 384.16

d^2 $(0.05)^2$

Finally, add10% for non- response rate; make the total sample size was **422**

4.8.2 Sampling Techniques

By using simple random sampling method ten police residence camps selected from 50 Addis Ababa police residence camps and then calculate sample size was distributed to each camp by population proportion to size applying proportional allocation formula,

Where, $_{NH} = \frac{NH}{N} Xn$.NH

Denote the number of samples to be selected from stratum H n; denote the total sample size NH; denotes number of elements (police) in stratum H; and N, the total study population. Finally systematic random sampling method was used to select sample unit. Sampling frame was obtained from a list of police force registration book provided by human resource department of the study camp.

The sampling interval (K) is determined by dividing the number of units in the population by the desired sample size for each police residence camp then the first unit was selected roundelay by using lottery method.

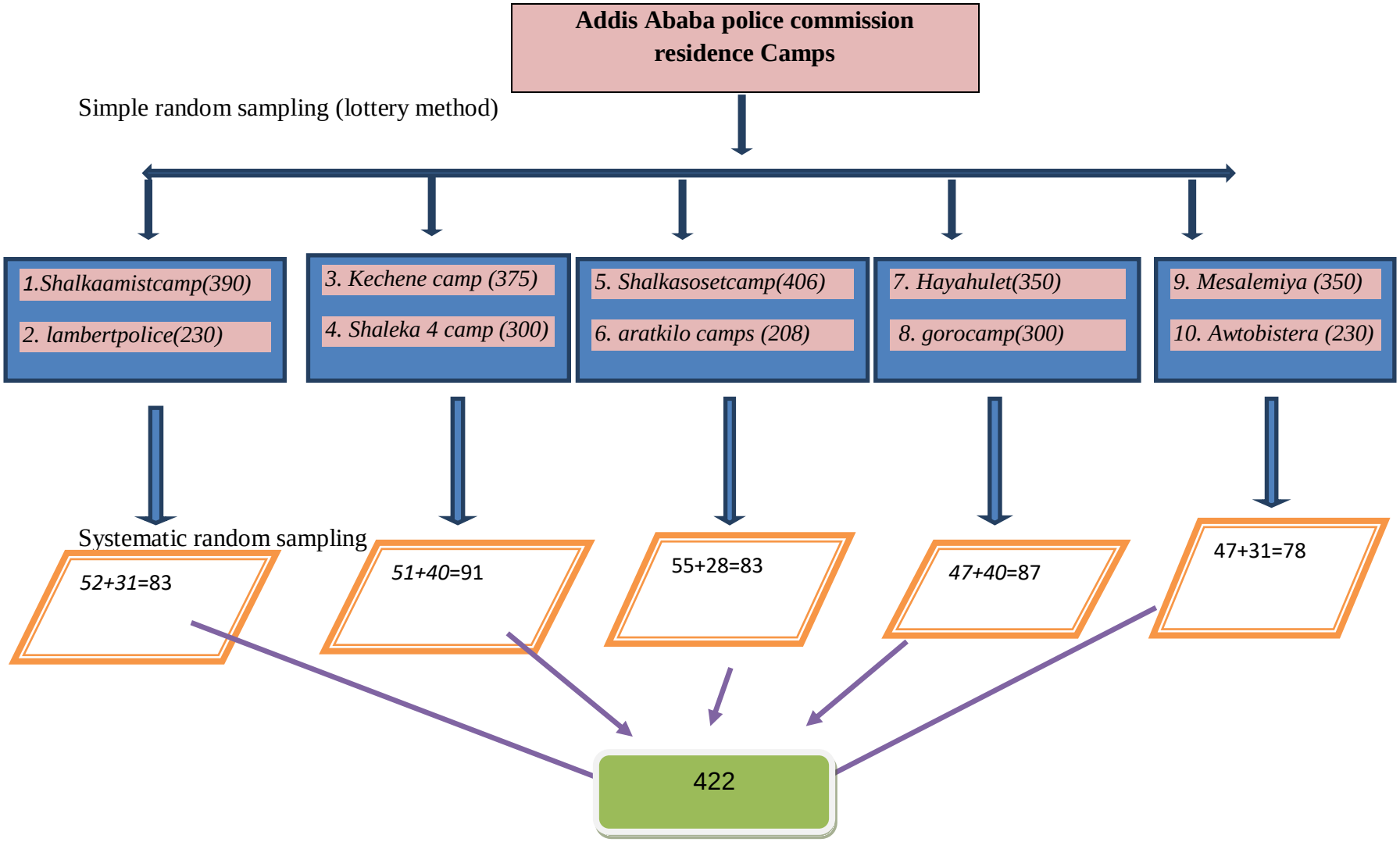

Figure 1 Schematic representation of sampling unit selection procedure in Addis Ababa police

4.8.3 Data collection and Processing

The data collection instrument was a standardized and structured questionnaire. The questionnaire was pre-tested. The questionnaire was first be prepared in English and hen translated into Amharic and back translated into English to ensure consistency. The questionnaire was finally being administered in the local language. The researcher then interviewed the researcher to collect socio-demographic and other risk factor data using a preliminary questionnaire after the study participants met the eligibility criteria. The 5 mill litter bloods were collected and left for about 30 minutes. The sprained blood was then detonated to separate the serum from the blood. The serum is divided in two alternatives. One of the vessels was used in accordance with the manufacturer's instructions for the HBsAg filter. The other instant was used for anti-HCV antibody testing according to the manufacturer's instructions.

4.8.4 Serological Test Principle

4.8.4.1 HBsAg Rapid Test cassette (Serum/ Plasma) HEALEN®

HBsAgRapid Test cassette (Serum/ Plasma) one step test for HBsAg Device, utilizes the principle of immunochromatorgraphy, a unique two site immunoassay on a membrane. As the test sample flows into the cassette cover, it combines colored anti-HBsAg colloidal gold samples with HBsAg. This complex moves to the coverage area and moves to the anti-HBsAg coating on the anti-HBsAg coating, creating a pink-purple colored band that ensures 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 move 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.

5.8.4.2. Hepatitis C Virus Antibody (HCV) Test (Strip) (Whole Blood /Serum/ Plasma)HESOtest®

Hepatitis C Virus Antibody (HCV) Test (Strip) (Whole Blood /Serum/ Plasma) is a lateral flow chromatographicimmunoassay based on the principle of the double antigen-sandwich technique.The membrane is pre-coated with HCV antigen on the test line region of the test. While detecting positive sample, HCV antibody in the sample (Whole Blood /Serum/ Plasma) react with the particle coated with HCV antigen. The mixture migrates upward on the membrane

and generates a colored line. The present of this colored line in the test region indicates a positive result, while its absence indicates a negative.

Sandwich ELISA for the detection of the Hepatitis B virus surface antigen (HBsAg)

Principle

For detection of AiD^{TM} HBsAg ELISA uses antibody sandwich direct enzyme immunoassay method, which microwells stripes are pre-coated with monoclonal antibody specific to HBsAg. Patients serum or plasma specimen is added to the microwells. During incubation the specific immunocomplex formed in case of present of HBsAg in the specimen, is captured on the solid phase. Then the second antibody conjugated the enzyme horseradish peroxidase directed against a different epitope of HBsAg is added into the wells. During the Second incubation step, these HRP-conjugated antibody will be bound to anti –HBs-HBsAg complexes previously formed during the first incubation and the unbound HRP-conjugate is then removed by washing. Chromogen solution containing tetramethyl-benzidine (TMB) and urea peroxide are added to the wells.In the presence of the antibody-antigen-antibody(HRP) sandwich immunocomplex the colorless chromogen are hydrolyzed by the bound HRP-conjugate to the blue colored product. The blue color turns yellow after stopping the reaction with sufuric acid the amount of color intensity can be measured and it is productional to the amount of antigen captured in the wells, and to its amount in the specimen respectively. Wells containing specimens negative for HBsAg remain colorless. (27).

Contents of Kit

1. **Microwell plate:** The plate is sealed in almunium pouch with dessicant. Each well contains monoclonal antibodie reactive to HBsAg (anti-HBs). The microwell strips can be broken to be used separately, stable for 4-8^{o}c.
2. **Negative Control:** Protein-stabilized buffer tested non-reactive for HBsAg.
3. **Positive Control:** HBsAg diluted Protein-stabilized buffer.
4. **HRP-Conjugate:** Horseradish peroxdase conjugated anti-HBs.
5. **Specimen diluents:** Buffer solution containing protein.
6. **Wash Buffer:** Buffer solution containing surfactant.
7. **Chromogen Solution A:** Urea peroxide solution.

8. **Chromogen Solution B:** TMB(Tetramethyle benzidine) N,N- dimethylformamide.
9. **Stop Solution:** Diluted sulfuric acid solution (0.5M H_2SO_4)

Fresh distilled or deionized water, disposable glove and timer, appropriate waste containers for potentially contaminated materials, disposing system or disposable pipette tips absorbent tissue or clean towel, dry incubator 37+1^{o}c, plate reader, single wavelength 450nm or wavelength 450/60~650nm, microwell aspiration/wash system.

Indirect assay for anti HCV ELISA (AiD^{TM}) anti-HCV ELISA ^{plus}

Principle

This kit is a two-step incubation enzyme immunoassay, which uses polystyrene microwell strips pre-coated with recombinant HCV antigens expressed in E.coli (recombinant Core and NS3/4/5). Patient's serum or plasma sample is added together with biotin-conjugated HCV antigens. During the first incubation step, the specific HCV antibodies, if present, will be captured inside the wells as a double antigen "sandwich" complex comprising of the coated, and the biotin-conjugated HCV antigens. The microwells are then washed to remove unbound serum proteins. During the second incubation step, the captured HCV antibodies are detected by adding of HRP-Conjugate. The microwells are then washed to remove unbound conjugate, and Chromogen solutions are added to the wells. In wells positive for HCV antibodies, the colorless Chromogens are hydrolyzed by the bound HRP conjugate to a blue colored product. The blue color turns yellow after stopping the reaction with sulfuric acid. The amount of color intensity can be measured and is proportional to the amount of antibodies captured in the wells, and to the sample respectively. Wells containing samples negative for antiHCV remain colorless (28).

Contents of Kit

1. **Microwell plate:** The plate is sealed in almunium pouch with dessicant. Each well contains recombinant HCV antigens. The microwell strips can be broken to be used separately, stable for 4-8^{o}c.
2. **Negative Control:** Protein-stabilized buffer tested non-reactive for HCV antibodies.
3. **Positive Control:** HCV antibodies diluted Protein-stabilized buffer.
4. **HRP-Conjugate:** Horseradish peroxdase conjugated avidin.

5. **BIOTIN-CONJUGATE:** biotinylated HCV antigen diluted in protein-stabilized buffer.
6. **Wash Buffer:** Buffer solution containing surfactant.
7. **Chromogen Solution A:** Urea peroxide solution.
8. **Chromogen Solution B:** TMB (Tetramethyle benzidine) N,N- dimethylformamide.
9. **Stop Solution:** Diluted sulfuric acid solution (0.5M H_2SO_4)

Fresh distilled or deionized water, disposable glove and timer, appropriate waste containers for potentially contaminated materials, disposing system or disposable pipette tips absorbent tissue or clean towel, dry incubator 37+1^{o}c, plate reader, single wavelength 450nm or wavelength 450/60~650nm, microwell aspiration/wash system.

4.8.5 Data Quality Assurance

The data collection instrument (questionnaire) is standardized and was pre-tested on 5% of the determined sample size. There was double entry of data to check for consistency/accuracy of the entered information. There was back translation of the questionnaire into English to ensure consistency of meaning. To assure randomness, systematic random sampling was used.

4.8.6 Data Entry and Analysis

Data were coded and entered into EPI-INFO version 7, then cleaned and verified. The data were analyzed by using SPSS version 25. A p-value of <0.05 was considered to be statistically significant, which was then cleaned and verified. Data were analyzed by using SPSS version 25. Output of the data was organized and summarized in terms of frequencies, presented using tables. Chi square tests were used to determine association between dependent and independent variables. A p-value of <0.05 was considered to be statistically significant.

4.8.7 Dissemination of the Result

This result from the research was officially communicated to the Addis Ababa Police commission, in Addis Ababa, Ethiopia.

The result of this study will be presented to Addis Ababa University, College of Health Sciences, and Department of Medical Laboratory Sciences.

It will also be presented for health researches conferences and will be sent for publication on peer review journals.

5. Ethical clearance

Study was reviewed for ethical soundness by College of Health Sciences, Addis Ababa University and approved prior to implementation. Subsequently a letter was written to Addis Ababa Police Commission requesting permission to conduct the study. The following measures were strictly observed to preserve ethical soundness of the research: an information sheet fully explaining the purpose of the study was handed to prospective study participants. Their participation in the study was on a strictly voluntary basis. Personal information collected during the study was not being passed on to third parties. To maintain confidentiality, no personal identifiers were used. Upon study termination, all data which were gathered for this purpose were destroyed. Positive finding laboratory investigation the result was communicated to physician and prescription of treatment and advice was effected.

6. Results

6.1 Socio-demographic characteristics

A total of 422 police personnel presenting to the Addis Ababa police commission residence camp were enrolled in this study. The majority of the study subjects 313 (74.2 %) were male and 109(25.8) were female the majority age of the study participants was 18-27 years 275(65.2) and the age range was 18-57 years. Majority 169(40%) of police personnel's were in the rank category of constable and 152(36%) were sergeant. Only 2(0.5%) individuals were commanders. More than half of the police person [270 (64.0 %)] were married and only 1(0.2 %) were widowed and 8(1.9%) were divorced. Data on educational level showed that 155(36.7%) police personnel completed 10th Grade, 133(31.5%) had college diploma and only 45(10.7%) had first degree and above. The majority of the police personnel's [248(58.8%)] were on operational activity in the organization including criminal defense. In terms of religion, 271(64.2%) of them were orthodox Christian. Table 1 below shows the socio-demographic characteristics of the study participants.

Table 1 Socio-demographic characteristics of HBV and HCV, police personnel at Addis Ababa Police Commission residence camp, Addis Ababa, Ethiopia, July 2021.

Viriable	**Socio-demographic**	**Frequency (N)**	**Percent (%)**
Sex	Male	313	74.2
	Female	109	25.8
	Total	**422**	**100.0**
Age(year)	18-27	275	65.2
	28-37	98	23.2
	38-47	40	9.5
	48-57	9	2.1
	Total	**422**	**100.0**
Rank	Constable	169	40.0
	Sergeant	152	36.0
	Inspector	42	10.0
	Commander	2	0.5
	Other	57	13.5
	Total	**422**	**100.0**
Marital status	Single	270	64.0
	Mirage	142	33.6
	Divorce	8	1.9
	Widowed	1	0.2

	Total	**422**	**100.0**
Education	9-10 Grade	155	36.7
	11-12 Grade	89	21.1
	Diploma	133	31.5
	First Degree and above	45	10.7
	Total	**422**	**100.0**

Sero-prevalence of HBV

The overall sero-prevalence of HBV was 18(4.3 %) of whom 88.9% (16/18) of police personnel's were male. In terms of rank majority 44.4% (8/18) of Police personnel's who tested positive for HBV were Sergeant followed by Constable 22.2% (4/18) and Inspector 22.2% (4/18). There was no significant difference between being Sergeant, constable or other rank group in relation to HBV. The same was true concerning marital status with which 55.6% (10/18) and 33.3% (6/18) who tested positive for HBV was single and married, respectively. In relation to educational status, 44.4% (8/18) of those exposed to HBV had a diploma, while the remaining 33.3% (6/18) and 11.1% (2/18) had completed grade 10 and 12, respectively. Fifty %(9/10) of those police officers tested positive for HBV were operational activity in the organization in crime prevention and the rest 22.2 %(4/18) were engaged in office works. (Table 2 shows).

Sero-prevalence of HCV

The majority (419 specimens, 99.3%) of the individuals were negative for HCV and only 3(0.7%) were positive for anti-HCV antibody. All HCV positive specimens were obtained from males. (Table 2 Show)

Table 2 Socio-demographic characteristics of police personnel and magnitude of HBV and HCV at Addis Ababa Police Commission residence camp, July 2021.

Socio-demographic characteristics		**Total n (%)**	**HBV**		**HCV**	
			Negative (%)	**Positive (%)**	**Negative %**	**Positive%**
Sex	Male	313(74.2)	297(73.5)	16(88.9)	310(74.0)	3(100.0)
	Female	109(25.8)	107(26.5)	2(11.1)	109(26.0)	0(0)
	Total	**422(100.0)**	**404(100.0)**	**18(100.0)**	**419(100.0)**	**3(100.0)**
Age(year)	18-27	275(65.2)	272(67.3)	3(16.7)	274(65.4)	1(33.3)
	28-37	98(23.2)	87(21.5)	11(61.1)	96(22.9)	2(66.7)
	38-47	40(9.5)	36(8.9)	4(22.2)	40(9.5)	0(0)
	48-57	9(2.1)	9(2.2)	0(0)	9(2.1)	0(0)
	Total	**422(100.0)**	**404(100.0)**	**18(100.0)**	**419(100.0)**	**3(100.0)**

Rank	Constable	169(40.0)	165(40.8)	4(22.2)	169(40.3)	0(0)
	Sergeant	152(36.0)	144(35.6)	8(44.4)	152(36.3)	0(0)
	Inspector	42(10.0)	38(9.4)	4(22.2)	41(9.8)	1(33.3)
	Commander	2(.5)	1(.2)	1(5.6)	2(.5)	0(0)
	Other	57(13.5)	56(13.9)	1(5.6)	55(13.1)	2(66.7)
	Total	**422(100.0)**	**404(100.0)**	**18(100.0)**	**419(100.0)**	**3(100.1)**
Marital status	Single	270(64.0)	260(64.4)	10(55.6)	267(63.7)	3(100.0)
	Mirage	142(33.6)	136(33.7)	6(33.3)	142(33.9)	0(0)
	Divorce	8(1.9)	6(1.5)	2(11.1)	8(1.9)	0(0)
	Widowed	1(.2)	1(.2)	0(0)	1(.2)	0(0)
	Other	0(0)	1(.2)	0(0)	1(.2)	0(0)
	Total	**422(100.0)**	**404(100.0)**	**18(100.0)**	**419(100.0)**	**3(100.0)**
Education Level	9-10 Grade	155(36.7)	149(36.9)	6(33.3)	154(36.8)	1(33.3)
	11-12 Grade	89(21.1)	87(21.5)	2(11.1)	89(21.2)	0(0)
	Diploma	133(31.5)	125(30.9)	8(44.4)	132(31.5)	1(33.3)
	First Degree and	45(10.7)	43(10.6)	2(11.1)	44(10.5)	1(33.3)
	Total	**422(100.0)**	**404(100.0)**	**18(100.0)**	**419(100.0)**	**3(100.0)**
Occupatio	In office	92(21.8)	88(21.8)	4(22.2)	91(21.7)	1(33.3)
	Office & field	43(10.2)	43(10.6)	0(0)	43(10.3)	0(0)
	Crime Defense	248(58.8)	239(59.2)	9(50.0)	246(58.7)	2(66.7)
	Crime Investigater	7(1.7)	5(1.2)	2(11.1)	7(1.7)	0(0)
	Other	28(6.6)	25(6.2)	3(16.7)	28(6.7)	0(0)
	All	4(.9)	4(1.0)	0(0)	4(1.0)	0(0)
	Total	**422(100.0)**	**404(100.0)**	**18(100.0)**	**419(100.0)**	**3(100.0)**
Religion	Orthodox	271(64.2)	257(63.6)	14(77.8)	270(64.4)	1(33.3)
	Protestant	120(28.4)	116(28.7)	4(22.2)	119(28.4)	1(33.3)
	Catholic	9(2.1)	9(2.2)	0(0)	8(1.9)	1(33.3)
	Muslim	22(5.2)	22(5.4)	0(0)	22(5.3)	0(0)
	Total	**422(100.0)**	**404(100.0)**	**18(100.0)**	**419(100.0)**	**3(100.0)**

6.2 Risk factor analysis for hepatitis B virus infection

The majority of police personnel have history of shivering (4.0 %), venous body piercing for treatment (stick) (3.9 %), circumcision (3.8 %), contact with jaundiced patient 11(2.6 %), alcohol consumption 8(1.9%) and surgical procedure 4(0.9%). Only 3 (0.7%) police had blood transfusion. Bivariate logistic regression analysis showed that police personnel's who had history of contact with jaundice patient, (OR 0.073; 95 % CI 0.041-0.131, p = 0.000), blood transfusion were (OR 0.134; 95 % CI 0.04–0.45, p = 0.000), history of venous body piercing for treatment (OR 0.57; 95 % CI 0.475–0.693, p = 0.002) and history of surgical procedure (OR 0.189; 95 % CI 0.071–0.505, p = 0.001) were significantly associated with hepatitis B virus infections. However, study variables such as history of tattooing on body, tattooing on gum, uvuloctomy,

nose and ear piercing, dental extraction at home and hospital, circumcision, shaving, Hospital admission, dental extraction at health facility, delivery by TBA, abortion were not associated with infection caused by these HBV (Table 3).

Table 3**:** Risk factors distribution among police personnel with respect to sero-status of HBV in Addis Ababa Police Commission residence camp, July 2021.

Risk factors	**HBsAg (%)**				
	Positive%	**Negativ%**	**Total**	**OR(95%, CI)**	**p-value**
Community acquired					
Tattooing on body	6(6.3)	89(93.7)	95	0.661(.335-1.303)	0.261
Tattooing on gum	2(7.7)	24(92.3)	26	0.535(.137-2.089)	0.372
Uvuloctomy	2(5.0)	38(95.0)	40	0.847(227-3.237)	0.809
Nose piercing	0(0.0)	3(100)	3	0.993(.984-1.001)	0.714
Ear piercing	3(2.5)	119(97.5)	122	1.767(.622-5.020)	0.242
Dental extraction at home	1(2.9)	33(97.1)	34	1.470(.213-10.156)	0.690
Circumcision	16(5.7)	271(94.3)	287	0.755(.632-.901)	0.052
Shaving***	17(6.2)	256(93.8)	273	0.673(.588-.769)	0.007*
Contact with jaundiced patient	11(37.9)	18(62.1)	29	0.073(.041-.131)	0.000*
Hospital acquired					
Hospital admission	4(8.5)	43(91.5)	47	0.479(.193-1.189)	0.127
Blood transfusion	3(25.0)	9(75.0)	12	0.134(.040-.452)	0.000*
Venous body piercing for treament	16(7.2)	206(92.8)	222	0.574(.475-.693)	0.002*
Surgical procedure	4(19.0)	17(81.0)	21	0.189(.071-.505)	0.001*
Dental extraction at health	4(4.4)	87(95.6)	91	0.969(.400-2.346)	0.945
Behavioral acquired					
Alcohol consumption	8(29.6)	19(70.4)	27	0.106(.054-.208)	0.000*
Delivery by TBA**	2(10.5)	17(89.5)	19	0.379(.095-1.516)	0.167
Abortion**	1(11.1)	8(88.9)	9	0.356(.047-2.699)	0.304

OR: Odds ratios, CI: confidence interval. *= having statistical association **= concerning female ***= concerning male

6.3 Risk factor analysis for hepatitis C virus infection

The risk factors associated with a positive an anti-HCV positive status among police personnel's, when compared to a negative an anti-HCV status. Among the anti-HCV positive conscripts, police personnel's those had history of shaving their beards 3(1.1%, P=0.201), Venous body piercing for treatment 3(1.4%, P=0.099), Circumcision 3(1.0%, P=0.233 and Tattooing on body 2(2.1%, P=0.066) reported they had never statistically significant, this behavior was conserved with any other behaviors those had negative for an anti HCV test (show below Table 4).

Table 4 Risk factors distribution among police personnel with respect to sero-status of HCV in Addis Ababa Police Commission residence camp, July 2021.

Risk factors	Anti-HCV-antibody (%)				
	Positive%	Negative%	Total	OR(95%, CI)	p-value
Community acquired					
Tattooing on body	2(2.1)	93(97.9)	95	0.333(0.147-0.756)	0.066
Tattooing on gum	0(0.0)	26(100)	26	0.938(0.915-0.961)	0.656
Uvuloctomy	0(0.0)	40(100)	40	0.905(0.877-0.933)	0.574
Nose piercing	0(0.0)	3(100)	3	0.993(0.983-1.001)	0.883
Ear piercing	1(0.8)	121(99.2)	122	0.866(0.174-4.322)	0.865
Dental extraction at home	0(0.0)	34(100)	34	0.919(0.893-0.945)	0.607
Circumcision	3(1.0)	284(99.0)	287	0.678(0.635-0.724)	0.233
Shaving***	3(1.1)	270(98.9)	273	0.646(0.602-0.693)	0.201
Contact with jaundiced	0(0.0)	29(100)	29	0.931(0.907-0.955)	0.637
Hospital acquired					
Hospital admission	0(0.0)	47(100)	47	0.888(0.858-.919)	0.538
Blood transfusion	0(0.0)	12(100)	12	0.971(0.956-987)	0.766
Venous body piercing for	3(1.4)	219(98.6)	222	0.523(0.477-0.573)	0.099
Surgical procedure	0(0.0)	21(100)	21	0.950(0.929-0.971)	0.691
Dental extraction at health	1(1.1)	90(98.9)	91	0.644(0.129-3.226)	0.619
Behavioral acquired					
Alcohol consumption	0(0.0)	27(100)	27	0.936(0.912-0.959)	0.649
Delivery by TBA**	0(0.0)	19(100)	19	0.955(0.935-0.975)	0.706
Abortion**	0(0.0)	9(100)	9	0.979(0.965-993)	0.797

OR: Odds ratios, CI: confidence interval. **= concerning female ***= concerning male

Table 5 Binary and multiple logistic regression analysis of selected independent variables with magnitude of hepatitis B virus

Variables	HBsAg				
	Negative	positive	Crude OR(95% C.I	Adjusted OR(95%CI)	p-value
Tattooing on body					
yes	89(93.7%	6(6.3%)	0.565 (.206,1.48)	3.911(0.748, 20.454)	0.106
No	315(96.3%)	12(3.7%)	1		
Uvuloctomy					
yes	38(95.0%)	2(5.0%)	0.831(.184, 3.750)	3.278(0.383, 28.058)	0.278
No	366(95.8%)	16(4.2%)			
Ear piercing					
yes	119(97.5%)	3(2.5%)	2.088(.593, 7.345)	0.671(0.082, 5.520)	0.711
No	285(95.0%)	15(5.0%)	1		
Dental extraction at home					
yes	33(97.1%)	1(2.9%	1.512(.195, 11.722)	15.284(0.060,3905.700)	0.335
No	371(95.6%)	17()4.4%	1		
Circumcision					
yes	271(94.4%)	16(5.6%)	0.255(.058, 1.124)	0.097(0.001, 8.023)	0.300
No	133(98.5%)	2(1.5%)	1		
Shaving					
yes	256(93.8)	17(6.2)	9.76(1.26,74.10)	29.21 (1.45,587 .61)	0.028
No	147(99.3%)	1(0.7%)			
Contact with jaundiced patient					
yes	18(62.1%)	11(37.9%)	33.69(11.68,97.16)	21.025(4.30,104.71)	0.000
No	386(98.2%	7(1.8%)	1		
Hospital admission					
yes	43(91.5%)	4(8.5%)	2.399(0.755, 7.616)	3.929(0.484, 31.860)	0.200
No	361(96.3%)	14(3.7%)			
Blood transfusion					
yes	9(75.0%)	3(25.0%)	8.778(2.154, 35.763)	2.276(0.146, 35.405)	0.557

No	395(96.3%)	15(3.7%			
Venous body piercing for treatment					
yes	206(92.8%)	16(7.2%)	7.68(1.74,33.87)	12.63(1.31,121.06)	0.028
No	198(99.0%)	2(1.0%)	1		
Surgical procedure					
yes	17(81.0%)	4(19.0%)	6.504(1.934, 21.871)	8.158(0.927, 71.823)	0.059
No	387(96.5%)	14(3.5%)	1		
Alcohol consumption					
yes	19(70.4%)	8(29.6%)	16.21(5.74,45.75)	5.36((1.10,26.09)	0.038
No	385(97.5%)	10(2.5%)	1		
Educational Level					
9-10 Grade	149(96.1%)	6(3.9%)	0.866(0.169, 4.445)	21.968(1.084, 445.314)	0.044
11-12 Grade	87(97.8%)	2(2.2%)	0.494(0.067, 3.629)		
Diploma	125(94.0%)	8(6.0%)	1.376(0.281, 6.732)		
First Degree and above	43(95.6%)	2(4.4%)	1		
What is the nature of your work/operational activity in the organization					
work in office	88(95.7%)	4(4.3%)	0.114(0.174, 0.776)		
Work in office and Sometimes in the field	43(100.0%)	0(0.0%)			
All	4(100.0%)	0(0.0%)			
Crime Defense	239(96.4%)	9(3.6%)	0.94(0.016, 0.553)	0.027(.002, 0.403)	0.009
Other	25(89.3%)	3(10.7%)			
Crime Investigator	5(71.4%)	2(28.6%)	0.30(0.039, 2.286)		

6.3 Binary and multiple logistic regression analysis of selected independent variables with magnitude of hepatitis B virus

A total of 25 variables were enter in multiple logistic regression model by using enter method. From those variables the nature of work or operational activity in the organization, shaving, contact with jaundiced patient, venous body piercing for treatment, frequent alcohol consumption, educational level and work/operational activity in the organization were statically significant at p-value <0.05.

Respondents who work or operational activity in office were 97.3% less likely expose to hepatitis B virus than those of whose worked at criminal defense [AOR=0.027(0.002- 0.403)].

Study participants who drank alcohol frequently were five times more likely exposed to hepatitis B virus than not alcohol drink which indicate that respondents who drinking alcohol [(AOR=5.36((1.10-26.09)].

Respondents who were history of contacting with jaundice patient were twenty one times more likely to be exposed to hepatitis B virus than those who were not in contact with jaundice patient [AOR=21.025(4.30-104.71)].

participants who were history of Venous body piercing for treatment were twelve times more likely exposed to hepatitis b virus than those who were not history of Venous body piercing for treatment [AOR=12.63(1.31-121.06)], respondents who were history of surgical procedure were eight times more likely expose to hepatitis b virus than those who were not surgical [AOR=8.158(0.927, 71.823)] and Respondents that Educational Level of grade 9-10 were approximately twenty-two times more likely exposed to hepatitis B virus than those who were educational Level were 11-12, Diploma, first degree and above [AOR=21.968(1.084, 445.314)].

Table 6 **Binary and multiple logistic regression analysis of selected independent variables with magnitude of hepatitis C virus.**

Variables	**HCV**				
	Negative	**positive**	**Crude OR(95% C.I**	**Adjusted OR(95%CI)**	**p-value**
Tattooing on body					
yes	93(97.9%)	2(2.1%)	7.011(.629, 78.174)	4.410(0.265, 73.380)	0.301
No	326(99.7%)	1(0.3%)	1		
Uvuloctomy					
yes	40(100.0%)	0(0.0%)	0.000(0.000)		
No	379(99.2%)	3(0.8%)			
Ear piercing					
yes	121(99.2%)	1(0.8%)	1.231(0.111, 13.707)	2.720(.110, 67.267)	0.541
No	298(99.3%)	2(0.7%)	1		
Dental extraction at home					
yes	34(100.0%)	0(0.0%)	0.000(0.000)		
No	385(99.2%)	3(0.8%)			
Circumcision					
yes	284(99.0%)	3(1.0%)	0.996(0.000)		
No	135(100.0%)	0(0.0%)	1		
Shaving					
yes	270(98.9%)	3(1.1%)	0.996(0.000)		
No	148(100.0%)	0(0.0%)	1		
Contact with jaundiced patient					
yes	29(100.0%)	0(0.0%)	0.000(0.000)		
No	390(99.2%)	3(0.8%)			

Hospital admission					
yes	47(100.0%)	0(0.0%)	0.000(0.000)		
No	372(99.2%)	3(0.8%)			
Blood transfusion					
yes	12(100.0%)	0(0.0%)	0.000(0.000)		
No	407(99.3%)	3(0.7%)			
Venous body piercing for treatment					
yes	219(98.6%)	3(1.4%)	0.995(.000)		
No	200(100.0%)	0(0.0%)			
Surgical procedure					
yes	21(100.0%)	0(0.0%)	0.000(0.000)		
No	398(99.3%)	3(0.7%)			
Alcohol consumption					
yes	27(100.0%)	0(0.0%)	0.000(0.000)		
No	392(99.2%)	3(0.8%)			
Educational Level					
9-10 Grade	154(99.4%)	1(0.6%)	0.286(0.018, 4.661)	0.201(0.004, 10.360)	0.425
11-12 Grade	89(100.0%)	0(0.0%)			
Diploma	132(99.2%)	1(0.8%)			
First Degree and above	44(97.8%)	1(2.2%)	0.333(.020, 5.442)		

6.4 Binary and multiple logistic regression analysis of selected independent variables with magnitude of hepatitis C virus

A total of 25 variables were enter in multiple logistic regression model by using enter method. From those variables the nature of work or operational activity in the organization, shaving, Contact with jaundiced patient, Venous body piercing for treatment, Frequent alcohol consumption, Educational Level and work/operational activity in the organization and others were not statically significant at p-value <0.05. Table 6 shows the Binary and multiple logistic regression analysis of selected independent variables characteristics of the study participants.

7. Discussion

Hepatitis caused by hepatitis B and hepatitis C virus represents a widespread major health problem. Hepatitis B and C viral infections are hepatocyte specific agents that lead to all 96% of all viral hepatitis-related deaths (4). Various studies have been conducted to describe and understand the burden of disease and to recommend preventive measures to eradicate infections.

This study has demonstrated that overall police personnel's attending Addis Ababa police Commission residence camps had an overall exposure to viral hepatitis [HBV and HCV] at rate of 5%. The result of the present study showed that the sero-prevalence of HBV among the Police personnel was 4.3% tested positive for HBsAg and 0.7% tested positive for anti-HCV Ab. However, it should be noted that the kits used were not confirmatory. A similar study conducted among Felegehiwot referral hospital, Northwest Ethiopia in which the sero-prevalence of HBsAg was 34(8%) and anti HCV was 18(4.3%) respectively (29). Young men presenting to the Brazilian ArmyA STROBE-compliant national survey-based cross-sectional, the estimated HBsAg and anti-HCV prevalence rates were 0.22% and 0.28%, respectively (15) In contrast, lower prevalence was reported in this study.

On the other hand our study findings were similar to a research conducted in the Bahir Dar Armed Forces General Hospital, Ethiopia in which participants gender are higher in male of HBV and HCV (4). Similar study conducted by Abdullah et al in the Jazan Region, Kingdom of Saudi Arabia reported a higher rate of HBV among males than females which is concordant to our own study. Similar to our findings, sero-prevalence of Hepatitis B virus was higher higher in age group of 30 to 50 years (18), (30).

Most participants' exposure to HBV and HCV was seen among among respondents with traditional risk factors (Community acquired) (such as Tattooing on body, Shaving, Alcohol consumption, and Contact with jaundiced patient high-risk). This is similar to a finding by Beste et al. study in which the evidence of HBV exposure was highest among respondents with traditional risk factors (such as drug use or high-risk sexual practices). More than half the individuals with HBV exposure (53%) reported no history of traditional risk factors; of these, 59.5% reported a history of combat exposure (31).

Other health facility based studies, or institution-based studies in Ethiopia have reported exposure to different factors for HBV and HCV infection were presented (12), (32).

The magnitude estimate from thus study is closer to the lower estimates observed from Hospital-based HBV and HCV surveys (12). For HCV the higher sero-positivity was recorded among males even though it was not significantly associated with none of the occupational groups.

The prevalence of HBV and HCV infection found in the current study can be graded intermediate and low according to WHO criteria (33). The prevalence of HBV infection can be graded high when the prevalence is >8 %, intermediate when the prevalence is between 2 and 8 % and low when the prevalence is <2 % (4). Hepatitis C virus infection can be also graded high, moderate or low when the prevalence is >3.5, 1.5–3.5 % and in the current study, (0.7 %) was positive for HCV infection. This prevalence is nearly similar to previous reports among medical waste handlers (0.2 %) in Gondar, Ethiopia (34).among apparently health people in Nigeria (0.8 %), and Morocco (0.62 %), and among blood donors in Jordan (0.8 %) and in Pakistan (0.89 %) (35), (19), (36). Lower prevalence of HCV infection was also reported (0.28%) among young men presenting to the Brazilian Army and in Colombia (0.15%) (15), (20). On the other hand, relatively higher prevalence of HCV infection (1.9 %) was reported in South Omo Zone, Southern Ethiopia, and among patients scheduled for surgery at Hawassa University comprehensive specialized Hospital, Hawassa City, southern Ethiopia 5.5%, (12).

In the current study, Hepatitis B virus are (4.3%) was positive for HBV infection. This prevalence is nearly similar to previous reports among refugees (7.3 %) in Gambella, Ethiopia (37). among apparently health people in Nigeria (0.8 %), and Morocco (0.62 %), and among blood donors in Jordan (0.8 %) and in Pakistan (0.89 %) (35), (19), (36). Lower prevalence of HBV infection was also reported (0.7%) among military related risk factor in the national Veterans' Health Administration system, in Colombia 0.15% and Brazilian Army (0.22%) (38), (20), (39). On the other hand, relatively higher prevalence of HBV infection (9 %) was reported in Hawassa University comprehensive specialized Hospital, Hawassa City, southern Ethiopia, among patients scheduled for surgery (12).

8. Strength and Limitation

8.1. Strength

HBV and HCV screening strategies among police personal may further reduce these viral diseases.

8.2. Limitation

- When human serum samples are tested for HBsAg and anti HCV antibodies using different commercial rapid test kits, discrepant results often occur. Usually confirmatory test is commonly used to evaluate positive rapid test results. But Due to resource constraints this study was unable to conduct confirmatory tests for those negative results. Thus some false negative results might be expected.

- This study was only set and able to measure the magnitude of HBV and HCV in Addis Ababa Police commission Camp personnel's and therefore this study didn't measure the magnitude of these viruses in the different sub-groups of liver inflammation classification.

9. Conclusion and Recommendation

9.1. Conclusion

The magnitude of HBV and HCV infection and risk factors among police personnel in Addis Ababa Police commission camps, Addis Ababa, Ethiopia had overall intermediate and low respectively. Higher prevalence of HBV and HCV infection was observed among police personnel's with male an age of 28-37 years and work /operational activity was crime Defense. Moreover, occupation, history of Contact with jaundiced patient and shaving were significantly associated with HBV infections. Strengthening HBV screening strategies among police personal may further reduce these viral diseases. Surprisingly the magnitude of HBV and HCV in the study was very low (4.3% and 0.7% HBsAg and Anti-HCV test-positive). Since the study was Institutional based, presumably everyone enrolled in the study would have fulfilled the operational definition for HBV and HCV cases and so the very low magnitude is unexpected. Significant association was found between the magnitude of HBV and some demographic and risk factor parameters, but it may not be that meaningful given the very small number of Anti-HCV-positive cases.

9.2. Recommendation

Due to lack of education and awareness of this Virus, HBV and HCV infections are rapidly spreading and becoming a major health problem due to its immediate and long-term effects. Proper measures must be adopted to educate the Addis Ababa police commission camp personnel's and for application of preventive measures to prevent its spread in the police personnel's. I conclude that HBV and HCV are major health problem in world and therefore the following recommendations must be carried out for its prevention.

- All police personnel's and their family should be tested for HBV and HCV sero status.
- To prevent the spread of HBV and HCV, people must be educated about these infections.
- Full coverage for all police personnels should be developed to improve immunization coverage.
- WHO guideline of universal immunization of adolescents for the preventable HBV must be strictly followed as it's for all infant.

- Avoidance of substances that affects judgmental capacity of individuals and increase risky factors.
- Initiating personal protective equipment used and distribution through their units will increase access and encourage polices forces to practice it.
- Another research on correct use of magnitude of HBV and HCV by using qualitative method is recommended to supplement this research.

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9. Annexes

Annexe I: Patient information and Consent form

Purpose

I have planned to conduct a study with objective of investigating the magnitude of HBV and HCV infection and Risk factor in Addis Ababa Police Camp. The knowledge gain from this work is believed to help the management and control liver disease.

Participation

I request that you and others volunteer to participate in this study. The most important thing is to get tested for HBV and HCV and ask a few questions about the cause of the risk factors. The laboratory test involves collection of 5 ml blood. All samples were collected using sterile and disposable equipments: tubes, syringes and needles.

Risks and discomforts associated

A small needle that lasts only a few seconds does not harm your health unless 5ml of blood is taken. However, you will see a doctor if you feel any discomfort.

Benefits

If there are positive results in the laboratory test, the results will be reported to your doctor and a prescription will be effected.

Confidentiality

Any information we collect about you during this research will be kept confidential.. Information about your identity will be put away after recording you file; and kept in a secured place. Only the principal investigators will be able to link your identity with the code number, should this become necessary to assist you medically.

Sharing the result

At the end of this study, I will report the results of the study in print or in any other way. The reports do not contain any information related to your personality, for example. Your name or identity. They guarantee the confidentiality of such information. Therefore, we need your permission to use the test results to write a report.

Right to refuse

Since participation in this study is entirely voluntary. You can refuse to participate in this research at any time. Your refusal to participate in this study will not affect any of the benefits you are supposed to get from the center.

Contact Address

If you have any further question and in case of urgency you can contact the principal investigator at any time using the following address:-

Name: - Solomon Mesfin (Principal investigator)

Address: - Addis Ababa University, College of Health Science, Department of Medical Laboratory,Public Health Diagnostic Microbiology.

City: - Addis Ababa

Telephone (mobile):- +251910883349/ +251944111974

Email: - solomonmesfinsholo@gmail.com

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 recognition of my right to withdraw from the study if I change my mind.

I……do herby give consent to Dr/Mr./Mrs/Miss…….to include me in the proposed research. I have been given the necessary information about the research. I have also been assured that I can withdraw my consent at any time without penalty or loss of benefits. The proposal has been explained to me in the language I understand.

Name of the Participant: - _____

Participant's signature: -_____

Name of Dr/Mr./Mrs./Miss: - _____

Dr/Mr./Mrs./Miss signature: - _____

Date: - _____

Witness: -_____

Annex II: Questionnaire

Addis Ababa University

Faculty of Medicine

Department of Medical Laboratory Science, Diagnostic Microbiology.

(To be translated to Local Language)

For data collectors: please write on the space provided or circle on the answer among choices accordingly.

1. Identification

1.1. Code_____

Part One Socio demographic Variable

1.2	Rank	1/ Constable 4/ Commander 2/ Sergeant 5/ Commissioner 3/ Inspector 6/ other
1.3	Age	_____
1.4	Sex	1) Male 2) Female
1.5	Marital status	1/ single 4/ widowed 2/ Mirage 5/ other 3/ divorce
1.6	Educational level	1/ 9-10 Grade 3/ Diploma 2/ 11-12 Grade 4/First Degree and above
1.7	What is the nature of your work/operational activity in the organization	1) work in office 2) Crime Defense 3) Work in office and Sometimes in the field 4) all 5) Other
1.8	Religion	1) Orthodox 2) Protestant 3) Catholic 4) Muslim 5) Other(specify): _____

2. Part two Questions related to HBV and HCV risk factors

Have you have or ever practiced the following?

2.1.1 Ear piercing 1. yes 2. No

2.1.2 Nose piercing 1. yes 2. No

2.1.3 Uvuloctomy 1. yes 2. No

2.1.4 Tattooing on body 1. yes 2. No

2.1.5 Tattooing on gum 1. yes 2. No

2.1.6 Dental extraction at home 1. yes 2. No

2.1.7 Dental extraction at health facility 1. yes 2. No

2.1.8 Circumcision 1. yes 2. No

2.1.9 Shaving 1. yes 2. No

2.1.10 Delivery by TBA 1. yes 2. No

2.1.11 Abortion 1. yes 2. No

2.1.12 Hospital admission 1. yes 2. No

2.1.13 Surgical procedure 1. yes 2. No

2.1.14 Blood transfusion 1. yes 2. No

2.1.15 Contact with jaundiced patient 1. yes 2. No

2.1.16 Frequent alcohol consumption 1. yes 2. No

2.1.17 Venous or body piercing for treatment 1. yes 2. No

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Annex IV: **Blood sample collection procedure**

1) Syringes
2) Blood Collection Tubes.
3) Tourniquets. Single use, disposable, latex-free tourniquets
4) Antiseptic. Individually packaged 70% isopropyl alcohol wipes.
5) 2×2 Gauze
6) Sharps Disposal Container. An OSHA acceptable, puncture proof container marked “Biohazardous”.
7) Cotton
8) PPE’s will be worn at all times.
9) Wash hands in warm, running water with a appropriate hand washing product,
10) A lab coat or gown must be worn during blood collection procedures.
11) Place a sheathed needle or butterfly on the syringe.
12) Remove the cap and turn the bevel up.
13) Pull the skin tight with your thumb or index finger just below the puncture site.
14) Holding the needle in line with the vein, use a quick, small thrust to penetrate the skin and vein in one motion.
15) Draw the desired amount of blood by pulling back slowly on the syringe stopper. Release the tourniquet.
16) Place a gauze pad over the puncture site and quickly remove the needle.

17) Immediately apply pressure. Ask the patient to apply pressure to the gauze for at least 2 minutes.
18) When bleeding stops, apply a fresh bandage, gauze or tape.
19) Transfer blood drawn into the appropriate tubes as soon as possible using a Blood Transfer Device, as a delay could cause improper coagulation.
20) Gently invert tubes containing an additive 5-8 times.
21) Dispose of the syringe and needle as a unit into an appropriate sharps container.

Annex V

Laboratory data collection format

CodeNo.	Laboratory result for							
	HBsAg				Anti-HCV Ab			
001.	Positive		Negative		Positive		Negative	
002.	Positive		Negative		Positive		Negative	
003.	Positive		Negative		Positive		Negative	
004.	Positive		Negative		Positive		Negative	
005.	Positive		Negative		Positive		Negative	
006.	Positive		Negative		Positive		Negative	
007.	Positive		Negative		Positive		Negative	
008.	Positive		Negative		Positive		Negative	
009.	Positive		Negative		Positive		Negative	
010.	Positive		Negative		Positive		Negative	
011.	Positive		Negative		Positive		Negative	
012.	Positive		Negative		Positive		Negative	
013.	Positive		Negative		Positive		Negative	
014.	Positive		Negative		Positive		Negative	
015.	Positive		Negative		Positive		Negative	
016.	Positive		Negative		Positive		Negative	
017.	Positive		Negative		Positive		Negative	

018.	Positive		Negative		Positive		Negative	
019.	Positive		Negative		Positive		Negative	
020.	Positive		Negative		Positive		Negative	
021.	Positive		Negative		Positive		Negative	
022.	Positive		Negative		Positive		Negative	
023.	Positive		Negative		Positive		Negative	
024.	Positive		Negative		Positive		Negative	

Make an "X" mark for the results

Declaration

I, the undersigned, declare that this M.Sc. thesis is my original work, has not been presented for a degree in this or any other university and that all sources of materials used for the thesis have been duly acknowledged.

M.Sc. candidate: **Solomon Mesfn (B.Sc.)**

Signature: _____

Date of submission: _____

This thesis has been submitted with our approval as advisors.

Advisor: **Dr. AndargachewMulu**

Signature: _____

Date: _____

Place: Addis Ababa, Ethiopia.

Advisor: **RegassaDiriba MSc**

Signature: _____

Date: _____

Place: Addis Ababa, Ethiopia.