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Incidence, risk factors, and treatment of hepatitis B in patients visiting Yekatit 12 Referral Hospital and Migbare Senay General Hospital in Addis Ababa, Ethiopia

MSC thesis submitted in partial fulfillment of the requirements for the Degree of Masters of Science in Biology

By

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Table of Contents

Contents **Page**

Acknowledgement i
Table of Contents ii
List of tables iii
List of figures iv
Abstract v
1. Introduction 1
2. Literature Review 4
2.1 History of hepatitis B 4
2.2 Hepatitis B infection 4
2.3 Ways of transmission and risk Factor 7
2.4 Prevention methods 9
2.5 Susceptibility based on race 11
2.6 Diagnosis and treatment 13
2.7 Global prevalence of hepatitis B virus infection.....18
3. Objectives 21
3.1 General Objective of the study.....21
3.2 Specific objectives……21
4. Materials and Methods 22
4.1 Hospitals 22
4.2 Data collection 22
4.3 Ethical considerations 22
5. Results and Discussion 23
5.1 Data collected from medical records 23
5.2 Data collected from patients using questionnaire 26
5.3 Data collected from interview 28
6. Conclusion and Recommendation 30
6.1 Conclusion 30
6.2 Recommendations 30
7. Limitation of the Study 31
8. Reference……32
9. Appendices……..43

List of tables

Table1. Incidence of HB infection among different age groups at Yekatit 12 Referral Hospital and Megbare Senay General Hospital from 2015-2018 ----------23

Table2. Assessment of risk factor for hepatitis B infection at Megebare Senay General Hospital----------27

List of figures

Figure.1 Hepatitis B virus----------2

Figure.2 Estimated global prevalence of hepatitis B virus infection----------19

Figure. 3 Incidence of HB infection between 2015 and 2018----------25

ABSTRACT

Incidence, risk factors, and treatment of Hepatitis B (HBV) among patients visiting Yekatit 12 Referral Hospital and Migbare Senay General Hospital in Addis Ababa, between February 2015 and May 2018 were studied. The study was conducted based on medical records from Yekatit 12 Referral Hospital (n=177) and Migbare Senay General Hospital (n=128). All available information on the background profile of the patients was extracted from the medical records. Interviews with patients (n=2 from Yekatit 12 Referral Hospital) and questionnaire survey (n=10) from Migbare Senay General Hospital were used to assess possible risk factors that have resulted in their infection with HBV. Interview with gastroenterologist was conducted on types of treatment, medication, prognosis, duration of treatment, and challenges. A total of 305 cases of HBV infection were recorded from both hospitals. The number of patients within the age group 18-27 (n=97) was significantly higher. The lowest incidence was observed for the age groups 0-5 and 6-17 (n=7 in both cases). HBV infection was significantly higher in females (n=185) than in males (n=120) (Ashraf, 2010). HBV infection incidence increased between 2015 (n=63) and 2016 (n=109) and decreased through 2017 (n=78) and 2018 (n=55). The patients revealed prior exposure to several risk factors including multiple sexual partners, unsafe tooth extraction, abortion, contact with infected individuals, surgery, having a tattoo. Doctors indicated that most drugs prescribed for chronic hepatitis such as lamivudine are expensive and less available.

Keywords: HepatitisB, ,Incidence, Risk factor, Treatment and Prevention

1. INTRODUCTION

The liver is the second largest organ in the body located on the right upper quadrant of the abdomen. It weighs about three pounds and is shaped like a football that is flat on one side. The liver performs many jobs in the body. It removes harmful substances from blood. It also performs many critical functions that affect metabolism throughout the body, including: bile production that's essential to digestion, filtering of toxins from the body, excretion of bilirubin, cholesterol, hormones, and drugs, metabolism of carbohydrates, fats, and proteins, activation of enzymes, which are specialized proteins essential to metabolic functions, storage of glycogen, minerals, and vitamins (A, D, E, and K), synthesis of plasma proteins, such as albumin and clotting factors(Rima,2016; Mounika,2017)

Hepatitis refers to an inflammation of the liver cells and damage to the liver. There are different types and causes, but the symptoms can be similar (Nordqvist, 2017).The condition can be self-limiting or can progress to fibrosis (scarring), cirrhosis or liver cancer. It may result from various causes, both infectious (i.e. viral, bacterial, fungal, and parasitic organisms) and non infectious (i.e. alcohol, drugs, autoimmune disease and metabolic diseases). Autoimmune hepatitis is a disease that occurs when body makes antibodies against liver tissue. But hepatitis viruses are the most common causes of hepatitis in the world (Naga, 2017).There are several types of hepatitis viruses, such as type A, B, C, D, E, F and G. Among the hepatitis viruses, type A, B and C are the most common ones. In particular, types B and C lead to chronic disease in hundreds of millions of people and, together, are the most common causes of liver cirrhosis and cancer (Charles, 2016; Naga, 2017).

Hepatitis B virus (HBV) is causative agent of one of the world's major infectious disease with about 350 million people being chronic carriers of the virus and it is the tenth leading cause of death worldwide (Liang, 2009).

Hepatitis B is an infection of the liver caused by the hepatitis B virus. It can be acute and self-resolving, (Davis, 2018).It is one of the major and common infectious diseases of the liver worldwide, caused by a small enveloped DNA virus, the HBV. The virus was first discovered as "Australia antigen", later named hepatitis B surface antigen (HBsAg), in patient blood. Hepatitis

B e antigen (HBeAg) was identified several years later as a marker for patients at high risk for transmission of the disease (Tong et al, 2005).

Hepatitis B virus is spherical with a diameter of 42nm. Using negative staining of virions adsorbed to the electron microscopic grids, a double-shelled structure of the virions becomes apparent. The outer protein shell (or envelop) is formed by the HBs proteins (Kumar and Agrawal, 2004). Surface structure details such as knobs or spikes as observed on many other enveloped viruses are found on HBV (Sugauchi et al., 2004).The inner protein shell is referred to as the core particle or capsid, having a diameter of 34nm in cryoelectron microscopy (Hanazaki, 2004). It is composed of HBc protein and encloses the viral DNA, which is often positively stained (Fig.1) (Tsitsilonis et al., 2004)

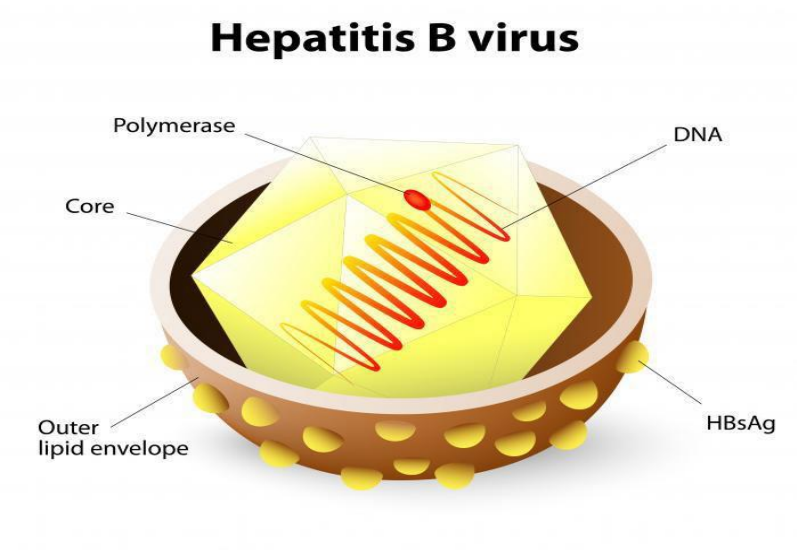

Fig.1 Structure of the Hepatitis B virus (Davis FNP, 2016)

The most common ways in which HBV spread include sexual contact, sharing of injecting equipments among persons who inject drugs , needle stick injuries in a health care setting, mother to baby at the time of birth(prenatal transmission) , transfusion of contaminated blood and blood products (Tsega, 2000).

As the symptoms of the different types of hepatitis are similar, the type and severity of hepatitis may only be diagnosed through laboratory tests. If hepatitis is suspected, the following tests can confirm a diagnosis such as blood tests, nucleic acid tests, a liver biopsy, elastography, ultrasound and surrogate markers. Laboratory diagnosis of hepatitis B infection focuses on the detection of the hepatitis B surface antigen HBsAg (Nordqvist, 2017).

Treatment options vary depending on type of hepatitis and whether the infection is acute or chronic. There is no specific treatment, cure, or medication for an acute HBV infection. Most people diagnosed with chronic HBV infection need treatment for the rest of their lives. Treatment for chronic hepatitis B may include Antiviral medications, Interferon injections and Livertransplant (Osborn and Lok, 2006). The goals of treatment for chronic hepatitis B virus infection are to reduce inflammation of the liver and to prevent complications by suppressing viral replication (Thad et al., 2010).

Hepatitis B infection occurs all over the world and there are approximately 620,000 HBV related deaths and approximately 4.5 million new HB infections occur worldwide each year. In high endemic areas like central Asian Republics(Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan), South East Asia, Sub-Saharan Africa and the Amazon basin the prevalence is over 8% but in low endemic areas like United States, Northern Europe, Australia and parts of South America the prevalence is less than 2%. In intermediate endemic areas like Middle East, some Eastern European countries and the Mediterranean basin the prevalence is between 2% and 8% (Franco et al., 2012).

The overall prevalence of HBV in Ethiopia varies from 4.7 - 16.8% for HB surface antigen . Patients with Diabetes Mellitus (DM) have high risk of infection through contaminated needles with HBV because of frequent blood tests (Mekonnen et al., 2014).

Study of epidemiology of diseases that have major public health importance such as hepatitis B should be conducted regularly to evaluate changes in the incidence and prevalence. Such studies are taken as integral parts of prevention, treatment planning and strategies. This study is justified on this basis. Specifically, it attempts to document the incidence of hepatitis B among patients who visited Yekatit 12 Referral Hospital and Megebare Senay General Hospital between 2015 and 2018.

2. LITERATURE REVIEW

2.1 Historical background

The hepatitis B virus was discovered in 1965 by Dr. Baruch Blumberg who won the Nobel Prize for his discovery. Originally, the virus was called the "Australia Antigen" because it was named for an Australian aborigine's blood sample that reacted with an antibody in the serum of an American hemophilia patient (Ganem and Prince,2004).HBV is a Hepatotrophic DNA-containing virus that replicates via reverse transcription (Shen et al., 2004). HBV is the only known DNA virus that has hepatocyte specificity (Lu et al., 2004). The virus was the first human hepatitis virus from which the proteins and genome were identified and characterized. Before discovery of the hepatitis viruses, two types of hepatitis transmission were differentiated based on epidemiological observations. Type A was considered to be predominantly transmitted by the fecal-oral route, whereas type B was transmitted by non-oral route (Seo et al., 2004).

Clinical and epidemiologic studies began to differentiate among various types of acute hepatitis in the decades after World War II. The groundbreaking studies of Krugman and colleagues in 1967 firmly established the existence of at least two types of hepatitis, one of which (then called serum hepatitis, and now called hepatitis B) was parenterally transmitted. Links to the virus responsible for this form of hepatitis were derived by serologic studies conducted independently by Prince and colleagues and by Blumberg and colleagues. Blumberg and colleagues, searching for serum protein polymorphisms linked to diseases, identified an antigen (termed Au) in serum from patients with leukemia, leprosy, and hepatitis, though the relationship of this antigen to hepatitis was initially unclear. By systematically studying patients with transfusion-associated hepatitis, Prince and coworkers independently identified an antigen, termed SH, that appeared in the blood of these patients during the incubation period of the disease, and further work established that Au and SH were identical. The antigen represented the hepatitis B surface antigen (HBsAg). These seminal studies made possible the serologic diagnosis of hepatitis B and opened up the field to strict epidemiologic and virologic investigation (Ganem and Prince, 2004).

2.2 Hepatitis B infection

The hepatitis B virus is a small, double-shelled DNA virus belonging to the Hepadnaviridae family of viruses. Hepatitis B virus is not related to the hepatitis A virus or the hepatitis C virus

(Nettleman and El.Mortada,2017). Other Hepadnaviridae include duck hepatitis virus, ground squirrel hepatitis virus, and woodchuck hepatitis virus(Littlejohn et al,2016). Humans are the only known host for HBV, although some nonhuman primates have been infected in laboratory conditions (Radii and Saud, 2017). HBV is relatively resilient and, in some instances, has been shown to remain infectious on environmental surfaces for more than seven days at room temperature(Pfaender et al,2018).

The HBV has a complex life cycle. The virus enters the host liver cell and is transported into the nucleus of the liver cell. Once inside the nucleus, the viral DNA is transformed into a covalently closed circular DNA (cccDNA), which serves as a template for viral replication (creation of new hepatitis B virus). New HBV virus is packaged and leaves the liver cell, with the stable viral cccDNA remaining in the nucleus where it can integrate into the DNA of the host liver cell, as well as continue to create new hepatitis B virus. The hepatitis B virus reproduces in liver cells, but the virus itself is not the direct cause of damage to the liver. Rather, the presence of the virus triggers an immune response from the body as the body tries to eliminate the virus and recover from the infection. This immune response causes inflammation and may seriously injure liver cells (Nettleman and El.Mortada,2017).

Hepatitis B is an infection of the liver caused by the hepatitis B virus. It can be acute and self-resolving, or it can be chronic, leading to cirrhosis and liver cancer(Davis,2018).Rarely, acute hepatitis damages the liver so badly it can no longer function. This life-threatening condition is called "fulminant hepatitis." Patients with fulminant hepatitis are at risk of developing bleeding problems and coma resulting from the failure of the liver. Patients with fulminant hepatitis should be evaluated for liver transplantation (Castaldo and Chari,2006) . The body's immune response is the major determinant of the outcome in acute hepatitis B. Individuals who develop a strong immune response to the infection are more likely to clear the virus and recover (Liang,2009). However, these patients also are more likely to develop more severe liver injury and symptoms due to the strong immune response that is trying to eliminate the virus. On the other hand, a weaker immune response results in less liver injury and fewer symptoms but a higher risk of developing chronic hepatitis B. People who recover and eliminate the virus will develop life-long immunity, that is, protection from subsequent infection from hepatitis B. Most infants and children who acquire acute hepatitis B viral infection have no symptoms. In these

individuals, the immune system fails to mount a vigorous response to the virus. Consequently, the risk of an infected infant developing chronic hepatitis B is approximately 90%. In contrast, only 6% to 10% of people older than 5 years who have acute hepatitis B develop chronic hepatitis B (Nettleman and El.Mortada,2017). The proportion of patients with acute HBV infection who progress to chronic infection varies with age and immune status(Fattovich et al;2008) . As many as 90% of infants who acquire HBV infection from their mothers at birth or in infancy become chronically infected. Of children who become infected with HBV between 1 year and 5 years of age, 30% to 50% become chronically infected. By adulthood, the risk of acquiring chronic HBV infection is approximately 5%(WHO,2001). Acute HBV progresses to chronic HBV in approximately 40% of hemodialysis patients and up to 20% of patients with immune deficiencies (Bernieh ,2015).

Chronic hepatitis B infection lasts six months or longer. It persist because the immune system can't fight off the infection. Chronic hepatitis B infection may last a lifetime, possibly leading to serious illnesses such as cirrhosis and liver cancer (Nordqvist,2017). Most people do not experience any symptoms during the acute infection phase. Some individuals experience only the initial infection, but others remain chronically infected, as the virus continues to attack the liver over time without being detected (Nordqvist, 2017).

Acute symptoms appear from 60 to 120 days after exposure to the virus, and they can last from several weeks to 6 months. The symptoms are similar to mild flu, and may include diarrhea, fatigue, loss of appetite, mild fever, muscle or joint aches, nausea, slight abdominal pain, vomiting, weight loss and Jaundice (Davis,2018). The signs and symptoms of chronic hepatitis B vary widely depending on the severity of the liver damage. They range from few and relatively mild signs and symptoms to signs and symptoms of severe liver disease .Most individuals with chronic hepatitis B remain symptom free for many years or decades. They are often asymptomatic and may not be aware that they are infected; however, they are capable of infecting others and have been referred to as carriers. During this time, the patient's liver function blood tests usually are normal or only mildly abnormal. Some patients may become worse and develop inflammation or symptoms, putting them at risk for developing cirrhosis (Nettleman and El.Mortada,2017).

An estimated two billion persons worldwide have been infected with HBV, and more than 350 million persons have chronic, lifelong infections. HBV infection is an established cause of acute and chronic hepatitis and cirrhosis. It is the cause of up to 50% of hepatocellular carcinomas (HCC) (Kwon and Lee ,2011; Toy, 2011).The World Health Organization estimated that more than 600,000 persons died worldwide in 2002 of hepatitis B-associated acute and chronic liver disease (Akhter et al.,2016).

Hepatitis B complications could lead to:

- Fulminant hepatitis
- Hospitalization
- Cirrhosis
- Hepatocellular carcinoma
- Death

While most acute HBV infections in adults result in complete recovery, fulminant hepatitis occurs in about 1% to 2% of acutely infected persons. About 200 to 300 Americans die of fulminant disease each year (case-fatality rate 63% to 93%). Although the consequences of acute HBV infection can be severe, most of the serious complications associated with HBV infection are due to chronic infection. Chronic infection is responsible for most HBV-related morbidity and mortality, including chronic hepatitis, cirrhosis, liver failure, and hepatocellular carcinoma. Approximately 25% of persons with chronic HBV infection die prematurely from cirrhosis or liver cancer. Chronic active hepatitis develops in more than 25% of carriers and often results in cirrhosis. An estimated 3,000 to 4,000 persons die of hepatitis B-related cirrhosis each year in the United States (Nelson et al.,2016).Persons with chronic HBV infection are at 12 to 300 times higher risk of hepatocellular carcinoma than non-carriers. An estimated 1,000 to 1,500 persons die each year in the United States of hepatitis B-related liver cancer.

2.3 Ways of transmission and risk factors

2.3.1 Ways of Transmission

The hepatitis B virus can survive outside the body for at least seven days. During this time, the virus can still cause infection if it enters the body of a person who is not protected by the

vaccine. The incubation period of the hepatitis B virus is 75 days on average, but can vary from 30 to 180 days. The virus may be detected within 30 to 60 days after infection and can persist and develop into chronic hepatitis B (Davis, 2018).

Perinatal transmission (transmission during birth) is the major route of HBV transmission in many parts of the world, and an important factor in maintaining the reservoir of the infection in some regions, particularly in China and South- East Asia. In the absence of prophylaxis, a large proportion of viraemic mothers, especially those who are seropositive for HBeAg, transmit the infection to their infants at the time of, or shortly after birth. The risk of perinatal infection is also increased if the mother has acute hepatitis B in the second or third trimester of pregnancy or within two months of delivery. Although HBV can infect the fetus in uterus, this appears to be uncommon and is generally associated with genital bleeding during pregnancy after the 20th to 24th week of pregnancy up to delivery and placental tears. The risk of developing chronic infection is 90% following perinatal infection (up to 6 months of age) but decreases to 20–60% between the ages of 6 months and 5 years(Dusheiko ,2016).

Horizontal transmission, including household, intra-familial and especially child-to-child, is also important. At least 50% of infections in children cannot be accounted for by mother-to-infant transmission and, in many endemic regions, prior to the introduction of neonatal vaccination, the prevalence peaked in children 7–14 years of age (WHO,2015).

Hepatitis B is also spread by percutaneous or mucosal exposure to infected blood and various body fluids, as well as through saliva, menstrual, vaginal, and seminal fluids. Sexual transmission of hepatitis B may occur, particularly in unvaccinated men who have sex with men and heterosexual persons with multiple sex partners or contact with sex workers. Transmission of the virus may also occur through the reuse of needles and syringes either in health-care settings or among persons who inject drugs. In addition, infection can occur during medical, surgical and dental procedures, through tattooing, or through the use of razors and similar objects that are contaminated with infected blood (Mohr et al., 2018).

2.3.2 Risk factors

Health workers can be at risk if they are exposed to unsafe medical practices, such as reusing medical equipment, not using personal protection, or incorrect disposal of sharps. Screening is available for people who have a higher risk of HBV infection or complications due to undiagnosed HBV infection. These include infants born to mothers with HBV,sex partners of infected persons, sexually active individuals who engage in unprotected intercourse or have multiple partners, men who have sex with men, injection drug users, people who share a household with someone who has chronic HBV infection, health care and public safety workers at risk from occupational exposure, for example, to blood or blood-contaminated body fluids,hemodialysis patients, anyone receiving chemotherapy for cancer and anyone coming from a region with a high incidence of HBV, including some Asian countries and all women during pregnancy(Hassan et al ; Davis,2018) .

2.4 Prevention methods

Several vaccines have been developed for the prevention of HBV infection. These rely on the use of one of the viral envelope proteins (hepatitis B surface antigen). The vaccine was originally prepared from plasma obtained from patients who had long-standing hepatitis B virus infection. However, currently, it is made using a synthetic recombinant DNA technology that does not contain blood products. One cannot be infected with hepatitis B from this vaccine (Mahoney et al; 2004).

Hepatitis can be dangerous and difficult to treat, so people are advised to take precautions against possible infection. Only allow the use of well-sterilized skin perforating equipment, such as during a tattoo, piercing, or acupuncture .Have the HBV vaccination if anybody is at risk. The hepatitis B vaccine is the mainstay of hepatitis B prevention. WHO recommends that all infants receive the hepatitis B vaccine as soon as possible after birth, preferably within 24 hours. The birth dose should be followed by 2 or 3 doses to complete the primary series. The complete vaccine series induces protective antibody levels in more than 95% of infants, children and young adults. Protection lasts at least 20 years and is probably lifelong (WHO,2011). All children and adolescents younger than 18 years-old and not previously vaccinated should receive the vaccine if they live in countries where there is low or intermediate endemicity (Nelson et al.,

2016).In those settings it is possible that more people in high-risk groups may acquire the infection and they should also be vaccinated. They include people who frequently require blood or blood products, dialysis patients, recipients of solid organ transplantations, people interned in prisons, persons who inject drugs, household and sexual contacts of people with chronic HBV infection, people with multiple sexual partners, healthcare workers and others who may be exposed to blood and blood products through their work, and travelers who have not completed their hepatitis B vaccination series, who should be offered the vaccine before leaving for endemic areas(Stasi et al;2017) . The vaccine has an excellent record of safety and effectiveness. Since 1982, over 1 billion doses of hepatitis B vaccine have been used worldwide. In many countries where between 8–15% of children used to become chronically infected with the hepatitis B virus, vaccination has reduced the rate of chronic infection to less than 1% among immunized children(Chang and Chen,2016).

In 2015, global coverage with the third dose of hepatitis B vaccine reached 84%, and global coverage with the birth dose of hepatitis B vaccine was 39% (WHO,2017). The WHO Region of the Americas and WHO Western Pacific Region were the only regions that have wide coverage. In addition, implementation of blood safety strategies, including quality-assured screening of all donated blood and blood components used for transfusion can prevent transmission of HBV. Worldwide, in 2013, 97% of blood donations were screened and quality assured, but gaps persist. Safe injection practices, eliminating unnecessary and unsafe injections, can be effective strategies to protect against HBV transmission. Unsafe injections decreased from 39% in 2000 to 5% in 2010 worldwide. Furthermore, safer sex practices, including minimizing the number of partners and using barrier protective measures (condoms), also protect against transmission(Hutin et al;2018)

In May 2016, The World Health Assembly adopted the first "Global Health Sector Strategy on Viral Hepatitis, 2016-2020" (WHO,2018) . The strategy highlights the critical role of Universal Health Coverage and the targets of the strategy are aligned with those of the Sustainable Development Goals. The strategy has a vision of eliminating viral hepatitis as a public health problem and this is included in the global targets of reducing new viral hepatitis infections by

90% and reducing deaths due to viral hepatitis by 65% by 2030(Singh ,2018) . Actions to be taken by countries and WHO Secretariat to reach these targets are outlined in the strategy**.**

To support countries in moving towards achieving the global hepatitis goals under the Sustainable Development Agenda 2030, WHO is working in the following areas:

- raising awareness, promoting partnerships and mobilizing resources
- formulating evidence-based policy and data for action
- preventing transmission and
- Scaling up screening, care and treatment services.

WHO also organizes World Hepatitis Day on July 28 every year to increase awareness and understanding of viral hepatitis **(**Diarra, 2017)

Lifestyle and home remedies (Lok ,2018).

If someone is infected with hepatitis B, he or she can take steps to protect others from the virus.

- Make sex safer; use a new latex condom every time while having sex.
- Tell sexual partners to get tested, anyone with whom you've had sex needs to be tested for the virus.
- Don't share personal care items, if using IV drugs, never share needles and syringes. And don't share razor blades or toothbrushes.

2.5 Susceptibility based on race

CDC surveillance data indicated a decrease in the incidence rate of Hepatitis B from 2000-2012 across all race/ethnicities. Despite the noted overall decreasing trend, acute Hepatitis B infection rates are highest among non-Hispanic blacks. This is in contrast to Asian/Pacific Islanders and Hispanics with the lowest rate (0.4 cases per 100,000 for each population). Non-Hispanic blacks in 2012 were found to have 1.1 cases per 100,000 populations. The 2012 data indicated that the rate for females in the surveillance data was 0.68 cases per 100,000 populations (CDC, 2014).

Multiple studies have established that injected drug use (IDU) puts an individual at greater risk for contracting HBV. Commonly, infection in the population occurs when exchanging or sharing needles, facilitating contact with infected blood of a Hepatitis B positive person. Despite the large number of research in this area; only a fraction of the research involves or is directed at African Americans, specifically black females who have history of injected drug use (IDU) and no injected drug use (NIDU).Beyond the scope of injected drug use, African American drug use as a whole creates a huge health inequality within that population. Persons who use non- injected drugs are also at risk for contracting blood borne illness via risky sexual behavior (Celentano et al., 2008).

Current research has shown that alcohol use is a common risk factor in the acquisition of many diseases. Alcohol induces a sedation state which impairs the individual's judgment and alters their behavior. The greater percent of research which focus on alcohol use has been among the white population. However, Bachman et al. (1991) study found that African American adolescents and young adults engage in less heavy drinking than their white counterpart. These findings may explain why African Americans are often overlooked in studies focusing on alcohol use. The lack of research data leaves the African American population less informed about the effects of alcohol specific to their race. Pedersen et al.'s (2012) suggests that when comparing the response rate after alcohol consumption between Europeans and African Americans; African Americans needed fewer drinks to feel intoxicated. The effect of increased sedation among African American females may contribute to poor judgment and risky behavior and consequently increase risk for contracting an infectious disease. Alcohol use has been associated with many adverse effects and health consequences. Sexual behavior and sexually transmitted diseases have been adversely linked to alcohol use (Seth et al., 2011). Individuals under the influence of alcohol are more likely to make poor decisions to include selection of sex partner. Consequently, individuals under the influence of alcohol are more at risk of becoming infected with Hepatitis B, HIV and other infectious diseases due to increased risky behavior (Seth et al., 2011).

Risky sexual behavior encompasses early age of sexual initiation, large number of sexual partners, anal sex, decreased condom use, and partner choice. Black females make up half of the

newly reported cases of sexually transmitted diseases in ages 15-24.They are more at risk of becoming infected with Hepatitis B (Pflieger et al., 2013).

Social Economic Status (SES) encompasses several factors including education, income and occupation (American Psychology Association, 2015) .Blacks are disproportionately represented among the lower socioeconomic class. Black children are three times more likely to grow up in lower income families than their white counterparts. Black females who are extremely affected by low SES may not have access to health care nor have adequate insurance to obtain vaccinations for their children. Women with lower socioeconomic status tend to engage in risky sexual behavior, drug use and are less likely to live in a married household .Thus they are more at risk of becoming infected with Hepatitis B (Cooper et al., 2007 and Rosenthal et al., 2014).

Since the 1940s research has shown that blacks are less likely to marry than whites (Torr, 2011). Studies have shown marriage to be a positive factor and beneficial to couples. Marriage has been shown to be beneficial across all racial groups however; least beneficial among black couples (Jackson et al., 2014).Black females living alone face financial and other difficulties. Black women with lower income may have less access to healthcare. Along with financial problems unmarried women also tend to have more sexual encounters than married women. Sexual contact outside of marriage as well as lower income and limited access to healthcare, among other things, seem to burden the black female population and may serve as contributing factors to their increase risk of contracting infectious diseases, including Hepatitis B (Phillip ,2015).

2.6 Diagnosis and treatment

2.6 .1 Diagnosis

As the symptoms of the different types of hepatitis are similar, the type and severity of hepatitis may only be diagnosed through laboratory tests(Dunphy,2015).If hepatitis is suspected, the following tests can confirm a diagnosis such as liver function tests, blood tests, nucleic acid tests, a liver biopsy, paracentesis, elastography, surrogate markers and ultrasound(Lurie et al;2015)

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- ***Liver function tests:*** use blood samples to determine how efficiently the liver works. High liver enzyme levels may indicate that the liver is stressed, damaged, or not functioning properly.
- ***Blood tests:*** These can detect whether the body is producing antibodies to fight the disease, and they can assess liver function by checking the levels of certain liver proteins and enzymes. They can be used to distinguish acute and chronic infections.
- ***Nucleic acid tests:*** For hepatitis B and C, HBV DNA or HCV RNA test can confirm the speed at which the virus is reproducing in the liver, and this will show how active the disease is.
- ***A liver biopsy:*** This can measure the extent of liver damage and the possibility of cancer. It is an invasive procedure that involves the doctor taking a sample of tissue from the liver. It can be done through the skin with a needle and doesn't require surgery. Typically, an ultrasound is used to guide the doctor when taking the biopsy sample. This test allows the doctor to determine how infection or inflammation has affected the liver. It can also be used to sample any areas in the liver that appear abnormal.
- ***Paracentesis:*** Abdominal fluid is extracted and tested, to identify the cause of fluid accumulation.
- ***Liver ultrasound:*** A special ultrasound called transient elastography can show the amount of liver damage, the liver's stiffness by emitting sound waves.
- ***Surrogate markers:*** A type of blood test that assesses the development of cirrhosis and fibrosis.
- ***Ultrasound:*** uses ultrasound waves to create an image of the organs within the abdomen. This can be a useful test in determining the cause of the abnormal liver function (Nordqvist, 2017).

Laboratory diagnosis of hepatitis B infection focuses on the detection of the hepatitis B surface antigen HBsAg. WHO recommends that all blood donations be tested for hepatitis B to ensure blood safety and avoid accidental transmission to people who receive blood products. Acute HBV infection is characterized by the presence of HBsAg and immunoglobulin M (IgM) antibody to the core antigen, HBcAg. The presence of HBeAg indicates that the blood and body fluids of the infected individual are highly infectious. Chronic infection is characterized by the

persistence of HBsAg for at least 6 months (with or without concurrent HBeAg). Persistence of HBsAg is the principal marker of risk for developing chronic liver disease and liver cancer (hepatocellular carcinoma) later in life (Nordqvist, 2017).

Anti-HBc (core antibody) develops in all HBV infections, appears shortly after HBsAg in acute disease, and indicates HBV infection at some undefined time in the past. Anti-HBc only occurs after HBV infection and does not develop in persons whose immunity to HBV is from vaccine. Anti-HBc generally persists for life and is not a serologic marker for acute infection(Gerlich,2013)

IgM anti-HBc appears in persons with acute disease about the time of illness onset and indicates recent infection with HBV. IgM anti-HBc is generally detectable 4 to 6 months after onset of illness and is the best serologic marker of acute HBV infection. A negative test for IgM-anti-HBc together with a positive test for HBsAg in a single blood sample identifies a chronic HBV infection. HBV DNA assays are used to monitor response to treatment, assess the likelihood of maternal-to-child transmission of HBV, and to detect the presence of occult HBV infection (i.e. infection in someone who tests HBsAg negative(Krajden et al;2005)

Screening healthy people for hepatitis B

Doctors sometimes test certain healthy people for hepatitis B infection because the virus can damage the liver before causing signs and symptoms. Screening for hepatitis B infection for someone who:

- Are pregnant
- Live with someone who has hepatitis B
- Have had many sexual partners
- Have had sex with someone who has hepatitis B
- Homosexual men
- Have a history of a sexually transmitted illness
- Have HIV or hepatitis C
- Have a liver enzyme test with unexplained abnormal results
- Receive kidney dialysis
- Take medications that suppress the immune system, such as those used to prevent rejection after an organ transplant

- Use illegal injected drugs
- Are in prison
- Were born in a country where hepatitis B is common, including Asia, the Pacific Islands, Africa and Eastern Europe
- Have parents or adopted children from places where hepatitis B is common, including Asia, the Pacific Islands, Africa and Eastern Europe

2.6.2 Treatment

Treatment options vary depending on type of hepatitis and whether the infection is acute or chronic. There is no specific treatment, cure, or medication for an acute HBV infection. Supportive care will depend on the symptoms (Davis, 2018).

Treatment for suspected exposure

Anyone who has unprotected exposure to another individual's potentially infected blood or body fluid can undergo a post-exposure "prophylaxis" protocol. This consists of HBV vaccination and HBIG (Hepatitis B immune globulin) given after the exposure and before acute infection develops. This protocol will not cure an infection that has occurred, but it decreases the rate of acute infection (Bhimji ; King,2018).

Treatment for acute hepatitis B infection

If hepatitis B infection is acute, it is short-lived and will go away on its own, may not need treatment. Instead, your doctor might recommend rest, proper nutrition and plenty of fluids while the body fights the infection. In severe cases, antiviral drugs or a hospital stay is needed to prevent complications. Acute hepatitis B doesn’t require specific treatment (Tillmann and Patel,2014)

Treatment for chronic hepatitis B infection

For chronic HBV infection, the World Health Organization (WHO) recommends treating the individual with an antiviral medication (Davis, 2018). Most people diagnosed with chronic hepatitis B infection need treatment for the rest of their lives. Chronic hepatitis B is treated with antiviral medications. This form of treatment can be costly because it must be continued for

several months or years. Treatment for chronic hepatitis B also requires regular medical evaluations and monitoring to determine if the virus is responding to treatment. Treatment helps reduce the risk of liver disease and prevents the patient from passing the infection to others. Treatment for chronic hepatitis B may include antiviral medications, interferon injections and liver transplant(Osborn and Lok, 2006).

- ***Antiviral medications:*** Several antiviral medications — including entecavir (Baraclude), tenofovir (Viread), lamivudine (Epivir), adefovir (Hepsera) and telbivudine (Tyzeka) — can help fight the virus and slow its ability to damage the liver. These drugs are taken by mouth.
- ***Interferon injections:*** Interferon alfa-2b (Intron A) is a man-made version of a substance produced by the body to fight infection. It's used mainly for young people with hepatitis B who wish to avoid long-term treatment or women who might want to get pregnant within a few years, after completing a finite course of therapy. Interferon should not be used during pregnancy. Side effects may include nausea, vomiting, difficulty breathing and depression.
- ***Liver transplant:*** If the liver has been severely damaged, a liver transplant may be an option. During a liver transplant, the surgeon removes the damaged liver and replaces it with a healthy liver. Most transplanted livers come from deceased donors, though a small number come from living donors who donate a portion of their livers (Kholodenko and Yarygin,2017).

The goals of treatment for chronic hepatitis B virus infection are to reduce inflammation of the liver and to prevent complications such as cirrhosis by suppressing viral replication (Thad et al; 2010). Treatment with current antiviral drugs suppresses viral reproduction in about 40% to 90% of patients with chronic hepatitis B. This can delay or reduce complications such as cirrhosis. However, only about 50% of people achieve a sustained viral suppression, and relapse is common. The medications do not cure the infection. Liver transplantation should be considered for patients with impending liver failure due to acute (initial) infection or advanced cirrhosis. Hepatitis B is preventable through vaccination. All children should receive the vaccine. In addition, adults at high risk for hepatitis B should be vaccinated. Unvaccinated people who are

exposed to hepatitis B should be evaluated by a physician to determine if they need specific immune globulin (HBIG) (Nettleman and El. Mortada,2017).

WHO recommends the use of oral treatments - tenofovir or entecavir, because these are the most effective drugs to suppress hepatitis B virus. They rarely lead to drug resistance as compared with other drugs, are simple to take (1 pill a day), and have few side effects so require only limited monitoring. Entecavir is off-patent, but availability and costs vary widely. Tenofovir is protected by a patent until 2018 in most upper-middle- and high-income countries, where the cost ranged from US$ 400 to US$ 1500 for a year of treatment in February 2017. While some middle-income countries (such as China and the Russian Federation) still face patent barriers in accessing tenofovir, generic tenofovir is affordable in most countries where it is accessible. The Global Price Reporting Mechanism (GPRM) indicates that the cost for a year of treatment ranged from US$ 48 to US$ 50 in February 2017.

There is still limited access to diagnosis and treatment of hepatitis B in many resource-constrained settings. In 2015, of the 257 million people living with HBV infection, 9% (22 million) knew their diagnosis. Of those diagnosed, the global treatment coverage was only 8% (1.7 million). Many people are diagnosed only when they already have advanced liver disease (Hellard et al,2017).

Among the long-term complications of HBV infections, cirrhosis and hepatocellular carcinoma cause a large disease burden. Liver cancer progresses rapidly, and since treatment options are limited, the outcome is in general poor. In low-income settings, most people with liver cancer die within months of diagnosis. In high-income countries, surgery and chemotherapy can prolong life for up to a few years. Liver transplantation is sometimes used in people with cirrhosis in high income countries, with varying success (Mazzanti et al;2016).

2.6 Global prevalence of hepatitis B virus infection

Hepatitis B infection occurs all over the world and there are approximately 620,000 HBV related deaths and approximately 4.5 million new HBV infections occur worldwide each year. In high endemic areas like central Asian republics(Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan,

and Uzbekistan) , South East Asia, Sub-Saharan Africa and the Amazon basin the prevalence is over 8% but in low endemic areas like United States, Northern Europe, Australia and parts of South America the prevalence is less than 2%. In intermediate endemic areas like Middle East, some Easter European countries and the Mediterranean basin the prevalence is between 2% and 8 %(Fig.2) (Franco et al., 2012).

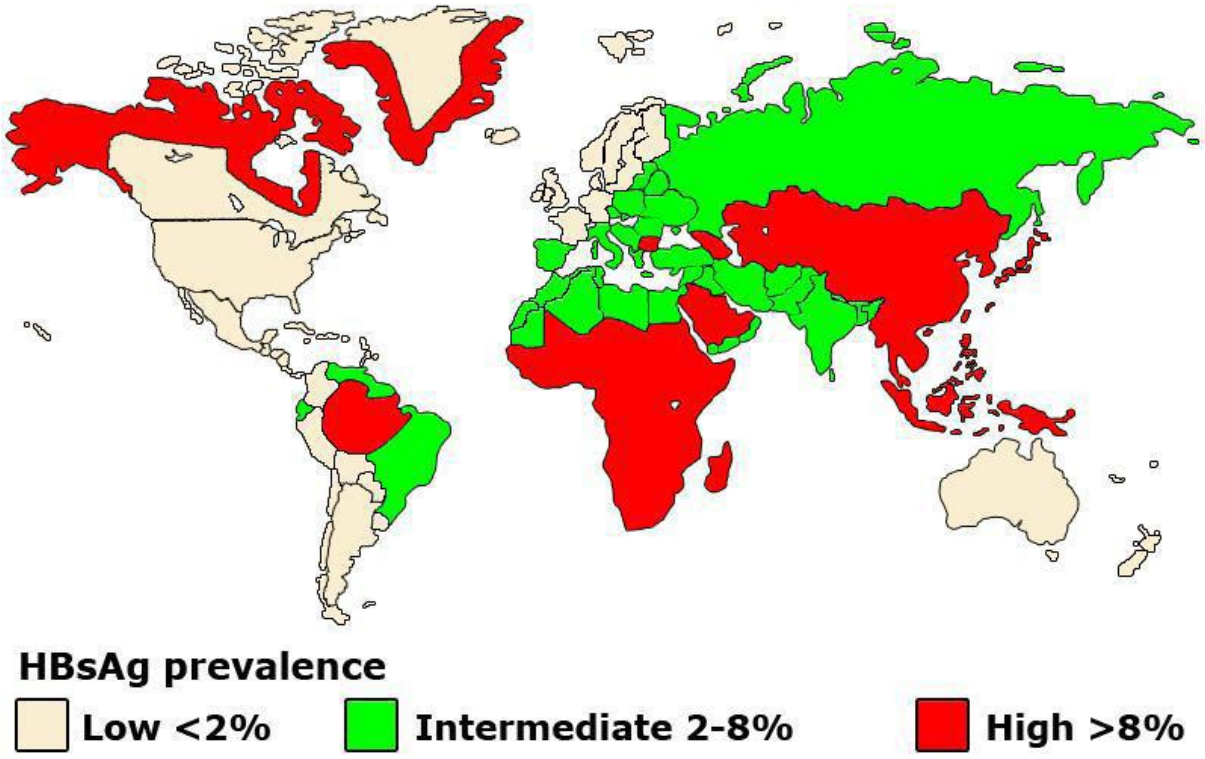

Fig.2 Estimated global prevalence of hepatitis B virus infection (Ott et al; 2012)

HBV is a major global health problem. Worldwide, some 887,000 people died from HBV-related liver disease in 2015. Between 850,000 and 2.2 million people in the United States are thought to be living with chronic HBV infection (Davis, 2018).

Globally, an estimated 350 million persons are chronically infected with hepatitis B virus (HBV), resulting in 600,000 deaths annually from cirrhosis, liver failure, and hepatocellular carcinoma. Approximately 88 % of the world's population lives in regions where the prevalence of chronic HBV infection among adults is more than 2%. The prevalence of HBV infection in the United States is 0.4 %, with an estimated 0.8 to 1.4 million persons chronically infected.

With the implementation of vaccination programs in 1991, the incidence of new infections in the United States has declined from 11.5 cases per 100,000 persons in 1985 to 1.6 cases per 100,000 persons in 2006 (Thad et al; 2010).

In the United States in 2005, the highest incidence of acute hepatitis B was among adults aged 25–45 years. Approximately 79% of persons with newly acquired hepatitis B infection are known to engage in high-risk sexual activity or injection-drug use. Other known exposures (e.g., occupational, household, travel, and healthcare-related) together account for 5% of new infections. Approximately 16% of persons deny a specific risk factor for infection. Although HBV infection is uncommon among adults in the general population (the lifetime risk of infection is less than 20%), it is highly prevalent in certain groups. Risk for infection varies with occupation, lifestyle, or environment.

Countries like Japan, India, central Asia and the Middle East including Eastern and Southern Europe, as well as parts of South America, are all areas with intermediate (2% to 7% HBsAg positive) prevalence of chronic HBV infection. Low prevalence (<2% HBsAg positive) of chronic HBV is found in regions including the United States, Northern Europe, Australia, and the southern part of South America (Amidu et al; 2012).

The overall prevalence of HBV in Ethiopia varies from 4.7 - 16.8% for HB surface antigen and 70-76% for at least one marker positive. Patients with Diabetes Mellitus (DM) have high risk of infection with HBV because of frequent blood tests (Mekonnen et al., 2014).

3. OBJECTIVES

3.1 General Objective of the study

The aim of this study was to assess incidence, risk factors, and treatment of hepatitis B (HB) among patients who visited Yekatit 12 Referral Hospital and Migbare Senay General Hospital in Addis Ababa, between 2015 and 2018.

3.2 Specific objectives to:

- determine HB incidence in subjects based on sex and age categories.
- determine annual rate of incidence in the subjects.
- assess available treatment options and challenges.
- assess possible risk factors pertinent to the patients included in the study

4. MATERIALS AND METHODS

4.1. Hospitals

The study was conducted at Yekatit 12 Referral Hospital and Migbare Senay General Hospital in Addis Ababa. Yekatit 12 Referral Hospital is located in Arada Sub-city, Woreda 06 and Migbare Senay General Hospital is located in Yeka Sub-city, Woreda 08,Addis Ababa,Ethiopia.

4.2. Data collection

Medical records, interview with patients and a medical doctor were used as data sources. Medical records available between February 2015 and May 2018 (n=177 from Yekatit12 Referral Hospital and n=128 from Migbare Senay General Hospital) were used. All available information on the background profile of the patients was extracted from the medical records. Interview with patients (n=2 from Yekatit 12 Referral Hospital) and questionnaire survey (n=10 from Migbare Senay General Hospital) were used to assess possible risk factors that have resulted in their infection with hepatitis B. In addition, information on treatment options and accessibility were obtained from interviews. Interviews with gastroenterology specialist yielded information on types of treatments, medication, prognosis, duration of treatment, and challenges. The overall data collection was conducted between December 2017 and May2018.

4.3. Statistical analysis

Variations in incidence of HBV infection between age, sex, and years were statistically analyzed using the nonparametric Chi-square test on SPSS ver. 17 software. The 95% confidence interval was used to determine the level of significance.

4.4. Ethical considerations

Ethical clearance was obtained from Addis Ababa University, College of Natural and Computational Science Institution Review Board (CNS-IRB) after the study protocol has been submitted.

5. RESULTS AND DISCUSSION

5.1. Data collected from medical records

5.1.1. Incidence among age groups

A total of 305 cases of HB were recorded from the two hospitals. This highest incidence was recorded in the age group 18-27 (n=97) followed by age group 28-37 (n=79) and 38-47 (n=55). The least number of HB cases were observed in age groups 0-5 and 6-17 (n=7) each. The difference in the number of cases under each age group was statistically significant ($p < 0.05$) (Table 1).

Table1. Incidence of HB infection among different age groups at Yekatit 12 Referral Hospital and Megbare Senay General Hospital from 2015-2018

Age groups	Number of incidence		
	Yekatit 12 Referral Hospital	Megbare Senay General Hospital	Total
0-5	4	3	7
6-17	2	5	7
18-27	73	24	97
28-37	39	40	79
38-47	29	26	55
48-57	16	12	28
58-67	9	12	21
≥ 68	5	6	11
TOTAL	**177**	**128**	**305**

In this study, it is found that the incidence of HB infection among patients visiting Yekatit 12 Referral Hospital and Migbare Senay General Hospital was 5.7% (305/5263).

According to established criterion, the incidence of HB infection in this study area can be classified as an intermediate endemicity area (WHO, 2015).This finding show similarity with a prevalence of 6.1% reported in Southern Ethiopia (Ramos et al., 2011) and 6% in Addis Ababa (Desalegn et al; 2016). But, relatively it is higher than 4.9%, 4.4%, 4.3% and 3.8% of prevalence which were reported from Dessie (Baye et al., 2014), Felege Hiwot (Molla et al., 2015), Arba Minch (Yohanes et al; 2016) and Bahir Dar city (Zenebe et al., 2014) , respectively. However, it is lower than earlier survey of Ethiopian blood donors (8%) (Kefene et al; 1988). On the other hand, in comparison with other countries, higher results (16.6%) were reported in Nigeria (Kolawole et al; 2012) and 10.6% in Ghana (Cho et al., 2012). Whereas, lower prevalence, 1.5%, 1.6% and 4% were reported in Libya, Algeria and Tunisia, respectively (Gasim. et al., 2013). This variation might be due to differences in cultural practices and sexual behavior.

Regarding to the age group, the highest incidence was recorded in the age group 18-27 (n=97) followed by age group 28-37 (n=79) and 38-47 (n=55). The least number of HB cases were observed in age groups 0-5 and 6-17 (n=7) each. The rate of HB infection subjects varies between countries, the highest values being detected in the 20-40 age class as a possible consequence of a major role played by horizontal transmission (Te and Jensen, 2010). According to study conducted by (Kolou et al., 2017), individuals with age range from 20-39 years old were more infected than children and older population. The main reason of these differences could be the sexual transmission of HBV. Sexual transmission was shown to be involved in HBV contamination (Custer, 2004; Shepard et al., 2006). The same trend was observed in Romanian adult population (18–69 years) during 2006–2008 (Gheorghe et al., 2013).

5.1.2. Incidence among males and females

The sex specific incidence rate of HBV was higher in females (n=185) than males (n=120). This difference was statistically significant ($p<0.05$).

The sex specific incidence rate was higher among females (185) than males (120) positive for HBsAg. The results reported in studies concerning HBV infection, study demonstrated that history of multiple sexual partners, nose piercing and history of abortion were significant predictors of HBV infection. Women with a history of abortion had a chance of 11 times to develop HBV infection compared to their male counterparts. Similar results were reported from

Jimma (Awole et al., 2005), Arba Minch (Yohannes et al., 2016), Addis Ababa (Dessalegn et al., 2016) and Dessie (Baye et al., 2014). This high incidence of infection could be attributed to poor practices of infection prevention control during abortion and related activities. Moreover, women with a history of multiple sexual partners were 17 times more likely to develop HBV infection compared with those having single partner. Similar findings reported in Addis Ababa, Ethiopia (Duncan et al., 1995) and in Nigeria (Rabiu et al;2010).This finding may be explained as hepatitis B is blood born virus; blood, semen and other body fluids are common source of infection that sexual contacts serve as a mode of transmission. Thus, sexually active women have a higher chance of getting the infection especially those who have the history of multiple sexual partners.

5.1.3. Annual trends of incidence

HB incidence increased between 2015 and 2016 from 63 to 109 and started to decline since 2017 (n=78) and 2018 (n=55). The annual variation in HB incidence was statistically significant ($p<0.05$) (Fig 3).

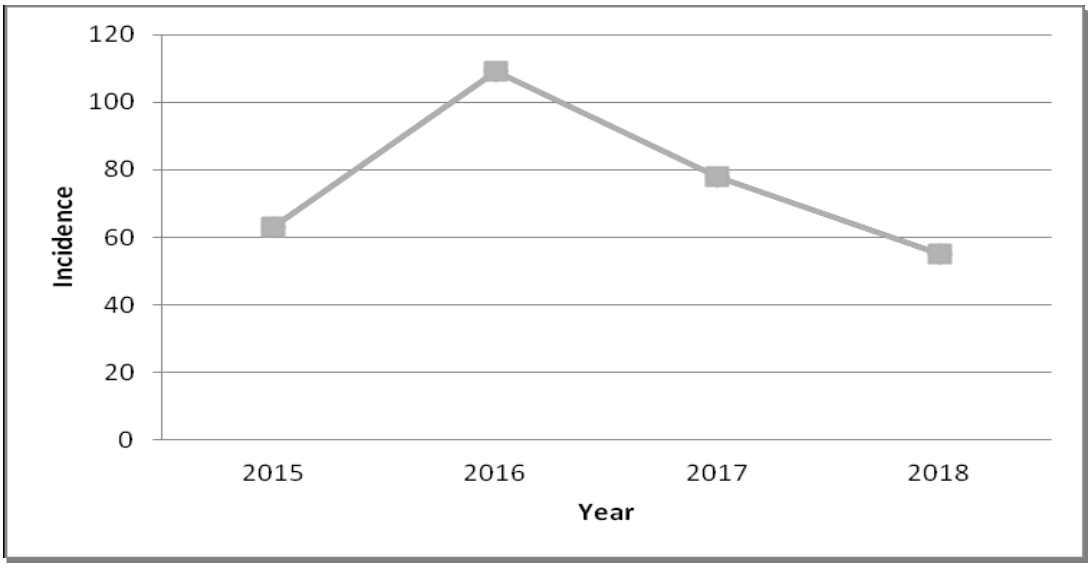

Fig 3. Annual trend of HB incidence at Yekatit 12 Referral Hospital and Megebare Senay General Hospital between 2015 and 2018

In the present study, HB incidence increased between 2015 and 2016 from 63 to 109 and started to decline since 2017 (n=78) and 2018 (n=55). In contrast a study by (Daniel et al., 2016)

reported that there was year to year decrement in the prevalence of HBsAg. A 12% prevalence was observed in 1990 in children and adolescents aged up to 19 years in western sub-Saharan African countries, the highest rate documented in the world in this age class, and only slightly decreasing in 2005. In southern sub-Saharan Africa, chronic HBV infection among younger age groups (0-14 years) had increased in 2005, with a prevalence of 8%-9% in females. Also in eastern sub-Saharan African countries, the HBsAg positivity rate had increased in the younger ages over time, whereas no significant changes were detected in the older age groups.

5.2. Data collected from patients using questionnaire (n=10)

The questionnaire survey revealed a number of potential risk factors to which the patients were exposed. These included; tooth extraction, having a tattoo, abortion, uvuloctomy, contact with HB infected person, and surgery. In addition, two of the patients reported history of STD while six patients had multiple sexual partners (Table 2).

Table 2. Assessment of risk factors for hepatitis B infection at Megebare Senay General Hospital.

	Sex	***Risk factors***
Potential accidental infection	Male	Circumcision
		Tooth extraction at health facility
		Unsafe hair cuts
	Male	Circumcision
		Tattooing on body
		Unsafe hair cuts
	Female	Abortion
		Ear piercing
		Tattooing on gum
	Male	Circumcision
		Uvuloctomy
		Unsafe hair cuts
	Male	Circumcision
		Tooth extraction at health facility
		Contact with HB patient
	Female	Ear piercing
		Tooth extraction at health facility
		Tattooing on gum
		Delivery by TBA
	Female	Ear piercing
		Contact with HB patient
	Male	Circumcision
		Contact with HB patient
		Unsafe hair cuts
	Female	Abortion
		Blood transfusion
	Male	Circumcision
		Surgical Procedure
		Blood transfusion
Risk of sexual transmission	Male (2)	History of STD
	Male(3) Female(3)	Multiple sexual partners

This study found among the risk factors studied to be associated with Hepatitis B included multiple sexual partners. Among other risk factors circumcision and tooth extraction in health facility are the common risk factors. In study conducted by Lavanchy (2004) results suggested that younger age of sexual initiation and multiple sex partners are significant risk factors for the acquisition of Hepatitis B Virus. The high HB incidence rate observed in this present study might be due to multiple sexual practices and low level of awareness of the different routes of HBV transmission.

5.3 Data collected from interview

5.3.1. Gastroenterologist

Interview was conducted with a gastroenterologist in Yekatit12 Referral Hospital.

In the interview, the doctor stated that treatments for acute and chronic HB infections are different. The acute stage is not treated with antiviral medications instead sufficient rest and plenty of fluids are suggested, vitamin B-complex is also prescribed.

The chronic stage is treated with antiviral medications. The treatment must be continued for several months or years and also requires regular medical evaluations and monitoring to determine if the virus is responding to treatment. The doctor also lists some of the approved drugs in Ethiopia for treating chronic stage of hepatitis B infection, such as lamivudine, adefovir, tenofovir, telbivudine, entecavir and interferons. Among these drugs, tenofovir is easily available type of drug but others are not easily available and also expensive such as lamivudine. Based on their side effects, the doctor also told me that tenofovir may cause renal toxicicity (nephrotoxicicity) and sometimes it may cause bone toxicicity. Adefovir may cause nephrotoxicicity even at low doses.

In relation to effectiveness of the treatment, the response of the doctor was that all above listed antiviral drugs are effective to treat HB infection.

According to the study conducted by Abate et al., (2014) hepatitis medications are not affordable to the majority of the population and the situation is not changed. Since there is no public funding/subsidy for hepatitis infections in Ethiopia, payment is generally out-of-pocket by the individual. In addition to that the drugs (tenofovir, lamivudine) are not readily available either in the public or private sectors in Ethiopia. Based on their side effect, tenofovir may cause renal toxicicity (nephrotoxicicity) and sometimes it may cause bone toxicicity. Adefovir may cause

nephrotoxicicity even at low doses. In relation to effectiveness of the treatment all above listed antiviral drugs are effective to treat hepatitis B infection.

5.3.2. Interview with patients

Interview was also conducted with two patients in Yekatit12 Referral Hospital.

One of the patients is a driver, he is 38 years old. In his life time he was infected with TB and STD. The risk factor of this patient to expose him for hepatitis B infection was unprotected sex. The other patient is 62 years old. He told me that his wife died 6 years ago with infection of HB. This suggests that he has got the disease from his wife.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The HBV incidence was higher in females compared to males (185 vs. 120). The incidence of HBV by specific age group was highest (97) in the age groups of 18-27. This suggests that these younger ages are highly expose to sexual initiation and multiple sex partners. HBV incidence showed increase between 2015 and 2016, but started to decline until 2018. The potential risk factors reported by patients included multiple sexual partners, circumcision and tooth extraction in health facilities without proper safety practices.

6.2 Recommendations

Since HBV is major health problem, the following recommendations are given

- Vaccination against HBV is recommended for all newborns and individuals who are at increased risk for infection.
- Awareness of people on high-risk behaviors such as reusing medical equipment and personal protection, incorrect disposal of sharps by health workers , sharing unsterile needles by drug users, repeated blood transfusions, having multiple partners etc..and also on modes of transmission of HBV is important to prevent viral infection.
- There should be public funding/subsidy for HB infections in order to solve unaffordable price of medication.

7. LIMITIONS OF THE STUDY

- Most patients were not volunteers for the interview and filling the questionnaire.

- This study was only able to document the incidence of HBV between 2015 and 2018 in two selected hospitals because these hospitals started diagnosis and treatment of HBV at the end of 2014.

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Appendices

አዲስ አበባ ዩኒቨርስቲ የተፈጥሮ ሳይንስ ትምህርት ክፍል

ለመረጃ ሰጭዎች፡- ጥያቄዉን ካነበባችሁ በኃላ መልሱን በተሰጠዉ ሳጥን ውስጥ ከተሰጡት አማራጮች በአንዱ የክኤስ ምልክት ይጻፉ ።

1. ጠ ቅ ላ ላ ጥ ያ ቄ

1.1. ኮድ----------

1.2. ፆታ ሀ. ወንድ ☐ ለ . ሴት ☐

2. ሄፓታይተስ "ቢ" ን በተመለከተ ጥያቄዎች

ከዚህ በታች ያሉትን በህይወትህ /ሽ አድርገህ /ሽ ታዉቃለህ /ቂያለሽ ?

2.1 . ያባለዘር በሽታ ሀ. አዎ ☐ ለ . አይደልም ☐

2.2. ከአንድ በላይ የትዳር ጓደኛ ሀ. አዎ ☐ ለ . አይደልም ☐

2.3. ደም መቀበል ሀ. አዎ ☐ ለ . አይደልም ☐

2.4 . ማስወረድ ሀ. አዎ ☐ ለ . አይደልም ☐

2.5 . ጤና ድርጅት ጥርስ ማስነቀል ሀ. አዎ ☐ ለ . አይደልም ☐

2.6 . ግርዛት ሀ. አዎ ☐ ለ .አይደልም ☐

2.7 . ማንኛዉም አይነት ቀዶ ጥገና ሀ. አዎ ☐ ለ . አይደልም ☐

2.8 . በልምድ አዋላጅ መዉለድ ሀ. አዎ ☐ ለ . አይደልም ☐

2.9. ጆሮ መበሳት ሀ. አዎ ☐ ለ . አይደልም ☐

2.10. አፍንጫ መበሳት ሀ. አዎ ☐ ለ . አይደልም ☐

2.11. እንጥል ማስቆረጥ ሀ. አዎ ☐ ለ . አይደልም ☐

2.12 ሰዉነት መነቀስ ሀ. አዎ ☐ ለ .አይደልም ☐

2.13. ድድ መነቀስ ሀ. አዎ ለ. አይደልም ☐

2.14. ፀጉር ቤት ፀጉር መቆረጥ / ፂም መላጨት ሀ. አዎ ☐ ለ . አይደልም ☐

2.15.የወፍ በሽታ ከያዘዉ ሰዉ ጋር ንክኪ ሀ. አዎ ☐ ለ . አይደልም ☐