KIBOGORA POLY TECHNIC

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF BIOMEDICAL LABORATORY SCIENCES

THE PREVALENCE OF HEPATITIS B AND C CO-INFECTION AMONG HIV PATIENTS UNDER ANTIRETROVIRAL THERAPY ATTENDING KIRINDA DISTRICT HOSPITAL.

This research project is submitted in Partial Fulfillment of the Requirements for the Degree of Bachelor of Biomedical Laboratory Sciences.

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Kibogora, August, 2019

DECLARATION BY THE CANDIDATE

We hereby declare that this is our own original work and not a duplication of any similar academic work. It has therefore not been previously or currently submitted for any other degree, diploma or other qualification to Kibogora polytechnic or any other institution. All materials cited in this paper which are not our own have been duly acknowledged.

Signature…… Signature ……..

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Date 26/08/2019

DECLARATION BY THE SUPERVISOR

I declare that this work has been submitted for examination with my approval as KP supervisor.

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ABSTRACT

Prevalence of hepatitis B and C co- infection among HIV patient under ART.

The main objective of our study is the prevalence of hepatitis B and C among HIV patient attending KIRINDA HOSPITAL. The methodology of our study was cross section involving all HIV patients above 18 years attending KIRINDA HOSPITAL. After carrying our study on sample size of 82 patients attending KIRINDA HOSPITAL we have seen that 5(6.1%), 6(7.3%) , and 1(1.2%) of those infected being detected with HIV/HBV, HIV/HCV and HIV/HBV/HCV co- infections respectively , which are higher than that previously observed in Rwanda. Un protected sexual intercourse was only significantly associated with such co – infection (p=0.018 and 0.028 for HIV/HBV, HIV/HCV respectively. After analyzing our data we recommended to the minister of health to advance the diagnostic evaluations such as HBV PCR and HCV RNA PCR testing that should be introduced in Rwanda. And also to emphasize on the vaccination of HBV and distribution of medicaments especially in rural areas. To kirinda hospital to make Planning and special attention regarding the selection of antiretroviral drugs for treatment, monitoring and follow up to assess disease progression of co-infected patients should be reinforced. To the Patients they should avoid consuming alcohol and use appropriate precautions to prevent transmission of HBV, HCV and HIV to others. To other researchers is to carry out the same study across the whole country using a large sample size and to further investigate more risk factors associated with hepatitis B and C co – infection among HIV patients under ART.

DEDICATION

we dedicate this research project to our God who protected us in our study, to our families , our parents for their support and advice that has help us in our daily life and our studies and all close friends.

ACKNOWLEGMENT

Above all we thank Almighty God for blessing us with knowledge, power and wisdom to make this research a success and for the strength health and will prevail over all the problems that would have prevented us from complicating this research project .Thank you Lord.

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May God bless you all

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LIST OF SYMBOLS AND ABBREVIATIONS

AIDS: Acquired Immuno Deficiency Syndrome

ALT: Alanine Amino Transferase

ART: Antiretroviral therapy

ARV: Antiretroviral

KH: kirinda Hospital

CD4: Cluster of Differentiation Four

CDC: Center for Disease Control and Prevention

HAART: Highly Active Antiretroviral Therapy

HBsAg: Hepatitis B surface Antigen

HBV: Hepatitis B Virus

HCV: Hepatitis C Virus

HIV: Human Immune Deficiency virus

IDUs: Intravenous Drug Users

SPSS: Statistical Program for Social Sciences

UNAIDS: Joint United Nation Program on HIV/AIDS

KP: Kibogora polytechnic

CHAPTER ONE: GENERAL INTRODUCTION

1.0 Introduction

This chapter describes exactly the background of the study, research questions Problem statement, and objectives of study. It explains clearly who benefit from the study and how as well as the scope and the scope and subdivision of the study.

1.1 BACK GROUND OF THE STUDY

Liver disease due to chronic hepatitis viruses (HBV) and (HCV) are emerging as a significant cause of morbidity and mortality among individuals infected with HIV. ((Sherman M, Screening for hepatocellular carcinoma: the rationale for the American Association for the Study of Liver Diseases recommendations, 2012)

The above problem is mainly accelerated by the infection of human immuno deficiency virus (HIV) which is still regarded a serious public health problem killing 1.1 million (940000-1.3 million) people per year (UNAIDS, 2016). While it is documented that majority of health (HIV negative) individuals are able to clear HBV, HIV – infected individuals do not easily do so without treatment (Alter, 2006).

Moreover HIV infection increases risk of re –activation of previously a symptomatic and chronic HBV and HCV infections (Basked at al, 2015). Hepatitis Band C co- infected individuals have a threefold risk of getting hepatotoxicity

(Sulkowski, 2007).

Highly active antiretroviral therapy (HAART) may slow liver disease progression (JF, 2009)

However, HAART might increase fibrosis in co- infected patient trough cumulative hepatotoxicity (Moodier, 2009)

When treatment for HIV and HCV is indicated, the regimen should be selected with special consideration of potential drug – drug interactions and overlapping toxicities with

HCV treatment regimen. It is advisable to avoid zidovudine when other antiretroviral drugs are used since, it may increase the risk of side effects. Via overlapping toxicities, such as anemia and neutropenia. The current treatment of chronic hepatitis C infection in HIV positive patient should be peg – interferon at standard doses plus weight based Ribavirin (Soriano, 2006)

The combination of tenofovirdisoproxilfumarate (TDF) with Emtricitabine or Lamivudine or Alafenamide, Emtricitabine should be used for the both HIV and HBV infection (Anderson, 2016).

Therefore proper diagnosis of HBV and HCV among HIV positive individuals is important prior to treatment in order to better manage the infection. HIV and hepatitis B or C virus have similar modes of transmission and potentiate each other and thus co – infection is common (Benhamou, 2004).

Up to 33% of people with HIV worldwide may be co – infected with HBV or HCV (Noubiap, 2015) .

Worldwide 2-15% of people living with HIV are co – infected with HCV, 90% of which are intravenous drug users, while chronic HBV infection affects an estimated 5-20% of people living with HIV. The burden of those co- infections is greatest in the Africa and south East Asia – regions (WHO, Prevention &Control of Viral Hepatitis Infection : Framework for Global., 2012).

In Rwanda, the general prevalence of HIV is estimated to be 3%. Data on the prevalence and incidence of HBV and HCV co – infection with HIV- infected adults are scarce. (RBC, 2013)

A study of (. Pirillo MF, 2007), while 4.9% had anti HCV antibodies. A study of conducted on prevalence of hepatitis B and C co- infected patients in Kigali city HIV clinic in Rwanda found it to be 5.2% for active HBV and 5.7% for anti HCV antibodies. (Rusine, 2013)

This study was to determine the prevalence of HBV and HCV co – infections as well as associated risk factors in people on HIV antiretroviral therapy at Kirinda Hospital.

1.2 PROBLEM STATEMENT

Worldwide hepatitis B virus account for an estimated 370 million chronic infection, HCV for an estimated 130 million, and HIV for an estimated 40 million. In HIV infected persons, an estimated 2-4 million have chronic HBV co- infection and 4-5 million have HCV co –infection. HBV, HCV and HIV share common routes of transmission, but they differ in their prevalence by geographic region and the efficiency by which certain types of exposure transmit them. Among HIV positive person studied from western Europe and the USA ,chronic HBV infection has been found in 6-14% overall ,including 4-6% of heterosexual, 9-17% of men who have sex with men (MSM) and 7-17% of infection has been found in 25-30 of HIV positive persons overall 72- 95 % of injection drug users 1-12 % of MSM and 9-27% of heterosexuals. (Alter M. , 2006). In sub – Saharan Africa the average of 15 and 17 % of HIV infected patients are also infected with HBV or HCV respectively. A systemic review of epidemiology of HIV co infection with HBV and HCV in sub Saharan Africa reported on HBsAg prevalence of up to 20 % in HIV infected patient in Cameroon. Studies of other special group put estimate of HCV prevalence in Cameroon between 1-13%.These data suggest that estimates of co- infection prevalence may vary depending on the risk group and geographic area .(VerucchiG, CalzaL, ManfrediR, & Chiodo 2004).

In Rwanda the HIV prevalence has remained stable at 3% in the last ten years. Data on the prevalence of HBV and HCV co – infection with HIV infected adults are scarce. (RBC, 2013) It has been found that one of frequent complications of HIV infection is hepatitis B co – infection and due to the common method of transmission of these two viruses, the incidence rate of co- infection is increasing. It has been established that the following reduction in the CD4 positive cells count to lower than 200 cell /ml, the immune system of HIV positive patients fails to develop an adequate immune response against microbial

agents and as a result re- activation of HBV infection and its related complication occur. While the Rwandan have made much effort on making policies and programs by emphasizing on vaccination against HBV, encouraging the use of condoms and provisional of ARVs, many of the co – infected HIV individuals may not benefit from proper treatment because they do not know their co – infection status since, HCV and /or HBV testing and monitoring in HIV patients is not routinely done. This study was to determine the prevalence of HBV and HCV co- infections as well as associated risk factors in people on HIV antiretroviral therapy in Kirinda Hospital.

However no research has ever done at Kirinda Hospital therefore a reason to why we were interested to do this research on the prevalence of hepatitis B and C co- infection among HIV patient under ART treatment attending Kirinda Hospital here to come out with new information about this worldwide health problem.

1.3. OBJECTIVES OF THE STUDY

1.3.1. GENERAL OBJECTIVES

To determine the prevalence of HBV, HCV co–infection among HIV patient under antiretroviral therapy attending Kirinda Hospital.

1.3.2 SPECIFIC OBJECTIVE

- To assess the risk factors associated with HBV and HCV co– infection among HIV patient under ARV attending Kirinda hospital.
- To determine the prevalence of HBV and HCV co – infection among HIV patient under ARV attending Kirinda hospital.

1.4 RESEARCH QUESTIONS

- What is the risk factor associated with HBV and HCV co- infection among HIV patient under ARV attending Kirinda Hospital?
- What is the prevalence of HBV and HCV co- infection under ARV attending Kirinda Hospital?

1.5. JUSTIFICATION AND SIGNIFICANCE OF THE STUDY

The study findings will contribute to understand how screening of hepatitis B and C infection in all HIV patients is of great importance in order to know the status of this viral infection in those patients before initiation of treatment. And also to know the risk factors that influence increase of hepatitis B and C co –infection in HIV patients. The results from this study will improve the monitoring of patients with HIV that are co- infected with both HBV and HCV and will help future researchers in providing them basic information on the subject and will be of great use to program planner, academics, policy formulators and implementers, lab technicians and other service providers in prevention of these co – infection. The generated information will support the minister of health in making policies concerning treatment and management of viral infection.

1.6. LIMITATIONS OF THE STUDY

Anticipated problem and limitation were:

1. Unwillingness of patients to give the required information.

2. Shortage of fund needed to facilitate our study could have been a problem.

3 Inability to use more advanced technology in our research during the time.

1.7 Scope of the study

1.7.1 Time scope

This study will focus on the prevalence of hepatitis B and C co- infection among HIV patient under ART aged from June to August 2019.

1.7.2 Geographical scope

The study will be carried out at KIRINDA HOSPITAL, RWANDA Country, WESTERN Province, KARONGI District, MURAMBI Sector, and SHYEMBE Cell from June to August 2019.

1.8 Organization of the study

This research proposal is subdivided into two parts. The part one complies of the cover page, dedication, declaration, acknowledgement, table of contents, abstract, Appendices and list of acronyms and abbreviations. The second part will complies of five chapters plus reference list. Chapter one involves the introduction, background of the study, the problem statement , the objectives of the study, research questions, significance of study, limitations and the scope of study, Chapter two covers the overview of relevant literature of hepatitis B and C co- infection among HIV patients . Chapter three describes study area, study design, sample size, target population, data collection method, data analysis procedure and ethical consideration, chapter four covers the Data analysis and discussion then Chapter Five covers Conclusion and recommendation.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter presents the review of the existing scholarly literature about the prevalence of hepatitis B and hepatitis C co- infection in HIV patient.

2.1. DEFINITION OF KEY CONCEPTS/TERMS

Hepatitis: Is a systemic disease primarily involving the liver inflammation (WHO, 2015).

Hepatitis B Virus (HBsAg): HBV envelope protein and excess coat particles detectable in the blood in acute and chronic hepatitis B infection (WHO, 2015).

Hepatitis C Virus (HCV): a lipid enveloped 55 nm RNA virus distantly related to the pest viruses and flavi viruses (weber, 2016).

Sensitivity of a test: the ability of the test to correctly identify those with infection or disease (WHO, 2015).

Specificity of a test: the ability of the test to correctly identify those without infection or disease (WHO, 2015).

HAART: It is used to improve the quality of personal's life reduce the risk of other complicating disease, also are cocktail of medications that interfere with replication. (Altice F. L., 2007).

Virus: is an infectious agent of small size and composition that can multiply only in living cells of animals, plants and bacteria. The name was from the Latin word means << slimy liquid or poison (WHO, 2015) .

Cirrhosis: an advanced liver disease characterized by extensive hepatic fibrosis, nodularity of the liver, alteration of liver architecture and disrupted hepatic circulation (WHO, 2015).

Health: complete state of physical, mental and social wellbeing and it does not consist only the absence of the disease and infirmity.(WHO,2014)

Prevention: action that stops something from happening (WHO,2015).

Alanine amino transferase (ALT): Intracellular enzyme which they are released after cell injury or cell death reflects liver cell injury (WHO, 2015).

Prevalence: Is defined as the number of cases of disease in defined population at specified point in time (Tenny & Hoffman, 2019).

2.2. **Theoretical Literature**

2.2.1 Historical Background

Prevalence: Is a statistical concept referring to the number of cases of a disease that are present in a particular population at a given time (Tenny & Hoffman, 2019).

Hepatitis B virus (HBV) is an enveloped partially double strand DNA virus of the family of Hepadnavirdae. Its genome encoded four overlapping open reading frame (ORFs) that are translated into viral core protein, surface protein, polymerase, reverse transcriptase and HBX. (Beck J.)HBV cause acute and chronic hepatitis from liver inflammation. 257 million people are living with hepatitis B virus infection and resulted in 887000 deaths in 2015 (WHO, 2017).

Hepatitis C virus (HCV) is a single stranded RNA virus of flavivirus family. Their envelope surrounds the nucleo capsid, which is composed of multiple copies of a small basic protein (core or C), the RNA genome. ((Lee, 2004)

It is a positive – strand RNA molecule, with an open reading frame (ORF) encoding a poly protein of 3000 amino acid or more .HCV cause a contagious (Choo QL, 1989)liver disease that ranges in severity from a mild illness that attacks the liver. Which can further lead to a serious liver problems, including cirrhosis (scarring of the liver) or liver cancer (WHO, 2017).

Globally, 71 million people are estimated to have chronic hepatitis C infection with approximately 399000 people dying each year from hepatitis C (WHO, 2017). 36.7 million People living with HIV globally and 1.1 million died of related cause by the end of 2015 (WHO, , 2016).

HIV is a single stranded RNA of retrovirus, retroviridiae family infecting T4 lymphocytes (immune cell which is normally defend the body against infection and some types of cancer) and other cells bearing the CD4 markers on their surface, destroying or impairing their function. Infected individuals gradually became immune deficient (Kayser, 2005).

HIV is classified as HIV -1 and HIV- 2 and has many genes and gene product including: Gag ,pol, env, tat, rev,vif,vpr, vpu , nef, that are responsible for their pathogenesis. (WHO, 2005)

HBV, HCV, and HIV share similar transmission routes thus, co – infection is common. HIV also increase the pathological effect of hepatitis viruses potentiate re- activation of latent infections as a result of reduced immunity (Baseke, 2015).

ARVs are drugs that are aim to prevent HIV from multiplying in the body. They do not kill or cure the virus however, when taken in combination they help to prevent the weakening of the immune system (Baseke, 2015).

The increase in the use of antiretroviral (ARVs) has led to longer period for patient survival apparently increase liver disease among HIV patient , mainly due to high risk of getting hepatotoxicity found in HBV-HIV and HCV-HIV co- infected individuals (Sulkowski, 2007).This co – infection result in rapid progressing chronic liver disease like fibrosis , cirrhosis , end stage liver disease , hepatocellular carcinoma (HCC) as well as mortality due to liver pathology unless proper treatment is indicated (Noubiap, 2015)

A study done in Cameroon to estimate the seroprevalence and identification of risk factors associated with hepatitis and/ or C co- infection in HIV infected patient from five regions of Cameroon 2015. 531 HIV infected people were screened for the presence of HBV surface antigen (HBsAg) and antibodies to HCV (HCV Abs) and enzyme linked immunosorbent were used as a confirmatory test. (Noubiap J. J., 2015)

The result indicated that sero prevalence for HBsAg and HCV Abs were 23.7%, respectively. This study showed that due to this high prevalence of co – infection of those

viruses there is need to screen all HIV people for HBV or HCV co – infection before initiating ARV to improve management strategy of those people who are co – infected. (Noubiap J. J., 2015)

A case control study conducted to determine and evaluate the prevalence of HBV and HCV co – infection among HIV patient accessing health care at federal medical center keffi, nasarawa state Nigeria where a total of 200 hundred sero positive HIV participant of those 11% were positive for HBV, 13.5% were positive for HCV and 5% were co – infected with both HBV and HCV. This is showed that HBV and HCV are increasing among HIV patient which turn out to be a major contributor to the increased morbidity, mortality rate among those patient as a result of rapid probation to AIDS and hepatocellular carcinoma. Therefore having acquired knowledge on the effect of HBV and HCV co – infection is essential to ensure proper and meaningful treatment ((Thio C. L, 2002)

In Kenya, the study done with the objective of determining the prevalence of HBV and HCV co – infection among HIV patient attending academic model providing access to health care (AMPATH) 5 ml of blood from each 124 respondent was obtained a vein puncture from consenting volunteers and screened with the ELISA test for detecting HBsAg and HCV Abs . 5.7% had HIV/ HBV co- infection while 1.6% had HIV/ HCV co-infection. 7% and 3.8 male had HIV/ HBV. 1.9% female and 1.4 % male had HIV/HCV co infection. There was no triple viral co-infection. Although HBV and HCV co infection with HIV were reported as low among the subject, the prevalence rate maybe higher among the patient how have infected with HIV. (J.Alter, 2003)

Same studies have related sero prevalence of HBV and HCV and its effect on liver. For example in 2007, a cross section study done Basek et al in UGANDA (Kampala) on prevalence of hepatitis B and C and relationship to liver damage in HIV infected patient attending Joint Clinical Research Center Clinic (JCRC)Serum samples were collected patients detection of hepatitis B surface antigen (HBsAg) HCV specific antibodies and alanine amino transferase (ALT) liver enzyme 89 patients have been enrolled , 22% had at least one hepatitis virus ,16.9% tested positive for HBsAg and 5.6% for HCV , this study

showed that HBV or HCV infection in HIV infected patients there is increase in liver cell injury but they did not mention the high hepatotoxicity found in co – infected patient which increases the liver morbidity and mortality . They suggest that due to the high prevalence HBV and HCV among HIV positive individuals point to a need for screening of HIV positive individuals for the hepatitis virus (Baseke, 2015) .

In Rwanda , a study conducted by Rusine where 400 HIV patients were enrolled 100 being women and 100 being men initiating ARV and 200 women who did not yet qualify for ARV found it to be 5.2% for active HBV and 5.7% for anti HCV antibodies. In this study, there was regular follow up of the participants. The weakness of which is through to be common among HIV positive and identifying active HCV infection among these positive for anti HCV due to expensiveness of the materials to be used in detecting these infection. They suggested that there is a need of developing new diagnostic algorithms that are reliable and affordable in developing countries (Rusine, 2013).

2.3. TRANSMITION OF HBV AND HCV

Hepatitis B virus is transmitted through exposure to semen infective blood, and body fluids (WHO, , 2016) . Mother to child transmission and person to person are most common mode of transmission of hepatitis B virus in high and intermediate endemicity area (Kyomuhangi, 2012).

It may be transmitted through sexual contact, hepatitis B can enter the body through the break in the lining of the vaginal, urethra, rectum and mouth (WHO, , 2016).

Hepatitis B virus poses a risk to health care worker who sustain accidental needle stick injury while carrying for infected hepatitis B virus patient. (WHO, , 2016). tattooing and body piercing using un sterile equipment contribute to the transmission of hepatitis B virus .HCV is mostly transmitted through exposure to infective blood. Either through transfusion of HCV contaminated blood and blood product but through screening of blood for HCV; this risk has been significantly reduced, or via exposure of contaminated and inadequately sterilized medical equipment during medical procedures (WHO, , 2016) .

It is documented that 90% of HIV/ HCV co- infected people are intra venous drug user and it is among the risk factor of transmission of HCV since the user share needle should be contaminated (WHO, 2012).

Sexual transmission is also considered, but with reduced chance the virus may be spread when needle used for body piercing or tattooing not sterilized and infected blood enters person's skin. (Hahn, 2007).

2.4. RISK FACTORS ASSOCIATED WITH HBV AND HCV COINFECTION WITH HIV.

They are similarities in the transmission routes of and risk factors for HIV and the Hepatitis B viruses (HBV) AND hepatitis C VIRUS infection but each has a different biology and natural history of chronic infection (Sungkanuparph, 2004).

Risk factors analysis was carried out on different factors associated with infection such as : Gender, Age, Hospital admission, dental procedure, Intravenous drug user surgical exposer , blood transfusion ,hemodialysis, family history ,sexual behavior (Chen, 2016).

According to univariate dental treatment, traditional exposure such as (tattooing and skin piercing) and gender were not significantly associated with hepatitis B virus/hepatitis C or HIV infection. Intravenous drug users, blood transfusion, hospital admission and hemodialysis were associated with increased risk of hepatitis c virus infection. ($p<0.001$) risk factors for HBV infection were mainly direct contact with infected individual and family history of HBV infection (Bùie, 2014)

2.5. PATHOGENESIS AND CLINICAL MANIFESTATION

The rate of progression and complication from viral hepatitis are accelerated in the patient with HIV co – infection. (Kovacs, 2011) After acquiring of HBV and HCV infection HIV infected individual 3 to 6 times more likely to develop chronic HBV and HCV than HIV negative individual particularly in the clinical setting of low CD4 count (Thio, 2002)

Decreased rates of clearance of HBsAg as well increased anti HCV and increased HBV replication are also seen, with higher HBV DNA viral load.

In addition, HIV infected individuals are more likely to lose previously developed protective anti HBsAbs and develops acute hepatitis B infection (Kovacs, 2011).

In HIV infected person, a rapidly progressive form of liver disease called fibrosing cholestatic hepatitis is seen and though to be due to a viral cytopathic effect (Lacombe, 2009)

.A novel-1G mutation was identified in the HBV pre – core and overlapping core genes, which was associated with higher HBV DNA concentration in HIV /HBV co- infection individuals and this contribute to disease pathogenesis (Singhartiraj, 2012).

HBV or HCV patient co- infected with HIV initiating antiretroviral therapy (ART) , immune reconstitution inflammatory syndrome (IRIS) which can lead to worsening liver disease including hepatic decomposition (Kovari, 2013).

Additionally, a potential association with adverse HIV outcomes in HBV co- infected individuals was demonstrated in the study where HIV associated immune deficiency was enhanced by active HBV replication (Lacombe, 2009).

Also, an HBsAg positive status has demonstrated an association with a slower virological response to HAART, compared to an HBsAg negative status (Hoffmann C. J., 2008) HIV also speeds up the progression of HBV and HCV related liver disease. HIV- HBV co – infected patients are greater 17 times more likely to die of liver related cause compared to those mono – infected with HBV but it is twice as high for chronic hepatitis B co- infected individuals (Hoffmann C. J., 2008).

The impact of co- infection is especially important in region with widespread use of antiretroviral therapy. For individuals on antiretroviral therapy, co- infected with chronic HBV increases the risk of hepatotoxicity from antiretroviral therapy three-folds (Jain, 2009).

The pathogenesis was found to be multifactorial with antiretroviral therapy exposure as an important risk factor which can occur due to antiretroviral therapy (ART) due to interruption of HIV/ HBV treatment (Chauvel, 2007).

Patients present with malaise, weakness, loss of appetite, jaundice, esophageal varices, ascites, splenomegaly, portal vein thrombosis, variceal hemorrhage, or liver failure as severe and life- threatening complication. Mortality in advanced stages of diseases is high (Chauvel, 2007).

2.6. DIAGNOSIS OF HIV/HBV OR HIV/HCV CO-INFECTIONS.

2.6.1. LABORATORY DIAGNOSIS

Diagnosis of hepatitis B or C in HIV – infected patient is based on testing all HIV- infected patients for HBV and HCV infection using sensitive immunoassays licensed for the detection of HBsAg and antibody to HCV in blood respectively. At risk HBV or HCV sero negative patients should undergo repeat testing annually. Patients who test HBsAg and or anti – HCV positive should be tested for liver enzyme like ALT, AST and GGT (Alberti, 2005)

As elevated ALT is a marker of liver inflammation. An ALT level three times the upper normal limit is correlated with a cirrhosis risk. Suggesting that elevated ALTs in at – risk determinations of HBV DNA PCR is also required to identify occult HBV infection (Eva, 2011)

Liver enzymes should be monitored on regular basis, every six months for normal ALT level. liver enzyme become abnormal for a period of at least three months, HBV or HCV treatment is required appropriately.

2.7. PREVENTION AND TREATMENT

2.7.1. PREVENTION

Person who is co- infected with HIV and with hepatitis viruses can have serious medical complication. Including an increased risk for liver – related morbidity (WHO, , 2016).WHO recommends that HIV – positive individuals are vaccinated as early as possible with the HBV vaccine. Post vaccination testing of people living with HIV is recommended 1-2 months after administration of the last dose of the vaccine series (WHO, , 2016).The best way to prevent HCV infection is to educate people about causes and transmission of HCV as well as possible ways to minimize it (CDC, 2016).

Patients with HCV and or HBV/HCV co- infection should be counseled to avoid consuming alcohol and to use appropriate precaution to prevent transmission of HCV/HBV and or HIV to others (Chauvel, 2007).

2.7.2. TREATMENT

The aim of HBV treatment is shown dawn viral replication and minimizes ongoing liver damage. Pegylated interferon and ribavirin are recommended for treatment of HCV/HIV co –infected patient (Di Martino, 2002)

HIV/HBV co- infected patient can be effectively treated by combination of tenofovirdisoproxilfumarate (TDF) with Emtricitabine (ETC) or Lamivudine (3 TC) or Alafenamide (TAF) / Emtricitabine (ETC) (Anderson, 2016).

CHAPTER THREE: METHODOLOGY

3.0. INTRODUCTION

This chapter described the method that was used to carry out study ; it consist of the following study area , study population ,study design , sample size , sampling method , data collection and analysis and ethical consideration .

3.1. RESEARCH APPROACHES AND DESIGN

A qualitative cross sectional study was used aiming at determining the prevalence of HBV and HCV co- infection among HIV patient under antiretroviral therapy attending KIRINDA District Hospital from June to July 2019.

3.2. TARGET POPULATION

Study population was all HIV patients above 18 years under antiretroviral therapy attending KIRINDA District Hospital for routine care from June to July 2019.

3.3. SAMPLE SIZE

Sample size calculated and obtained by using a formula as follow: $\mathbf{N= (t^2QP) \div d^2}$

N: Sample size

t: level of significance or confidence interval at 95%, which is equal to 1.96

P: prevalence which is equal to 5.7% (Rusine, 2013)

Q= 1-P

d: margin of error which is equal to 5%..$\mathbf{N= [(1.96)^2(1-0.057) \times 0.057] \div (0.05)^2=82.}$ The study was carried out on 82 HIV patients under ART. (Rusine, 2013)

3.4. Data analysis procedures

Basic descriptive studies were used to describe the cohort, overall and by HCV/ HBV co – infection status. Logistic regression was used to determine factors associated with HCV/HBV co –infection. Variables that was significant at the P=0.1 level in univariate were included in a multivariate analysis. Data was analyzed using SPSS, v 22 (IBM Corp., Armonk, NY).

3.5. RELIABILITY AND VALIDITY MEASURES

Data collection was conducted in the period of two months which is from June to July 2019. The aim of the study was explained to the patients. Participants who consent to participate in the study were asked to sign a consent form. Questionnaire was used to assess risk factors associated with HBV and HCV co-infection among HIV patients under ART treatment (the full questionnaire on appendix 2).

3.6. RESEARCH INSTRUMENTS FOR DATA COLLECTION

In our research we use so many instrument related with our qualification which are:

- Questionnaires
- Laptop
- Paper

3.7. ETHICAL CONSIRERATIONS

Written permission was granted by Kibogora Polytechnic and presented to Director General of Kirinda District Hospital, person in charge of HIV patients under ART. Before data collection participant was given an explanation about the study and consent form was given. To insure confidentiality investigators were receiving participants one by one for personal information (This was done in the presence of the participant and the investigator to secure those information), getting code numbers that was to represent him or her as well as filling questionnaire. Participant's specimen tube and their corresponding result was labeled using provided code numbers. The outcome was presented to Kirinda District Hospital especially to the department in charge of HIV infected patients under ART in order to follow those patients.

CHAPTER FOUR: PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

4.1.0 Introduction

This chapter presents the findings of data collected from 82 HIV patients at Kirinda district Hospital. The data presentations of this information about the patient were represented using tables and some comments were added after each table.

4.1 Presentation of data

Table 1: The seroprevalence of HBV and HCV co-infection among HIV patients in relation to GENDER and AGE.

Characteristics	Overall (%)	HIV/HBV + (%)	HIV/HCV + (%)	HIV/HBV/HCV + (%)
Gender				
Female	57(69.5)	3(60)	6(100)	0(0)
Male	25(30.5)	2(40)	0(0)	1(100)
Total	82(100)	5(6.1)	6(7.3)	1(1.2)
Age Groups				
19–30	10(12.2)	0(0)	0(0)	0(0)
31–40	17(20.7)	2(40)	3(50)	0(0)
41–50	27(32.9)	2(40)	2(33.33)	0(0)
>50	28(34.2)	1(20)	1(16.67)	1(100)
Total	82(100)	5(6.1)	6(7.3)	1(1.2)

82 HIV patients comprising 25 (30.5%) males and 57 (69.5%) females, with age ranged between 20–67 years with a mean age of 44.57 years, with men 46.6 and 43.68 years for females. The results indicate that 5 (6.1%) were HIV/HBV co-infected, 6 (7.3%) HIV/HCV co-infected, and with 1 (1.2%) of those infected being detected with HIV/HBV/HCV co-infections.

Table 2: Factors influencing HBV and HCV co-infection among HIV patient attending KIRINDA DISTRICT HOSPITAL.

History of High Risk behaviors		**HIV/HBV co-infection**		**HIV/HCV co-infection** (Benhamou, 2004)		**P-value**	
		Negative	Positive	Negative	Positive	HIV/HBV	HIV/HCV
		(76)	(6)	(75)	(7)		
Multiple sex Partner	Yes	30	5	29	6	0.037*	0.01*
	No	46	1	46	1	0.114	0.064
By using multiple logistic regression analysis							
Unprotected sex	Yes	16	5	16	5	0.001*	0.005*
	No	60	1	59	2	0.018*	0.028*
Blood transfusion	Yes	9	2	10	1	0.140	0.944
	No	67	4	65	6		
Sharing sharp objects	Yes	12	2	12	2	0.277	0.404
	No	64	4	63	5		
Surgery	Yes	3	1	3	1	0.168	0.232
	No	73	5	72	6		
Chronic liver disease	Yes	64	5	63	6	0.956	0.907
	No	12	1	12	1		
Family history of	Yes	2	1	2	1	0.109	0.158
	No	65	5	64	6		

hepatitis							

The findings indicate that using unavailable regression, multiple sexual partners with p-value 0.037 for HIV/HBV, 0.016 for HIV/HCV and unprotected sexual intercourse with p-value 0.001 for HIV/HBV, 0.005 for HIV/HCV were significantly associated with co-infections. Although, under multiple logistic regressions, only unprotected sex (p-value 0.018 for HIV/HBV, 0.028 for HIV/HCV) was significant.

Other factors like blood transfusion (p-value 0.140 for HIV/HBV, 0.944 for HIV/HCV), drug injections, tattooing (p-value 0.523 for HIV/HBV, 0.350 for HIV/HCV), sharing sharp objects (p-value 0.277 for HIV/HBV, 0.404 for HIV/HCV), surgery (p-value 0.168 for HIV/HBV, 0.232 for HIV/HCV), chronic liver diseases (p-value 0.956 for HIV/HBV, 0.907 for HIV/HCV), family viral hepatitis history (p-value 0.109 for HIV/HBV, 0.158 for HIV/HCV) were not significantly associated with co-infection.

Based on the above discussed data by multiple logistic regulation its shows every factors with comparison about co – infection of HIV and HBV ,HIV/HCV with their matched P values it define well the highly significant risk factors which causes the co infection of hepatitis B and hepatitis C in HIV patient which are multiple sexual partner, un protected sexual intercourse and also other factors like sharing sharp object ,blood transfusion, chronic liver diseases, family history of viral hepatitis ,were not significantly associated with that co infection.

4.2 SUMARY OF FINDINGS

According to the seroprevalence of HBV and HCV co-infection among HIV patients in relation to GENDER and AGE as shown in table 4.1The results indicate that 5 (6.1%) were HIV/HBV co-infected, 6 (7.3%) HIV/HCV co-infected, and with 1 (1.2%) of those infected being detected with HIV/HBV/HCVco-infections. this is not high compared to the study of (Rusine, 2013)

In the study the prevalence of HBV and HCV infection in HIV infected adults in Kigali conducted on prevalence of hepatitis B and C co-infection in HIV-infected patients in

Kigali city HIV clinics in Rwanda found it to be 5.2% for active HBV and 5.7% for anti-HCV antibodies.

According to Factors influencing HBV and HCV co-infection among HIV patient to the findings indicate that using unavailable regression, unprotected sexual intercourse with p-value 0.001 for HIV/HBV, 0.005 for HIV/HCV were significantly associated with co-infections. Although, under multiple logistic regressions, only unprotected sex (p-value 0.018 for HIV/HBV, 0.028 for HIV/HCV) was significant.

Other factors like blood transfusion (p-value 0.140 for HIV/HBV, 0.944 for HIV/HCV), drug injections, tattooing (p-value 0.523 for HIV/HBV, 0.350 for HIV/HCV), sharing sharp objects (p-value 0.277 for HIV/HBV, 0.404 for HIV/HCV), surgery (p-value 0.168 for HIV/HBV, 0.232 for HIV/HCV), knowledge about viral hepatitis (p-value 0.956 for HIV/HBV, 0.907 for HIV/HCV), family viral hepatitis history (p-value 0.109 for HIV/HBV, 0.158 for HIV/HCV) were not significantly associated with co-infection. This is not different from one done by (Chen *et al*, 2016).

Hepatitis B and C Co-Infection in HIV Patients from the TREAT Asia HIV and According to univariate analysis, dental treatment, traditional exposures (such as tattooing and skin piercing) and gender were not significantly associated with HBV, HCV or HIV infection. Intravenous Drug Users, blood transfusion, hospital admission and hemodialysis were associated with increased risk of HCV infection ($P<0.001$)

(Bùi, 2014) Risk factors for HBV infection were mainly direct contact with infected individuals and a family history of HBV infection. According to the factors which influence the co- infection in HIV patient the study done by (L. Highleyman, et al 2010) , in national hospital of tropical disease , Vietnam based on the following factors: injection drug used and sexual intercourse shows the following result data on 724 HIV positive patients treated at the HIV outpatient clinic in NHTD during the study period. Of these, 364 (50.3%) were determined to be co- infected. Of these, 61/724 were seropositive for only HBV (8.4%), 256/724 were seropositive for only HCV (35.4%), and 47 were seropositive for both HCV and HBV (6.5%). As comparison with our finding the co-

infection in this hospital is high but also co infection with viral hepatitis is common in HIV patients.

Worldwide 33% of people living with HIV may be co- infected with both HCV and HBV.(Noubiap et al 2015) also 2-15% HIV patient are co infected with HCV ,90% of which are intravenous drug users(WHO,2012).

The study carried out in Libya on the seroprevalence of HBV/HCV and HIV co- infection and risk factors in Tripoli: A total of 9,170 participants from the nine districts of Tripoli were enrolled. The average prevalence of HBsAg was 3.7%, anti-HCV 0.9%, anti-HIV 0.15% and co-infection 0.02%. The prevalence varied from one district to another. HBV was more prevalent among those aged over 50 years and was associated with family history. Anti-HCV and anti-HIV were more prevalent among those aged 20–40 years. Intravenous drug use and blood transfusion were the main risk factors for HCV and HIV infection. As comparison with our finding based on the risk factor here in this study done in Libya the significant risk factors were intra venous drug users and blood transfusion while in our study carried out in KIRINDA Hospital the intravenous drug users and blood transfusion it is not associated with co infection of HBV /HCV in HIV patient because in Rwanda the blood to be transfused must be screened and tested for HIV and other related contagious disease which can be transmitted through blood (Romano L ,et al 2007).

In Rwanda the general prevalence of HIV estimated to be 3% (RBC,2013) while the data on the prevalence of HBV/HCV co- infection in HIV adult are scarce.

A study of (. Pirillo MF, 2007) in HIV – positive pregnant women in Rwanda found that 2.4% had active HBV, while 4.9% had anti HCV antibodies. A study of (Rusine, 2013) conducted on prevalence of hepatitis B and C co- infected patients in Kigali city HIV clinic in Rwanda found it to be 5.2% for active HBV and 5.7% for anti HCV antibodies. While our study was found it to be 6.1% HIV/HBV, and 7.3% HIV/HCV , 1.2% HIV/HBV/HCV co infection ,it seems to be higher than that previously observed in Rwanda (Rusine, 2013).

CHAPTER FIVE: GENERAL CONCLUSION AND RECOMMENDATIONS

5.0 INTRODUCTION

This chapter provides conclusions recommendations and suggestion on "the prevalence of HBV and HCV co- infection among HIV patients under ARVs attending KIRINDA district hospital as the case of study.

5.1 CONCLUSION

In conclusion, high prevalence of HBV, HCV co-infections was found in HIV infected population as these viruses share common route of transmission. This highlights the importance and the need of routine screening and constant surveillance in HIV patients before initiation of treatment prior to better management of co-infected population. Identified factors such as unprotected sexual intercourse and multiple sex partner also emphasizes the need of proper and increasing vaccination against HBV in high risk individuals, as well as educating HIV positive individuals regarding the prevention measures of these viral transmission.

5.2 RECOMMENDATION

- **Ministry of Health (MOH)**

- To advance the diagnostic evaluations such as HBV PCR and HCV RNA PCR testing should be introduced in Rwanda.
- Emphasis on the vaccination of HBV and distribution of medicaments especially in rural areas.
- Also emphasize on health education to educate people on how they can these virus transmitted and how they can prevent them.

- **KIRINDA District Hospital**

  - Planning and special attention regarding the selection of antiretroviral drugs for treatment,
  - Monitoring and follow up to assess disease progression of co-infected patients should be reinforced.

- **Patients**

- Patients should avoid sharing sharp objects and use appropriate precautions to prevent transmission of HBV, HCV and HIV to others

➢ **To other researcher**

To other researchers is to carry out the same study across the whole country using a large sample size and to further investigate more risk factors associated with hepatitis B and C co – infection among HIV patients under ART.

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APPENDICES

Appendix 1: QUESTIONNAIRE (English)

Dear participant,

We kindly request you to take your time to answer the following questions in the questionnaire, so that we can use your ideas in this research project. Our research topic is to assess prevalence of Hepatitis B and C co-infection in HIV patient under ART attending Kirinda District Hospital.

1. IDENTIFICATION OF THE INTERVIEWED

1. Code number:
2. Date of Birth:
3. Sex:
4. Profession:
5. Province:
6. District:
7. Sector:

2. QUESTIONS

PART 1: QUESTIONS RELEVANT WITH LIVING CONDITION OF THE PATIENT ATTENDING KIRINDA DISTRICT HOSPITAL.

1. What is your education level?

Primary ☐

Secondly ☐

University ☐

None ☐

2. What is your marital status?

Single ☐

Married ☐

3. How many sexual partners do you have had since past years?

One ☐

Two ☐

Three ☐

Above three ☐

None ☐

4. Have you ever used a condom while doing sex?

Yes ☐

No ☐

If yes, how often do you use it?

Always ☐

Sometimes ☐

5. Have you got any information about Viral Hepatitis?

Yes ☐

No ☐

If yes, how is Viral Hepatitis transmitted?

Unprotected sexual intercourse ☐

Sharing sharp objects ☐

From mother to infant during labour ☐

6. Does anybody in your family have virus hepatitis?

Yes ☐

No ☐

7. Did your partner ever user needle while injecting medication or drugs?

☐

Yes

No ☐

8. Did you get injured by needle? If yes ,how?

a) Accidently ☐

b) While injecting medication ☐

c) None ☐

9. Did you share sharp objects with others?

Yes ☐

No ☐

10. Have you ever get blood transfusion?

Yes ☐

No ☐

11. Did you undergo surgery intervention?

Yes ☐

No ☐

12. Do you have tattoos?

Yes ☐

No ☐

Appendix 2: PATIENT CONSENT FORM

TITLE OF THE STUDY: The prevalence of HBV and HCV co-infection among HIV patient under anti-retroviral therapy treatment.

Location: KIRINDA Hospital (Karongi district)

INVESTIGATORS: Names **Phone number**

NYIRAMISIGARO Felicite: **07885171133**

BENIMANA Emerthe: **0783581927**

Purpose: You are invited to participate in a research study voluntary. The purpose of this study is to determine the prevalence of HBV/HCV co- infection among HIV patients under ART attending Kirinda district hospital.

Procedures

If you consent to participate, a venipuncture will be done by a qualified technician to draw 5ml of blood from your forearm and this will take 30 to 40 minutes. The blood sample will be analyzed for HBV and HCV. You will also be required to respond (answer) to the questions related to transmission risk factors of HBV and HCV.

Risks

The risks of having blood drawn include minor bleeding and bruising. All of these do not cause any significant problems.

Benefits

There will be no direct benefits but results from this study will help the clinicians, planner and even government to offer the best services in the cure and treatment of HIV, HBV and HCV disease among the population in the future.

CONFIDENTIALITY

Your blood sample will be assigned a code number and the key to the code will be maintained by the Supervisor. Your identity will not be revealed to any unauthorized persons and you will not be personally identified in any reports or publications that may result from this study.

RIGHTS

Your participation is totally voluntary and there is no penalty for refusing to take part. You have right to get information collected on you in this study. If the study design is to be changed or any new beneficial or adverse effect related to the study, you will be informed.

QUESTIONS

If you have any questions, please ask us. If you have any additional or question later, contact the investigators through our phone numbers above.

Declaration by participant:

I hereby consent to take part in this study.

Participant's name:

Signature: Date:

Declaration by member of research team:

I have given a verbal explanation of the research project to the participant, and have answered the participant's questions about it. I believe that the participant understands the study and has given informed consent to participate.

Researcher's name:

Signature: Date:

Appendix 3: DATA COLLECTION REPORT FORM

TOPIC: PREVALENCE OF HBV AND HCV CO-INFECTION AMONG HIV PATIENTS UNDER ART ATTENDING KIRINDA DISTRICT HOSPITAL.

PARTICIPANT RESULT FORM

PARTICIPANT CODE NUMBER

AGE

SEX

ADRESS: Province.....District.....Sector.....Cell.....

Phone number: .....

Date of collection...../...../.....

Date of analysis ...../...../.....

TESTS DONE

SEROLOGICAL TESTS

I. SCREENING TESTS.

HBsAg result: .....

Anti-HCV result: .....

Date of results: ...../...../.....

Researcher names and signature

….....

. **Appendix Recommendation letter of collecting date**

Appendix 5 Letter of approval of collecting data

Appendix 6 Data collection sheet

NO	ID	AGE	SEX	POSITIVE	NEGATIVE
1					
2					
3					
4					