

KIBOGORA POLYTECHNIC

FACULTY OF HEALTH SCIENCES

DEPARTMENT OF BIOMEDICAL LABORATORY SCIENCES

TOPIC: PREVALENCE OF RENAL DYSFUNCTION AMONG HIV PATIENTS ATTENDING KABUTARE DISTRICT HOSPITAL

The undergraduate thesis presented in partial fulfillment of the requirements for the Bachelor's degree with honor in biomedical laboratory sciences.

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Declaration by candidate

We zita UMUHOZA and Emmanuel DUSENGE hereby declare that this is our original work and not a duplication of any similar academic work. It has therefore not been previously or concurrently 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 has been duly acknowledged.

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ABSTRACT

The research entitled “Prevalence of renal dysfunction among HIV patients”. The use of antiretroviral therapy (ART) led to a remarkable improvement in survival and reduction of opportunistic infections worldwide. The advancement in prognosis has changed the leading causes of mortality in HIV infected patients from infectious to non-infectious causes with kidney disease increasingly emerging as being significant. Nevertheless, the use of ART increased the life expectancy of people living with HIV but was found to increase the risk of having kidney dysfunction. Though 18.2 million people worldwide were receiving antiretroviral therapy by 2016; only 40% of HIV-infected persons in sub-Saharan Africa received antiretroviral therapy as of 2014 (Solomon, *et al.*, 2014). Despite the high prevalence of HIV in sub-Saharan Africa and high risk for renal dysfunction among HIV infected patients, it has been studied relatively infrequently in this population and especially in Rwanda. In particular, the prevalence of serum creatinine which has recently been associated with increased mortality, has received little attention. This study intended to determine the prevalence of CKF among HIV positive patients in Kabutare Hospital, to identify the factors associated with CKF among HIV positive patients in Kabutare Hospital and to grade the stage of the renal dysfunction among HIV Patients in Kabutare Hospital.

It used a quantitative approach with retrospective cohort design. It used a sample size of 150 HIV patients. The findings revealed that the renal dysfunction among HIV in Kabutare Hospital was high 27.3%. This prevalence was associated with older age 53.3% and type of ARV that patients are taking where tenofir is highly riskier drug 25.8%. A high number 41.5% of all HIV patients with kidney failure had a severe kidney failure. The use of tenofir at initiation of ARV increases risk for kidney dysfunction since it causes a decrease in creatinine clearance and kidney tubular dysfunction. Glomerular filtration rate is not routinely measured and proteinuria is not regularly checked. Thus, screening for abnormal GFR not merely measuring creatinine in HIV infected patients prior to the initiation of ARV for proper dosing of antiretroviral medication and early detection of kidney dysfunction among HIV patients therefore we recommend the government to make available needed machine and engage more laboratory technician to facilitate the task.

DEDICATION

This study is dedicated to Almighty God for his protection since the beginning until the end of our study. We also dedicate it to our Parents for their thoughtful and caring assistance and support during our studies. We cannot forget our supervisor for the strong ideas he gave us to our research project, our lovely classmates we used to share ideas about the studies, brothers and sisters for their support and prayers.

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May the Lord God bless them

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LIST OF ABBREVIATIONS

ARV: Antiretroviral

ART: Antiretroviral therapy

CKD: Chronic Kidney diseases

CKF: Chronic Kidney Failure

eGFR: estimated glomerular filtration rate

ESRD: End-stage renal disease

HIV: Human immune deficiency virus

IDSA: Infectious Disease Society of America

TDF: Tenofovir disoproxil fumarate

WHO: World Health Organization

CHAPTER ONE: GENERAL INTRODUCTION

1.0 BACKGROUND OF THE STUDY

The use of antiretroviral therapy (ART) showed a noteworthy improvement of HIV patients and led to decrease of opportunistic infections all over the world (Palella, *et al*, 2007).

The improvement in prognosis has changed the leading causes of mortality in HIV infected patients from infectious to non-infectious causes with kidney disease increasingly emerging as being significant (Mpondo, B., *et al*, 2011).

Nevertheless, the use of ART increased life expectancy of people living with HIV but was found to increase the risk of having kidney dysfunction. Renal dysfunction results directly or indirectly from a variety of mechanisms including the HIV infection, HIV-induced inflammation, comorbid diseases and drugs such as antiretroviral therapy (Flandre,*et al*, 2011)

In the systematic review and meta-analysis study on the Chronic kidney disease in the global adult HIV infected population shown that the overall CKD prevalence was 6.4%.The Africa has the highest CKD estimated at 7.9%.The differences in prevalence of CKD within Africa WHO region among people living with HIV were remarked where prevalence was highest in West Africa with 14.5% while lowest in Southern Africa with 3.2% (Udeme, Ekrikpo, *et al*, 2018).

In France, HIV has been associated with the rise up of the prevalence of kidney dysfunction where it was estimated at 0.7% (Vigneau, *et al.*, 2005). In Spain, KCD among HIV Patients was estimated at 1.1% (Trullas,*et al*,2008) and 28.5% in South Africa (Madala, Thusi, Assounga & Naicker,2014). In Ghana in the Ashanti region the renal insufficiency was reported at 13% among HIV Patients (Owiredu, *et al.* 2013). In Tanzania, proteinuria were detected in 72% and 36% of HIV patients, respectively (Msangoa, Downsa, Kalluvyaa, *et al.*, 2011).

However, the CKD in HIV Patients is relatively high, the early diagnosis and regular monitoring for renal dysfunction in HIV patients is essential for prognosis, medication dosing and treatment. The risk of undiagnosed HIV associated renal dysfunction is worrisome in resource-limited settings where routine laboratory testing is often not available. The WHO recommends assessing

creatinine clearance for patients at initiation of tenofovir and every six months if feasible, though inability to test does not preclude tenofovir use (Gupta, Eustace, *et al*, 2014).

1.1 STATEMENT OF THE PROBLEM

Chronic Kidney Disease (CKD) is a worldwide public health problem; moving from 27th to the 18th most important global cause of death within the last 2 decades (Liyanage *et al.*, 2015). One large study has shown that as much as 3.3% of HIV patients with normal baseline estimated glomerular filtration rate (eGFR) developed CKD over a relatively short follow up period of 3.7 years, highlighting the burden of kidney disease in HIV patients (Mocroft *et al.*,2010).

The use of the nucleotide transcriptase inhibitors and tenofovir disoproxil fumarate (TDF) causes a decrease in creatinine clearance in people living with HIV (Solomon, *et al.*, 2014). There has been increasing interest in TDF-associated tubular dysfunction (TD); the duration of TDF exposure appearing to play a part Cumulative TDF exposure is associated with increased risk of proximal tubular dysfunction in adults (Reynes, *et al.*,2013). Thus, the use of certain medicines found in ART regimes like tenofovir and ritonavir has been highly associated with the risk of CKD (Mocroft, Lundgren, *et al.*, 2016).

For reason, we explored markers of renal dysfunction as measured by serum creatinine in HIV patients in Kabutare Hospital, the overarching goal was to provide an essential basis to guide effective prevention and control strategies to reduce the burden of CKD in this population.

1.2 PURPOSE OF THE STUDY

The main purpose of this study was to determine the frequency of the chronic kidney failure (CKF) in people living with HIV (PLHIV) on antiretroviral treatment (ART) by considering serum creatinine in HIV patients initiating ART in and to identify associated factors.

1.3.1 MAIN OBJECTIVE

To determine the prevalence of CKF among HIV patients in Kabutare Hospital

1.3.2 SPECIFIC OBJECTIVE

- a. To identify the factors associated with CKF among HIV patients in Kabutare Hospital
- b. To grade the stage of the renal dysfunction among HIV patients in Kabutare Hospital

1.4 RESEARCH QUESTIONS

- a. What is prevalence of CKF among HIV patients in Kabutare Hospital?
- b. What are the factors associated with CKF among HIV patients in Kabutare Hospital?
- c. What is grade stage of the renal dysfunction among HIV patients in Kabutare Hospital

1.5 SIGNIFICANCE OF THE STUDY

Government of Rwanda benefits from this study in planning, implementing and designing relevant strategies oriented to prevention of CKD among HIV patients. This study will also help health policy makers to identify the factors associated with CKD among HIV patients for further education but also will help to update the existing data and policies on the prevention of KCD among HIV patients in Rwanda.

1.6 LIMITATIONS OF THE STUDY

Limitations of this study included the fact that all the details were sometimes not noticed in the patients' files while this study is a retrospective study. The weight of participants was ignored while it would be useful in interpreting the creatinine values.

Findings of this study may not be applicable to all areas in Rwanda since all hospitals were not represented and only investigation covered one district hospital. In addition, limited studies on prevalence of renal dysfunction among HIV patients in Rwanda was another limitation faced to literature review.

1.7 SCOPE OF THE STUDY

This study will be conducted in Kabutare District Hospital located in Huye District of Southern province of Rwanda. It will be a retrospective cohort study and will cover adult patients with HIV data attended ARV department of age 18 years old to 50 years old from January of 2018 to

December 2018. The study will be done to ascertain prevalence of kidney dysfunction among HIV patients but also to identify factors linked to that prevalence.

CHAPTER 2: LITERATURE REVIEW

2.1 Prevalence of CKF among HIV patients

The Worldwide and extensive use of antiretroviral therapies (ART) has improved lifestyle and life expectancy of HIV patients. Despite an increased life expectancy; they are highly exposed to chronic non communicable diseases including chronic kidney disease (CKD). The prevalence of renal dysfunction differs widely between geographical regions. Chronic kidney disease has become an important comorbidity among HIV-infected persons (Gupta, *et al.*,2012).

Since the introduction of highly active antiretroviral therapy, the number of deaths due to opportunistic infections has significantly declined, while a greater proportion of patients are developing chronic conditions not traditionally related to HIV, such as cardiovascular, liver, and kidney disease (Palella, *et al.* 2006). As the prevalence of HIV infection increases as a result of improved survival, the prevalence of renal dysfunction is projected to increase. The improvement in prognosis among HIV patients led to shift from infectious to non-infectious diseases including a significant increase of kidney failure (Mpondo, *et al.*,2014).

According to Udeme *et al.* 2018, the African countries have highest prevalence of KCH among HIV compared to European countries with 7.9% and 3.7% respectively. In France, statistics indicated that KCD among HIV positive varied between 0.4%–0.7% of patients in France in 2005 (Vigneau, *et al.*, 2005). In Spain, KCD among HIV Patients was estimated at 1.1% (Trullas *et al.*,2008).

In the Africa, the data varied from one country to another. In Cameroon KCD among HIV patients was at 6.6% in 2014 (Halle, Takongue, Kengne, Kaze & Ngu, 2015); and at 28.5% in South Africa (Madala, Thusi, Assounga & Naicker, 2014). In the study conducted in Ghana by (Flandre, *et al.*, 2011) shown that the prevalence of 4.7% of CKD among adult HIV patients. A similar study in the Ashanti Region of Ghana reported a renal insufficiency prevalence of about 13% (Owiredu *et al.* 2013).

The highest prevalence of CKD among HIV-infected adults has been reported in Nigeria. In a cross-sectional study of 400 consecutive cART-naive Nigerian adults without comorbid CKD

risk factors, 36% of participants had dipstick proteinuria and nearly a quarter had a Cockcroft–Gault creatinine clearance 60ml/min (Emem, *et al*, 2008).

Although available data suggest that the Cockcroft–Gault equation may underestimate GFR in sub-Saharan African populations (van Deventer, *et al.*, 2011), the high prevalence of CKD observed in this study is consistent with a high frequency of APOL1 risk alleles in West African populations (Kopp, *et al.* 2011). The majority of studies from Central, East, and Southern Africa have reported a lower prevalence of decreased creatinine clearance, although there is significant variability between different patient populations. In studies that have also reported MDRD eGFR, the estimated prevalence of eGFR \leq 60ml/min has ranged from as high as 12% to 1%. Few studies have assessed proteinuria, but estimates from Kenya, Rwanda, and South Africa have reported a prevalence of 5–9% among HIV-infected, cART-naive adults (Reid *et al*,2008).

In Tanzania, Renal dysfunction was highly prevalent in the HIV patients initiating first ART where Grade 2 renal dysfunction (eGFR between 60 and 89 ml/min/1.73m²) was present in 137 patients (38.6%), and 87 patients (25%) had Grade 3 dysfunction (eGFR between 30 and 59 ml/min/1.73m²). Microalbuminuria and proteinuria were detected in 72% and 36% of patients, respectively (Msangoa *et al*, 2011). Over 80% of HIV-infected patients starting ART in Tanzania had evidence of renal dysfunction, with reduced eGFR in over 60% of patients screened. These patients had no known preexisting renal disease or risk factors for renal dysfunction aside from HIV infection. These high rates of renal dysfunction were confirmed by the finding that over 70% of patients had detectable microalbuminuria (Msangoa, Downsa, Kalluvyaa, *et al.*, 2011).

In the study conducted in western Kenya on the renal disease in an antiretroviral-naive HIV-infected patient population in Western Kenya shown that of 373 patients with complete data, the prevalence of KCD was 6.2% (proteinuria) (Wools-Kaloustian *et al*,2005).

2.2 Factors associated with CKF among HIV patients

The renal dysfunction results directly or indirectly from a variety of mechanisms including the HIV infection, HIV-induced inflammation, comorbid diseases and drugs such as antiretroviral

therapy (Flandre, *et al.*2011). The nucleotide reverse transcriptase inhibitor has been found to causes a small but significant decrease in creatinine clearance in HIV populations (Solomon, *et al.*, 2014). There has been increasing interest in TDF-associated tubular dysfunction; the duration of TDF exposure appearing to play a part Cumulative TDF exposure is associated with increased risk of proximal tubular dysfunction in adults.

HIV infection can lead to chronic kidney diseases that increase mortality among these patients. The increase of CKD among HIV Patients may be increased by drug induced toxicity, opportunistic diseases as well as comorbid diseases including hypertension, diabetes and Hepatitis (Wyatt, Arons &Klotman,2006). The tenofovir taken by HIV patients as first line antiretroviral therapy regimen recommended by WHO increases risk for renal dysfunction in HIV patients (Solomon, *et al.*, 2014).

The occurrence of CKD and its progression among people living with HIV may also due nephrotoxic antiretroviral medication, HIV viraemia, chronic inflammation and cardiovascular diseases but also poor lifestyle such as smoking (Obiri-Yeboah, *et al.*,2018).

Tenofovir has been reported as acute kidney injury and sometimes seen as a cause of chronic kidney disease (Some, *et al.*,2017). Genetic factors and the histological subtype of kidney disease may show progression to chronic disease or resolve on ART initiation despite been a Tenofovir based regimen. Genetic factors including polymorphisms in APOL1 may have an important contribution to the burden of kidney disease as shown by other studies (Kasembeli, *et al.*, 2015). Older age is a known risk factor for CKD in HIV positive and negative populations. Worth noting also is the phenomenon of “premature ageing” as described in the HIV population as a result of the immune dysregulation (Juega-Mariño J, *et al.*, 2017).

The longer duration of HIV infection, and lower CD4 nadir were also associated with renal dysfunction. The main risk factors for TDF nephrotoxicity include preexisting renal impairment, older age, low body weight, advanced HIV disease (low CD4 count or AIDS), comorbidities especially diabetes, hypertension and hepatitis C co-infection, concomitant use of nephrotoxic drugs and protease inhibitors (Fernandez, *et al.*, 2011).

In a large European cohort study, CKD was associated with increasing cumulative exposure to the older protease inhibitor indinavir and the commonly used nucleotide reverse transcriptase inhibitor tenofovir disoproxil fumarate (TDF), both of which have established nephrotoxic potential. A significantly increased incidence of decreased creatinine clearance was also observed with longer exposure to atazanavir, a commonly used protease inhibitor that has been implicated in nephrolithiasis similar to that observed with indinavir, although less frequently (Mocroft, Kirk, Reiss, *et al.*,2010).

A subsequent analysis among US military veterans also demonstrated a strong association between CKD (defined as GFR ≤ 60 ml/min per 1.73m^2) and cumulative exposure to TDF, with similar findings for indinavir. Increasing exposure to TDF was also associated with rapid GFR decline (defined as ≥ 3 ml/min per 1.73m^2 per year over 2 years) and proteinuria, whereas cumulative exposure to atazanavir was associated with rapid eGFR decline but not with CKD or proteinuria (Scherzer, Estrella, Li, *et al.*,2012). Most recently, analysis of data from another large European cohort demonstrated an association between confirmed eGFR ≤ 70 ml/min per 1.73m^2 and cumulative exposure to TDF, atazanavir, or boosted lopinavir; this level of eGFR was also a strong predictor of TDF discontinuation. Only boosted lopinavir use was associated with eGFR ≤ 60 ml/min per 1.73m^2 in this study, although the authors speculate that the frequent discontinuation of TDF may have prevented further GFR decline (Wools-Kaloustian, Gupta, Muloma, *et al.*,2007).

This hypothesis is supported by the stabilization or improvement in GFR observed in a small study of 24 men who discontinued TDF with a GFR ≤ 60 ml/min per 1.73m^2 ; of note, recovery to baseline GFR occurred in less than half of these men after a median of 5 months (Wever, van Agtmael & Carr,2010). The association of tenofovir with GFR decline is consistent with a pooled analysis of data from earlier longitudinal studies, which demonstrated a small but significantly greater mean decline in creatinine clearance with tenofovir-containing cART as compared with alternative cART regimens. Although the clinical relevance of these epidemiologic associations is not clear, biologic plausibility is supported by the known potential for tenofovir and the protease inhibitors to cause acute kidney injury. The potential for TDF and/or certain protease inhibitors to promote CKD progression warrants further study given the widespread use of these agents (Cooper, Wiebe, Smith *et al.*,2010).

Countries in sub-Saharan Africa can expect to experience a large proportion of patients in whom the above-mentioned risk factors are present at ART initiation. A significant proportion of patients are underweight (Siedner, Bassett, Katz, Bangsberg, Tsai, 2013) and a recent review of patients initiated on ART in South Africa between 2010 and 2014 reported a median CD4 count of only 213 cells/ μ L (interquartile range (IQR) 117–324 cells/ μ L (Kufa-Chakezha, De Gita, Ballah, *et al.*, 2016). In addition, *Cryptococcus neoformans* is the leading cause of meningitis in South Africa, with the consequence that many patients will receive amphotericin B (Nelson MR, Katlama, Montaner, *et al.*, 2007). The large number of patients co-infected with *Mycobacterium tuberculosis* may also contribute to increased risk because of rifampicin-related nephrotoxicity and interstitial nephritis induced by immune reconstitution inflammatory syndrome (Madeddu, Bonfanti, De Socio, *et al.*, 2008).

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.0 INTRODUCTION

3.1 RESEARCH APPROACH

The study used a quantitative approach to address quantitative research questions. The numerical data were used to explore the prevalence and to weight the effect of associated factors to renal dysfunction among HIV patients in Kabutare Hospital. The data then analyzed using statistical SPSS software to arrive at results.

3.2 RESEARCH DESIGN

A retrospective study was used. The selection of subjects was a retrospective view of outpatient's records at Hospital from January 2018 to December 2018. The HIV patients of age 18 to 50 years old were selected from ARV department.

3.3 SAMPLING PROCEDURE

The target population of this study is 240 HIV patients attended Kabutare Hospital in 2018 in the unit of ARV. Based on the objectives of the study, probability sampling was used to select the patients' files. Simple random sampling technique was used where every all files of HIV patients had equal chance to be selected until the desired number was obtained.

3.4 SAMPLE SIZE

To determine the sample from population, the Yamane's formula has been applied, whereby the sample size is equal to the total population over one plus total population, multiplied by a square of margin of error (Yamane, 1967).

$$\text{Hence, } n = \frac{N}{1 + (N * e^2)}$$

$$\text{Sample size} = \frac{240}{1 + (240 * 0.0025)} = 150$$

Where represents n= Sample Size, N= Total Population and e= Margin of error, which is 0.05

Hence, the sample size for this study was 150 of HIV patients from ARV department.

3.5 RESEARCH INSTRUMENTS FOR DATA COLLECTION

The data was gathered from patients' files; we use papers, pen and ruler to trace lines we also use excel to extract needed data from files. The above materials were used to collect the data on

socio demographic variables, risk factors associated with CKD, creatinine value, duration for HIV medicine, type of medicine given to patients and other associated medical conditions. Hence, the study used both laboratory data and clinical data of patients to get more useful data.

3.6 ETHICAL CONSIDERATIONS

Approval for study was obtained from Kibogora Polytechnic research committee. Permission for the study is also obtained from Medical Director of Kabutare Hospital allowing the researchers to access the patients' records. Furthermore, strict confidentiality of all information, privacy of the patient was kept at each step of data collection and processing.

3.7 DATA ANALYSIS

Quantitative data were entered and analyzed using Statistical Package for Social Sciences SPSS version 20. Data was analyzed by using descriptive statistics. Frequency tables were drawn and from these the data presented in pie diagrams and bar graphs.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4. 0. INTRODUCTION

This chapter deals with results and discussions collected from the patients' files using a semi structured proforma. The data discussed quantitatively through descriptive statistics and descriptive statements. Thus, in line with the objective of the study; this includes three essential points, the determination of prevalence of kidney dysfunction among HIV patients in Kabutare district hospital; identification of factors associated with kidney failure and the grade the stage of the renal dysfunction among HIV Patients in Kabutare Hospital and grading the stage of the renal dysfunction among HIV Patients in Kabutare Hospital

4.1. PRESENTATION OF FINDINGS AND INTERPRETATIONS

Table 1: Demographic characteristics of patients

Variable	Category	Frequency	Percent
Age	18-30	20	13.3
	31-40	50	33.3
	41-50	80	53.3
Duration on HIV medicine	1-3 years	62	41.3
	4-7 years	48	32
	8-10 years	15	10
	Above 10	25	16.7
Sex	Male	68	45.3
	Female	82	54.7
Other associated health condition	None	134	89.3
	HBV	16	10.7

Table 4.1 described demographics characteristics of 150 patients, majority of them were female at 54.7% against 45.3% of the male. The mean age of the selected patients was 43 with majority, 53.3 % being between 41 to 50 years. The median duration of taking ARV among the patients included in the study was 4.5 years with majority 41.3% of patients at between 1 and 3 years. There was only Hepatitis B as a one associated health condition mentioned in the files of patients with a low rate 10.7%. A difference in Gender in diabetic patients in Kabutare Hospital could be justified by a high number of female in Rwanda population (NISR,2012).

Objective 1: Prevalence of kidney dysfunction among HIV patients in Kabutare Hospital

Table 2: Prevalence of renal dysfunction among HIV patients according to creatinine value

Creatinine	Frequency	Percent
0.7-1 Normal	70	46.7
1.1-2 Kidney failure	41	27.3
0-0.69 Muscle failure	39	26
Total	150	100.0

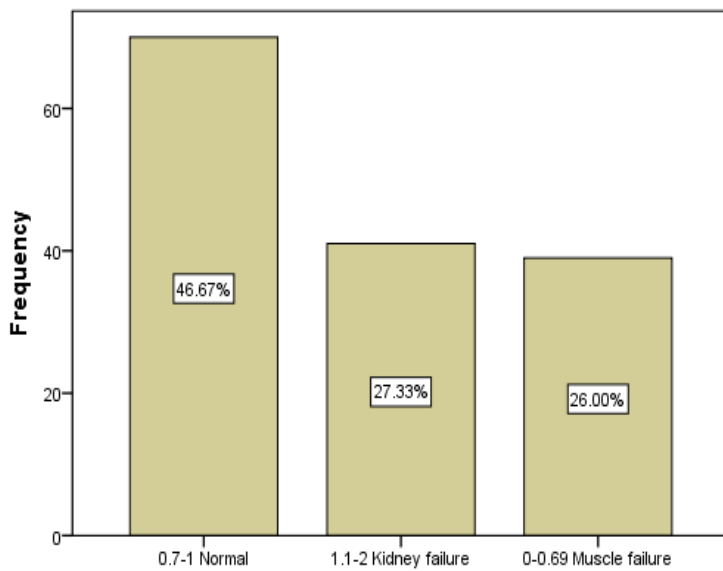


Figure1: Histogram for test of creatinine

Over 27.3% of HIV infected patients in Kabutare Hospital under treatment had evidence of renal dysfunction with creatinine which is more than 1; 26% of all patients shown a muscle failure to low creatinine level that varied between 0 and 6.9; 46.7% had a normal creatinine showing a good functioning of the kidney. These results are in the same line of the findings of the African countries have highest prevalence of CKF among HIV patients compared to European countries with 7.9% and 3.7% respectively according to (Udeme *et al*, 2018) . Like in Tanzania 60% HIV infected patients had shown the evidences of renal failure with a reduced eGFR. Similar to South Africa the renal dysfunction was estimated to 28.5%. Unlike findings in this study, other studies done in Cameroon, Ghana shown a slight difference in the number 6.6% and 4.7% respectively.

Objective 2: Factors associated with kidney failure

Table 3: Level of creatinine vs duration on ARV

Variable	Category	Duration on ARV				Total
		1- 3 years	4-7 years	8-10 years	Above 10	
Creatinine	0.7-1 Normal	34 (21.9%)	23 (14.8%)	7 (4.5%)	6 (3.9%)	70
	1.1-2 Kidney failure	10 (6.5%)	12 (7.7%)	4 (2.6%)	15 (9.7%)	41
	0-0.69 Muscle failure	18 (11.6%)	13 (8.4%)	4 (2.6%)	4(2.6%)	39
Total		62 (40%)	48 (31%)	15 (9.7%)	25(16.1%)	150

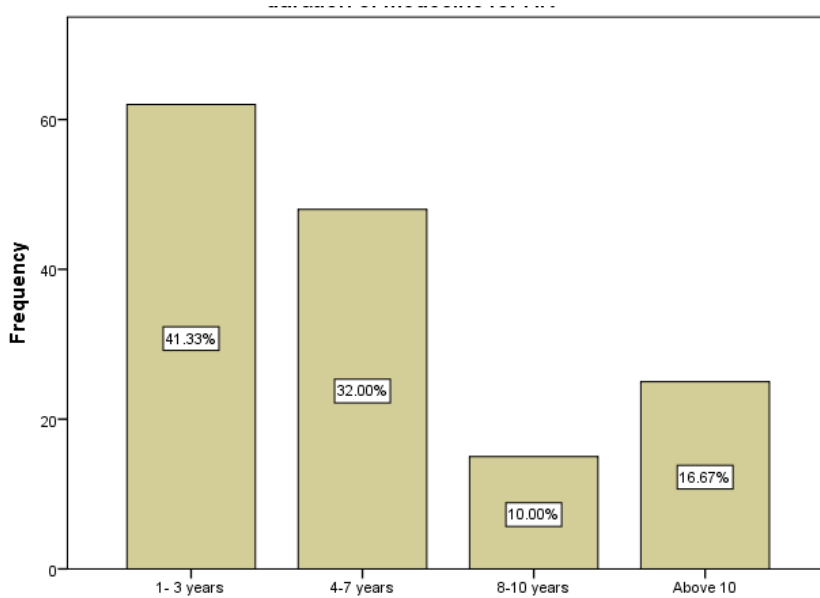


Figure2: Histogram for duration of HIV medicine

A level (9.7%) of kidney failure was identified in the group of HIV patients that are under treatment in the period of more than 10 years, followed with people that start ART with 6.5%. However, the kidney failure was but most of patients adapt themselves to HIV ART since 45.2% were normal even if they were under treatment.

Kidney failure and type of HIV medicine

Table 4: Level of creatinine vs type of ARV

Variable	Category	Type of ARV			Total
		Tenofovir	Efavirenz	Zidovune	
Creatinine	0.7-1 Normal	55 (35.5%)	7 (4.5%)	8 (5.2%)	70
	1.1-2 Kidney failure	40 (25.8%)	0 (0%)	1(0.6%)	41
	0-0.69 Muscle failure	37 (23.9%)	0 (0%)	2 (1.3%)	39
Total		132 (85.2%)	7 (4.5%)	11 (7.1%)	150

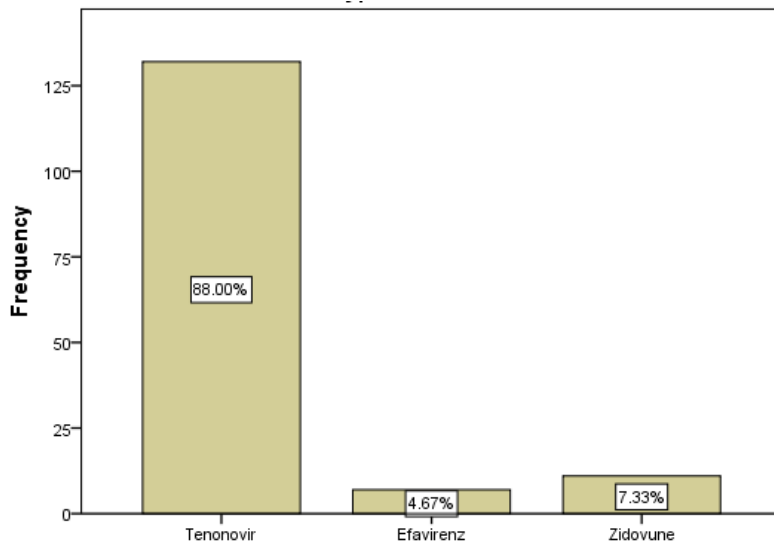


Figure3: Histogram of type for medicine taken by HIV patients

The highest level (25.8%) of renal dysfunction was observed in patients under tenofir treatment compared to those under Efavirenz and Zidovune 0% and 0.6 respectively. A high rate (23.9%) of muscle failure was remarked among patients using tenofir. The HIV Patients with renal dysfunction had any preexisting renal diseases. The finding that renal dysfunction may be present in the majority of HIV-infected outpatients initiating ART has important ramifications given the increasingly widespread use of tenofovir, a first-line agent recommended by the WHO with known renal toxicity. A high rate of renal dysfunction is related side effects of tenofir on the kidney function since it causes new onset or worsening renal toxicity due to proximal tubular dysfunction that is not always reversible with tenofovir discontinuation. Tenofovir adverse effect has usually been reported as acute kidney injury (Some F, et al.,2017) but sometimes seen as causing chronic kidney disease. Genetic factors and the histological subtype of kidney disease may show progression to chronic disease or resolve on ART initiation despite been a tenofovir based regimen. Regardless of etiology, this shows the importance of monitoring renal function before and during using tenofir in HIV infected individuals.

Kidney failure among HIV patients and age

Table 5: Level of creatinine vs patient's age

Variable	Category	Age			Total
		18-30	31-40	41-50	
Creatinine	0.7-1 Normal	7 (4.5%)	29 (18.7%)	34 (21.9%)	70
	1.1-2 Kidney failure	3 (1.9%)	11 (7.1%)	27 (17.4%)	41

	0-0.69 Muscle failure	10 (6.5%)	10(6.5%)	19 (12.3%)	39
Total		20 (12.9%)	50 (32.3%)	80 (51.6%)	150

Older age is a risk factor for kidney dysfunction in HIV patients. A percentage of 17.4% of people aged from 41 to 50 years old had kidney dysfunction compared to those aged from 18 to 30 years with 1.9%. The middle years from 31 to 40 years old shown a moderate rate of 7.1% kidney failure. Worth noting also is the phenomenon of premature ageing as described in the HIV population as a result of the immune dysregulation (Juega-Mariño J, et al.,2017). Screening and early diagnosis to identify early disease must be adhered to in ART clinics at all levels in Rwanda so as to initiate early therapy and change the natural history of renal disease among People living with HIV.

Older age was found as a risk factor for kidney dysfunction in HIV Patients. A percentage of 17.4% of people aged from 41 to 50 years old had kidney dysfunction compared to those aged from 18 to 30 years with 1.9%. The middle years from 31 to 40 years old shown a moderate rate of 7.1% kidney failure.

Objective 3: Grade the stage of the renal dysfunction among HIV patients in Kabutare Hospital

Table 6: Grade of renal dysfunction

Value of creatinine	Grade of kidney failure	Frequency	Percent
1-1.2	Tolerate/ low	14	34.1
1.2-1.9	Moderate	10	24.4
2 and above 2	Severe	17	41.5

A big number 41.5% of all HIV patients with kidney failure (17) had a severe kidney failure with a creatinine that vary between 2 and above 2; 24.4% of moderate kidney failure with an average of 1.2 to 1.9 creatinine and 34.1 % of low or tolerable kidney failure.

In the study done by (Msango, et al, 2011) on the Renal Dysfunction among HIV-Infected Patients Starting Antiretroviral Therapy in Mwanza, Tanzania also found that 38.6% of all enrolled patients were in the grade 2 renal dysfunction while 25% were in the grade 3 renal dysfunction.

4.2. SUMMARY OF FINDINGS

Majority of targeted HIV infected persons were female 54.7% against 45.3% the male from which 53.3 % being between 41 to 50 years. The duration of taking ARV among the patients was 4.5 years with majority 41.3% of patients at between 1 and 3 years. There was only Hepatitis B as a one associated health condition mentioned in the files of patients with a low rate 10.7%.

Over 27.3% of HIV infected patients in Kabutare Hospital under treatment had evidence of renal dysfunction with creatinine beyond 1; 26% of all patients shown a muscle failure with creatinine level that varied between” 0 to 0.69”; 46.7% had a normal creatinine showing a good functioning of the kidney. The renal dysfunction 25.8% was highly observed in patients under tenofir treatment compared to Efavirenz and Zidovune 0% and 0.6 respectively. A big number 41.5% of all HIV Patients with kidney failure (17) had a severe kidney failure with a creatinine that vary between 2 and above; 24.4% of moderate kidney failure with an average of 1.2 to 1.9 creatinine and 34.1 % of low or tolerable kidney failure.

CHAPTER FIVE: GENERAL CONCLUSION AND RECOMMENDATIONS

5.0 INTRODUCTION

This study was intended to identify the prevalence of renal dysfunction among HIV patients in Kabutare hospital since it was demonstrated that Sub-Saharan Africa has a high prevalence of HIV and high risk for renal dysfunction. In addition, it has been studied relatively infrequently in

Rwanda. Hence, the level of serum creatinine which has recently been associated with increased mortality was assessed among HIV patients in Kabutare Hospital using secondary data from patients' files.

5.1 Conclusion

The renal dysfunction among HIV patients in Kabutare Hospital was high 27.3%. This prevalence was associated with older age 53.3% and type of ARV that patients are taking where tenofir is highly riskier drug 25.8%. A high number 41.5% of all HIV patients with kidney failure had a severe kidney failure.

Renal dysfunction was highly prevalent among HIV patients in Kabutare Hospital especially in patients under tenofir due to underappreciated need to monitor renal dysfunction in HIV patients. The use of tenofir at initiation of ARV increases risk for kidney dysfunction since it causes a decrease in creatinine clearance and kidney tubular dysfunction. The duration on tenofir increase dramatically the risk for having kidney dysfunction among HIV patients under treatment. Thus, the use of certain medicines found in ART regimes like tenofovir and ritonavir has been highly associated with the risk of CKD.

5.2 RECOMMENDATIONS

In Rwanda, routine follow of HIV patients is only by estimation of serum creatinine. Glomerular filtration rate (GFR) is not routinely measured and proteinuria is not regularly checked.

Thus, **we recommend to hospital** to screen for abnormal GFR not merely measuring creatinine in HIV infected patients prior to the initiation of ARV for proper dosing of antiretroviral medication and early detection of kidney dysfunction among HIV patients.

The inefficient monitoring of renal dysfunction among HIV patients is due to inadequate materials in all health center where they are required to refer the patients to district hospital;

We also **recommend the researchers as well as hospital** to use urine dipstick to detect proteinuria which is good proxy of renal impairment especially moderate (2+) and severe (3+)

5.3 SUGGESTION FOR FURTHER STUDY

More researches are needed to correlate GFR with creatinine among HIV patients, to assess more contributory factors for renal diseases among HIV patients and to correlate tenofir and risk for renal dysfunction.

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