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Dissertation on:

PREVALENCE OF COMMON NONCOMMUNICABLE DISEASES IN ADULT PEOPLE LIVING WITH HIV AT CHUK/HIV CLINIC

Submitted for partial fulfillment for the award of Master's degree of medicine in Internal Medicine department, School of Medicine and Pharmacy, College of Medicine and Health Sciences, University of Rwanda

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Kigali, December 2020

Declaration

This is to certify that this thesis passed through the antiplagiarism system and found to be compliant and this is the approved final version of the thesis entitled:

''Prevalence of common non-communicable diseases in adult people living with HIV

at CHUK/ HIV Clinic''

Declared by:

Sylvie TURIKUMWE

Date: December 2020

Signature:

Supervisor: Dr Leopold BITUNGUHARI

Date: December 2020

Signature:

Dedication

To almighty God

To my supervisors

To my mother, sister and brother

To all participating in the fulfilment of this work

This work is dedicated

Acknowledgement

List of acronyms

ABC: Abacavir

AIDS: Acquired immunodeficiency syndrome

AKI: Acute kidney disease

ART: Antiretroviral therapy

AZT: Zidovudine

BP: Blood pressure

BMI: Body mass index

CD4: Cluster of differentiation 4

CI: Confidence interval

CHUK : Centre Hospitalier Universitaire de Kigali

CKD: Chronic kidney disease

CVD: Cardiovascular diseases

DM: Diabetes mellitus

DSDM: Differentiated Service Delivery Model

Dr: Doctor

D4T: Stavudine

EFV: Efavirenz

eGFR: Estimated Glomerular filtration rate

FSGS: Focal segmental glomerulosclerosis

HbA1C: Glycated hemoglobin

HDL: High Density Lipoprotein

HIV: Human immunodeficiency virus

HIVAN: HIV associated nephropathy

HTN: Hypertension

KLT: Kaletra

LDL-C: Low density lipoprotein cholesterol

NCD: non communicable disease

NRTI: Nucleoside reverse transcriptase inhibitors

Open MRS: Open Medical Record System

OPI: Opportunistic infection

PI: Protease Inhibitor

PLWHIV: People Living with HIV

SD: Standard Deviation

SPSS: Statistical Package for Social Sciences

TC: Total Cholesterol

TDF: Tenofovir

USA: United States of America

VL: Viral load

WHO: World health organization

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Abstract

Background: The introductions of highly active antiretroviral therapy prolonged life span of PLWHIV and hence they live longer as immunocompetent people therefore; they are likely to develop chronic diseases, which are associated with ageing. The aim of this study was to assess the prevalence of non-communicable diseases and associated risk factors among people living with HIV at a Referral Hospital of Rwanda.

Method: A cross sectional study was conducted to PLWHIV followed at the ambulatory HIV clinic of Centre Hospitalier Universitaire de Kigali (CHUK) from August 2019 to Feb 2020. Social-demographic data, psychometric and clinical data were collected using structured questionnaire. Anthropometric and biochemical measurements were performed and result were recorded using Epidata and exported to SPSS for analysis. Logistic regression analysis was used to explore risk factors.

Result: In total, 222 out of 2580 PLWHIV were enrolled, all participants were on ART and overall NCD prevalence was 48% with 67.5% of them having only one disease.

The most predominant disease was hypertension 22%, newly diagnosed 80%; Diabetes mellitus 9.9%, with 41% newly diagnosed; renal impairment 9.9% with 54 % newly diagnosed and dyslipidemia 3.2%. The dual diseases were hypertension with renal impairment 34.6% and diabetes with hypertension 30%. The Age above 65years OR: 8.3;95%CI(2.3-30),P<0.001;physical inactivity 48% OR:2.1, 95%CI(1.1-3.8),P:0.013; adverse drug reaction 50% OR:2.2,95% [CI 1.2-4.1], P:0.009 were significantly associated with NCDs. Living in rural region.OR:7, 95%CI (2.5-19.5) P<0.001 and low education level OR: 2.6 CI 95 %(1.1-6.4) were associated with hypertension.

Conclusion: Hypertension, renal failure and Diabetes are most predominant diseases in HIV population. Most of NCDs in this population are undiagnosed and uncontrolled. The Most risk factors are age above 65 years, living in rural areas, lower level of education and ART induced NCDs.

Key words: NCD, prevalence, PLWHIV, CHUK.

Chap 1. Introduction

1.1. Background

The introduction of antiretroviral drugs has prolonged the survival and improved the quality of life among people living with HIV/AIDS resulting in declining of opportunistic infections and increase in development of chronic disease associated with ageing including cardiovascular diseases, diabetes, chronic kidney disease, chronic lung disease, and some type of neurological complications of HIV and cancers(1).

These no communicable diseases remained a great cause of morbidity in this population. Both HIV and NCDs require team approach and health systems that can deliver both effective acute and chronic care and that can support good adherence to treatment and monitor drug effects(2).

1.2. Literature review

1.2.1. Introduction

Non-communicable diseases and HIV are major concern of public health system in low and middle income countries especially in Sub-Saharan Africa (3).

Study done in Nigeria has reported high risk of CVD in people living with HIV and increased prevalence of hypertension in people living with HIV on antiretroviral therapy and report an increase in prevalence of HTN from 19% to 50% after 2years of starting antiretroviral treatment(4).

In Uganda, the prevalence of hypertension was 14% and 79% of them was previously undiagnosed with only 15% on treatment and 50% were not controlled (5). In Italy and USA, they found that NCD treatment cost as proportion of HIV treatment cost will increase from 11 to 23% in Italy and 40 to 56% in USA from 2015 to 2035(6).

In other study done in Cambodia, it was found that 8% had DM, 15% had HTN, and 35% had hypercholesterolemia. 48% of them were with one or more NCD and 78% of them were not aware of the disease before. Newly discovered disease was found in 90% of DM, 44% of HTN and 90% of hypercholesterolemia(7).

Study done in Tanzania on prevalence of NCD in people living with HIV revealed HTN at 26% and DM at 4% and they were strongly associated with ageing and obesity(8).

In a study done in Kenya, HIV infected population had significantly high rate of raised blood pressure than those with HIV negative. More than one third of people tested for HIV had elevated blood pressure and more than one quarter were obese (9)

1.2.2. Relationship between HIV and NCD

Study had reported that there is increased risk of cardiovascular diseases among people HIV population due to HIV and non-communicable diseases linkage either by direct HIV effects or indirectly by antiretroviral therapy or by traditional risk factors related to ageing (10).

Association between HIV with CVD is related to traditional cardiovascular disease risk factors, HIV itself due to inflammation and side effects of antiretroviral treatment. HIV itself or its associated proteins induce inflammation of blood vessels and provoke formation of atherosclerotic high risk plaque which increase risk of myocardial ischemia and stroke(11).

Several studies found that some antiretroviral drugs have different effects on cholesterol and fatty acid balance. They increase cholesterol levels and change fat distribution by increasing abdominal fat that contribute to the heart diseases risks. Non-Nucleoside Reverse Transcriptase Inhibitors especially stavudine causes increased level of triglyceride, and total cholesterol with high low density cholesterol(12).

All PIs except atazanavir were associated with hyperlipidemia, especially ritonavir boosted protease inhibitors lead to elevations of low-density lipoprotein, triglyceride and total cholesterol and a decrease in high-density lipoprotein cholesterol. The prevalence of hypertriglyceridemia and hypercholesterolemia among people living with HIV on PI-based therapy regimen were 38% and 25% respectively and it was related to dose and time(13)

Type 2 diabetes mellitus risk is increased among people living with HIV and is associated with antiretroviral therapy cumulative exposure. HIV is a condition, which is associated with insulin resistance and lipodystrophy. HIV itself leads to chronic inflammation, which expose to glucose intolerance and increasing the risk of insulin resistance. The combination of protease inhibitor like lopinavir or indinavir and Nucleoside Reverse Transcriptase Inhibitor like Stavudine was found to increase the risk of diabetes mellitus type 2(14).

In many HIV clinic, dietary counseling for increasing calorie for gaining weight, the majority consume fatty diets and these patient are at high risk of obesity which is increasing risk of non-communicable disease (15).

Kidney disease contributes to HIV related morbidity and increases mortality. With the increase of life span of HIV infected patients due to introduction of antiretroviral treatment, there is development of chronic medical conditions such as renal failure with increasing prevalence. The common type of HIV associated nephropathy is a focal segmental glomerulosclerosis (FSGS). HIVAN may be due to the direct infection of the kidney cells by HIV, resulting to kidney damage or the release of cytokines during HIV infection. Approximately 80% of patients with HIVAN have a CD4 count less than 200cells(16).

The prevalence of chronic kidney disease in people living with HIV in Sub-Sahara was ranging from 25 to 77% and the reported risk factors contributing to renal dysfunction were hypertension, diabetes mellitus, coinfections, low CD4 count less than 200 cells/mm^3 and chronic exposure to nephrotoxic drugs like Tenofovir, atazanavir and lopinavir(17).
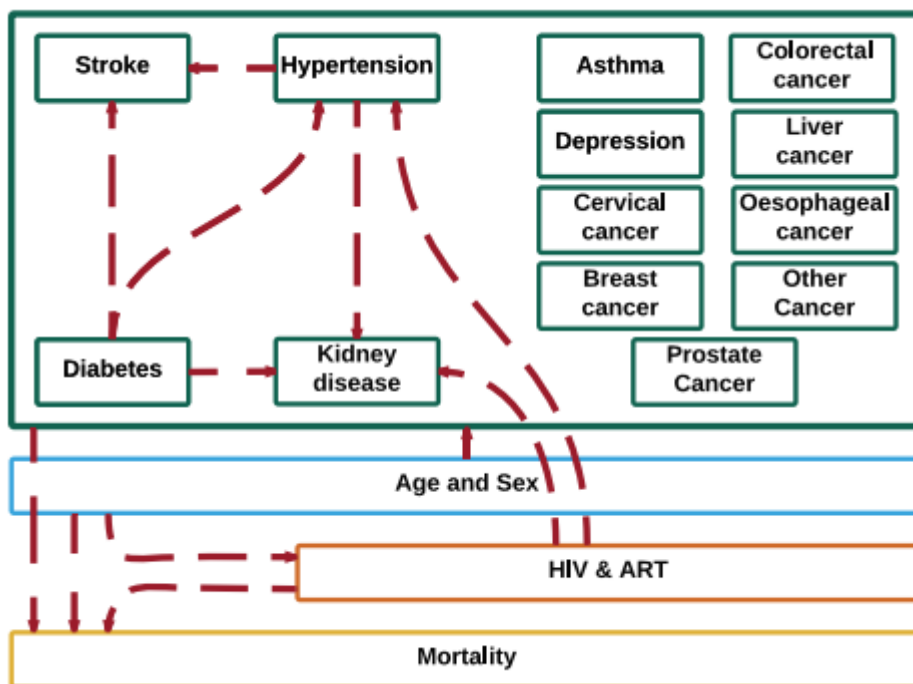
Figure 1: schematic of multidisease model(18)

1.2.3. Common non communicable disease

1.2.3.1. Cardiovascular Diseases (CVD)

Study has reported the increased risk of cardiovascular diseases in people living with HIV in comparison with HIV uninfected. It was reported in both people living with HIV on ART and not on ART. Cardiovascular disease in HIV pathophysiology is unclear. It is thought to be

mechanism including interaction between traditional risk like smoking and HIV related risk (6).

The predictor of cardiovascular disease in HIV population were age, obesity, smoking, total and low density lipoprotein, use of abacavir, Protease inhibitor and nucleoside reverse transcriptase inhibitors(19).

Study review done in developed countries has reported that the incidence of cardiovascular disease in people living with HIV was ranging from 1.19 to 11.3 per 1000 persons per year with increased risk of stroke, sudden cardiac death and heart failure in people living with HIV(20).

1.2.3.2. Diabetes

A study done in Zimbabwe found that the prevalence of Diabetes mellitus in people living with HIV is ranging from 2.1 to 26.5% and 20-43.5% for glucose intolerance(21). The predictors of DM in Africa were duration of HIV, cumulative exposure to highly active antiretroviral therapy, large abdominal waist circumference, overweight, obesity, high BMI, low income, sedentary living, lack of education and high baseline viral load(12).

Antiretroviral therapy was associated with insulin resistance, glucose intolerance and DM type 2. People living with HIV on ART have 2 to 5 fold increased risk of developing diabetes mellitus compared to ART naïve patients. It is attributed to PI but efavirenz, atazanavir and stavudine also were reported to increase risk of Diabetes mellitus(15).

The increased level of glucose intolerance was associated to pancreatic beta cell lipotoxicity due to drug effect of lipodystrophy which is insulin resistant state. PI increase insulin resistance by interfering with glucose transporter type 4 translocation from the cell cytosol to the surface of cell. PI inhibits adipocyte differentiation and secretion of adipokines which modulate insulin sensitivity. In people living with HIV on PI and NRTI, insulin secretion and beta cells function decreased by 25-50%(14).

1.3. Problem statement

According to the WHO, NCDs kill 38 million people each year. Three quarter of these deaths occurred in low and middle income countries, where no programmes developed for early screening and prevention of these pathologies. Deaths from NCDs occur at earlier ages in these countries with 82% death in people younger than 70years(22). The most common reported non communicable diseases in study done in Uganda were hypertension 12%, diabetes mellitus 4.7%, chronic kidney disease1.6%, asthma 1.6% and cardiomyopathy 1.6% (23) and in a study done in Ethiopia the most reported non communicable diseases were hypertension 12.7%, diabetes mellitus 7.1%, hypertriglycedemia 4.7%(12)

Of 36 million people living with HIV in the world, 70% of them live in Sub-Saharan Africa. Southern Africa is the most affected region in Africa followed by East-Africa with 17 million people living with HIV. In Uganda, the prevalence of HIV was estimated to be 7.3% which is the highest in East African region(23). In Rwanda according to national statistics by WHO 2016, HIV prevalence was 3.1% in general population for more than a decade(24). The prevalence is higher in Kigali city 6% compared with other province 2 to 3%(25). The introduction of antiretroviral therapy has changed the course of HIV which was previously feared, untreatable and fatal condition in early 80's and 90's, and patient are living longer and ageing raises risk of coexistence of HIV with other chronic diseases like NCDs(26).

In Uganda, 45% of non-communicable related deaths are caused by cardiovascular diseases such as hypertension, coronary artery disease, and cardiomyopathy, 51% death by cerebrovascular disease such as stroke and 5% death by diabetes(5).

Other chronic condition associated with HIV including chronic kidney disease, chronic lung disease and neurodegenerative disorders can contribute to non-communicable disease related morbidity and mortality. Those non communicable diseases cause disability and reduce quality of life for a greater number of people(23).

A 2010 joint MOH and WHO's survey has reported that the prevalence of high blood pressure, diabetes mellitus, and hypercholesterolemia were 11, 2.9, and 20%, respectively. The same survey also reported a high prevalence of risk factors among Cambodians, including a high prevalence of high cholesterolemia (20%), low prevalence of adequate fruits intake and vegetable consumption (80%), and a high prevalence of alcohol use at 50 %(27)

Rwanda's health management information system data in 2013 revealed that NCD are included in top 8 causes of morbidity in District hospital and NCD accounted for 22% of District Hospital admissions and 51% of District Hospital outpatient consultations (28).

In a national HIV Clinic, instead of providing ARV drugs only, if comprehensive care services were included for integrating interventions like neurocognitive assessment, nutrition assessment with dietary counselling and support, smoking cessation, promoting exercise, monitoring blood pressure, blood sugar and cholesterol as part of HIV care will provide opportunities for reducing risks of NCDs among people living with HIV(8).

Our HIV care and treatment programs do not routinely collect information on NCD risk factors or NCD occurrence. Our country did carry out national HIV surveillance and NCD surveys, but these 2 surveys are not linked. It is known that HIV and NCD are linked but there is no data on prevalence of NCD in PLWHIV in Rwanda.

NCD prevalence and their associated risk factors in our HIV population are not known, therefore no plan for designing and implementing required interventions to that population(13). We conceived and proposed this study to assess the prevalence and risk factors of NCDs among people living with HIV for strengthening interventions to decrease morbidity and mortality for affected population.

1.4. Research question

The main questions arising from this study project are:

i. What is the prevalence of NCD in people living with HIV at CHUK?
ii. What are the most risk factors of NCD in that population?
iii. What is the gap in NCD screening in this population?

1.5. Significance of the study

1.5.2. Personal interest

i. Submission of a dissertation as a requirement to a Master's degree with Honors.
ii. Getting more knowledge and understand the factors associated with NCD and HIV

1.5.3. Scientific interest

i. Understand the expected life span of this big number of diseased population
ii. Recognition of NCD prevalence in PLWHIV

iii.   Awareness of risk factors associated with NCD in PLWHIV in our settings and encourage NCD screening and prevention in PLWHIV

1.5.4. Public health interest

Result of this study will help in for plan, designing and implementing intervention needed to the HIV population and in promoting integration of NCD and HIV care management. Also will serve as preliminary data to conduct more studies that will analyse the possibility of integration of NCDs Care in HIV care and treatment.

1.6. Objective of the study

1.6.1. General objective

The main objective of this study is to determine the prevalence of non-communicable diseases in people living with HIV attending HIV clinic at CHUK.

1.6.2. Specific objective

  i.   Determine common non communicable diseases in people living with HIV
 ii.   Describe risk factors associated with non-communicable disease focusing on hypertension and diabetes in people living with HIV.
iii.   Describe the gaps in non-communicable diseases screening in HIV population

Chap 2. Methodology

2.1. Type, site and period of the study

This is a cross-sectional study conducted in HIV patients followed in HIV Clinic at CHUK located in Kigali City of Rwanda, over the period of 6 months from August 2019 to Feb 2020. The period of the study was chosen based on DSDM and monthly appointment from HIV program guideline. Differentiated service delivery model is the model used in HIV clinic to group patient in categories based on their level of viral load suppression and based on their category they give different appointment monthly, two monthly, 3monthly and 6monthly. The DSDM aims to increase capacity to provide HIV care and treatment to all patients, while focusing more intensive services towards higher-risk HIV patients and reducing the frequency of routine healthcare visits for stable, low-risk HIV patients.

2.2. Sample size

The Sample size was calculated using prevalence sample size formula based on the prevalence from the study done in the neighboring country, as there is no known prevalence for our population.

$$\textbf{Sample size=n} = \frac{Z^2 P(1-P)}{D^2} = \frac{1.96^2 \times 0.15 \times (1-0.15)}{0.05^2} = \textbf{200}$$

Where:

n: minimal sample size required

Z: Score corresponding to the level of confidence with which it is desired to be sure that the true population lies with $\pm D$ percentage points of the sample estimate otherwise noted assume 2 sided test with z=1.96.

P: expected population proportion otherwise noted from published previous study, assume p=0.5 to obtain the most conservative estimate for n; here p was 0.15 from published study in Tanzania(13).

D: Precision or absolute error.

Simple random sampling technic was used for participant recruitment.

2.3.   Sampling method

In 6 months period of data collection, we recruited 258 participants and 36 refused to consent and we enrolled 222 participants who accept to consent from 2582 patients of total population expected to consult the clinic at an appointment of 6 months based on DSDM appointment. With a calculated sample size of 200 participants, where we used simple random sampling and random numbers were generated from random sample table run from excel computer program. We distributed these numbers to the attendants on their respective appointment where every participant was assigned a number and we systematically selected participants from the population at every 10th participant (k=10) were recruited in the study.

Formula: k=N/n=2582/258=10(here k is approximated to 10)

With N=2582; n= 258

2.4.   Selection criteria

2.4.1. Inclusion criteria

HIV population aged from 15years and above who were coming for routine, follow up at HIV clinic in the period of the study was recruited. HIV infected patients on ART who or whose advance directive accepted to consent for study participation were included regardless their immunological status or OIs.

2.4.2. Exclusion criteria

Patients who refused to consent, vulnerable group of people like prisoner, or whose advance directives mentioned opposition to be involved in a research project.

2.5.   Data collection and analysis

Based on pre-established data collection form, data were collected using patient interview, where each participant was assigned a unique code number for identification. History taking, consultation of medical files, open clinic (recording system used at CHUK) and open MRS (Medical Recording System) software were used for clinical information data. Demographic data, clinical data, Para clinical data, and anthropometric measures were collected using data collecting form. Sociodemographic data included were age, sex, residence, education level, occupation, marital status, smoking and alcohol consumption. Clinical data included duration of HIV, viral load and CD4 count, antiretroviral drug used and side effect, history of other drugs used. Anthropometric measures used were height and weight for BMI. Systolic blood pressure was taken in consultation room on both arms and

repeated after 15minutes. Para clinical data analyzed were blood sugar, glycated hemoglobin, lipid profile and renal function test. Request form was competed and blood sample was collected and sent to laboratory for analysis.

Data from data collection form were entered in software for analysis by using Epidata 3.1 then exported to SPSS version 25. Quantitative data were presented using tables in frequencies and percentages or in charts accordingly. Pearson Chi-square test was used to determine the association between categorical variables. Fisher's exact test was used on association with count less than 5. Logistic regression (binary logistic regression) was used to study the associations in the presence or development of different non-communicable diseases and their predictors.

The statistically significance of associations (significance level) was set at P value <0.05 (level of marginal significance within a statistical hypothesis test).

2.6. Ethical consideration

The permission to conduct this study was obtained from the research and ethics committee of university of Rwanda and University Teaching Hospital of Kigali and Institutional review board (IRB). At the time of data collection, the informed consent form was completed and signed by each participant in the study after explanation of importance of the study, patient rights to participate and withdraw. All information from medical records and interpretation results concerning patients will be kept confidential .No name of patient will appear anywhere during study conduction and after publication. Before conducting the study, we attributed the code and number to each patient.

2.7. Study description and data included

After receiving research approval letter from IRB and CHUK research committee every HIV patient with inclusion criteria who came at CHUK in HIV clinic for follow up in the period of study was recruited as study participant.

Every patient enrolled was explained about the study and signed consent/assent form before participation. Through the pre-established questionnaire, the information was collected on socio-demographic characteristic, clinical parameters, anthropometric and psychometric measurement and Para-clinical measurement.

On socio-demographic, the participant was interviewed through history taking in order to establish possible risk factors of non-communicable disease. The variables was age, sex,

residency, occupation, diet, and tobacco use and alcohol consumption, advance directives, instrumental activity daily living, availability of capillary glucometer machine for home blood sugar control and self-measuring device for blood pressure monitoring.

Clinical parameters was including duration of HIV here the cut off was 10years based on time when ART was initiated in our HIV clinic in 2005; time since ART was initiated for each participant, type of antiretroviral therapy and line of treatment, history of stopping antiretroviral therapy for a month or more, adverse drug reaction, baseline viral load and CD4 count and current viral load with their trend of suppression, previous history of known non communicable diseases and their level of control focusing on DM, HTN, dyslipidemia and renal impairment.

Anthropometric measured was weight and height for calculation of BMI. Vital sign taken was blood pressure. Anthropometric measurement and vital sign were taken by trained nurse in triage room.

Para clinical measurement and sample collected by trained laboratory technician were including blood sugar and glycated hemoglobin, renal function test and lipid profile.

Blood pressure was repeated in consultation room in sitting position and BP$\geq$140/90mmHg in two readings with 15mnutes interval was considered as hypertension.

Diabetes mellitus was diagnosed with fasting blood sugar above 126mg/dl or Random blood glucose above 200mg/dl, or glycated hemoglobin above 6, 5%,

Lipid profile done was fasting cholesterol, and triglyceride and cholesterol above 6.2mmol/l with high LDL-C above 4mmol/l and triglyceride above 2.2mmol/l were considered as dyslipidemia.

Other labs done were serum creatinine for estimated glomerular filtration rate calculation and if equal or less than 90ml/min were considered as impaired renal function.

Blood samples were collected and sent to laboratory for analysis and the results were recorded from open clinic and documented on data collection form. The abnormal result was communicated to the patient for control and initiation of treatment and regular follow up.

2.8.   Participants enrollment
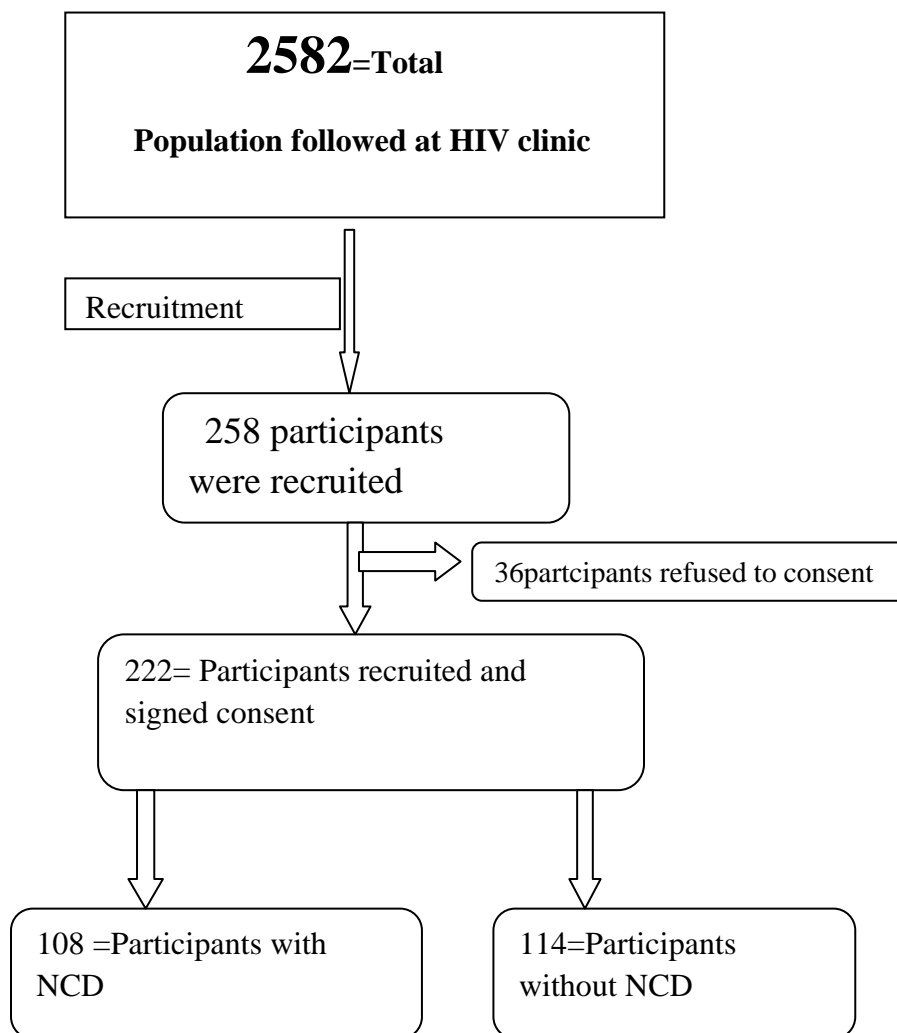
Figure 2: Participant enrollment procedure

Chap 3. Result and discussion

3.1. Result

3.1.1. Descriptive data on baseline sociodemographic characteristics

With 200-target sample size estimated, 222 patients out of 2582 people living with HIV followed at CHUK/ HIV Clinic were enrolled over the study period of 6 months based on DSDM scheduled appointment. The participants were predominantly female at 61% and the majority was younger and middle aged with mean age of 47, SD of 13.3.

The majority of participants were living in urban region at 90% and their level of education is mainly secondary at 73% and 6% were public employers, 37% were cultivator and 47% were doing housework as their daily living activity.

Table 1. Sociodemographic characteristics of study participant (n=222)

Variables	N	%
Gender		
Male	87	39.2
Female	135	60.8
Age mean age 47		SD 13.3
Residence		
Rural	22	9.9
Urban	200	90.1
Education background		
Primary/None	55	24.8
Secondary/University	167	75.2
Instrumental activities of daily living		
Housework	105	47.3
Employed	25	6.3
Private	9	4.1
Cultivator	83	37.4
Advance directives		
Yes	6	2.7

3.1.2. HIV clinical characteristics

HIV clinical information is described in table 2 below. A 100% of all recruited participants were on ART and 63% of them were living with HIV on ART for more than 10years. 81% of study subjects were on first line ART, 17% of them on second line and 1.4% on third line. 27% of participants experienced side effects on Antiretroviral therapy and most offended drugs are D4T and TDF at rate of 36% and 35% respectively and the offended drug was replaced by other drug in same group or different group according to protocol and national guideline and 92% of participants had suppressed viral load.

Table 2.HIV Clinical information from study participants (n=222)

Variable	N	%
HIV diagnosis duration		
≤10 years	81	36.5
>10 years	141	63.5
Line of treatment		
First line	181	81.5
Second line	38	17.1
Third line	3	1.4
Current viral load trend		
Suppressed	185	92.0
Not suppressed	16	8.0
Adverse drug reaction		
Yes	60	27.0
No	162	73.0
Drug with adverse drug reaction		
D4T	22	36.7
TDF	21	35.0
AZT	8	13.3
EFV	3	5.0
KLT	3	5.0
Nevirapine	2	3.3
ABC	1	1.7

3.1.3. Natural and clinical characteristics of participants

Natural habit of participants was also reviewed as important predictors because it can contribute in NCD. The majority of reviewed participant were eating fruits and vegetables at daily basis. 23% consume alcohol and 9% used to smoke but they were neither heavy drinker nor smoker. In all participant 70% were doing physical exercise and 94% of them at weekly basis. Body mass index of participant is another risk factor for NCD and 53% of them were having normal BMI, 28% were overweight, 12% were obese and 5% were underweight.

Table 3.Natural and clinical characteristics of study participants (n=222)

Variables	N	%
Smoking		
Yes	20	9.0
Alcohol consumption		
Yes	51	23.0
Eating vegetables		
Daily	220	99.1
Weekly	2	0.9
Eating fruits		
Daily	219	98.6
Weekly	3	1.4
Physical exercise		
Yes	156	70.3
Frequency of physical exercise		
Once/week	148	94.9
Twice/week	8	5.1
BMI		
Underweight	12	5.4
Normal	118	53.2
Overweight	64	28.8
Obese	28	12.6

3.1.4. Prevalence of NCD in study participants

The main variable of the study is prevalence of no communicable diseases in study population, as our HIV clinic does not routinely screen for NCD in people living with HIV. In this study, In this study, a total of 222 participants out of 2582 HIV patient followed at CHUK/HIV Clinic were enrolled. The overall NCD prevalence was 108(48.6%) out of 222 study participants. Diabetes Mellitus prevalence was 9.9%(22 out of 222); HTN prevalence was 22.5%(50 out of 222 participant); renal impairment prevalence was 9.9%(22 out of 222 participant) and 54% of; Dyslipidemia prevalence was 3.4%.

Table 4.Prevalence of non-communicable diseases among study participants (222)

NCD	N	%
Diabetes	22	9.9
Unknown	9	41.9
Known	13	59.1
Hypertension	50	22.5
Unknown	40	80.0
Known	10	20.0
CKD	22	9.9
Unknown	12	54.5
Known	10	45.5
Asthma (Known)	2	0.9
Heart diseases (Known)	3	1.4
Thyroid disease (Known)	2	0.9
Dyslipidemia Unknown	7	3.2

3.1.5. Previously known NCD control

Before the study only 31 %(34 out of 108) participant were living with known NCD under treatment and 50% of them were controlled with good follow up. Only 36% of people with diabetes mellitus were using glucometer machine for home blood sugar monitoring and 8.7% of hypertensive patient were using blood pressure machine for home blood pressure monitoring.

Table 5: Diabetes mellitus and hypertension control and monitoring device use

Variables	N	%
Diabetes mellitus control		
Presence of glucometer		
Yes	8	36.4
No	14	63.6
Blood sugar control (HbA1c)		
≤6.5	**3**	**13.6**
>6.5	19	86.4
Hypertension control		
Presence of BP machine at home		
Yes	2	8.7
No	21	91.3
Blood pressure control		
Stage 1	10	43.5
Stage 2	13	56.5

3.1.6. Morbidity and multi-morbidity in PLWHIV

For a total of 222 studied subjects, 48% have NCD, 67.5% of them have only one NCD, and 32.5% have more than one NCD with 92.4% having dual NCD and 7.6 % having Triple NCD. 34.6% were having HTN and renal impairment; 30% having DM and HTN; 15% with HTN and dyslipidemia.

Table6. Morbidity and multi-morbidity

Variable	N	%
Only one NCD	54	67.5
Multiple NCDs	26	32.5
HTN and CKD	9	34.6
DM and HTN	8	30.8
HTN and DYSLIPIDEMIA	4	15.4
DM and CKD	1	3.8
DM and DYSLIPIDEMIA	1	3.8
HTN and THYROID DISEASE	1	3.8
DM and HTN and ASTHMA	1	3.8
DM and HTN and CKD	1	3.8

3.1.7. Analytical data

3.1.7.1. Predictors of HTN in study population

In our study population the most predictors associated with developing hypertension were female gender 8.9% vs 5.7%; age above 65years, 41% ,OR: 2.6, CI 95%(0.9-7.3); P:0.06; BMI above 25, 14% OR:1.9,CI 95%(0.8-4.7),P,0.1; low level of education;OR:2.6,CI 95%(1.1-6.4);P:0.03; physical inactivity 12% ,OR: 1.3, 95%CI(0.5-3.2),P:0.5; alcohol 13%, OR:1.5, 95%CI(0.6-3.9) and living in rural region,36% vs7% of people living in urban region, OR:7, 95%CI(2.5-19.5), P<0.001.

Table7. Predictors of hypertension in study participant

Predictor	Hypertension		OR (95% CI)	P value
	Yes	No		
Residence				
Rural	8 (36.4%)	14 (63.6%0	7.0 (2.5-19.5)	<0.001
Urban	15 (7.5%)	185 (92.5%)		
Smoking				
Yes (n=20)	2 (10.0%)	18 (90.0%)	0.95 (0.2-4.4)	0.956
Alcohol consumption				
Yes (n=51)	7 (13.7%)	44 (86.3%)	1.5 (0.6-3.9)	0.372
Physical inactivity				
Yes (n=66)	8 (12.1%)	58 (87.9%)	1.3 (0.5-3.2)	0.576
Education				
None/Primary	10 (18.2%)	45 (81.8%)	2.6 (1.1-6.4)	0.033
Secondary/University	13 (7.8%)	154 (92.2%)	Ref	
BMI category				
<25	10 (7.7%)	120 (92.3%)	1.9 (0.8-4.7)	0.126
≥25	13 (14.1%)	79 (85.9%)	Ref	
Age category				
≤65 years	43 (21.0%)	162 (79.0%)	Ref	
>65 years	7 (41.2%)	10 (58.8%)	2.6 (0.9-7.3)	0.063

3.1.7.2. Predictors of renal impairment

Renal impairment prevalence in people living with HIV was (9.9%)22 out of 222participants and the majority 54%(12 out of 22) have moderate decline in GFR between 30 and 59ml per minute and only 9.1% have kidney failure on hemodialysis. The predictors associated with renal impairment were age above 65years,OR: 12.3, CI 95%(1.3-120),P:0.03, living in rural region, OR:3.2, 95%CI(1-9.6)P:0.04 smoking , OR:3.6; 95%CI(1.2-11.2)P:0.02; alcohol consumption OR:4, 95%(1.6-9.8)P:0.003. It is also associated with adverse drug reactions mainly TDF and other non-communicable disease multi-morbidity like HTN and DM.

Table 8. CKD stage

CKD stage	N	%
1. GFR above 90ml/min	2	9.1
2. GFR between 60 and 90ml/min	4	18.2
3.GFR between 30 and 59ml/min	12	54.5
4.GFR between 15 and 30ml/min	2	9.1
5.Kidney failure with GFR<15ml/min	2	9.1

Table 9.Association between having Kidney disease and different predictors

Predictor	Chronic kidney disease		OR (95% CI)	P value
	Yes	**No**		
Age category				
<35 years	1 (2.4%)	40 (97.6%)	Ref	
35-65 years	17 (10.4%)	147 (89.6%)	4.6 (0.6-35.8)	0.142
>65 years	4 (23.5%)	13 (76.5%)	12.3 (1.3-120.2)	0.031
Residence				
Rural	5 (22.7%)	17 (77.3%)	3.2 (1.0-9.6)	0.043
Urban	17 (8.5%)	183 (91.5%)	Ref	
Smoking				
Yes (n=20)	5 (25.0%)	15 (75.0%)	3.6 (1.2-11.2)	0.025
Alcohol consumption				
Yes (n=51)	11 (21.6%)	40 (78.4%)	4.0 (1.6-9.8)	0.003

3.1.7.3.   Association of NCD with Adverse drug reactions

60% of patients with adverse drug reactions developed renal impairment, 20% developed HTN and 15% has DM. 19% of patient with side effects on D4T developed HTN, 33% of patient with side effect on kaletra developed diabetes mellitus.

Table10. Frequency of patients with specific NCD with adverse drug reaction on specific ART drugs

Drug with ADR	NCD	N	%
TDF (n=20)	Diabetes	3	15.0
	Hypertension	4	20.0
	CKD*	12	60.0
AZT (n=8)	Hypertension	1	12.5
	CKD	1	12.5
D4T (n=21)	Hypertension	4	19.0
KLT (n=3)	Diabetes mellitus	1	33.3
EFV (n=3)	Diabetes	1	33.3

3.1.7.4.   Association of NCD with different predictors

Elderly people with age above 65years are at high risk of developing NCD with prevalence of 58% OR: 8.3; 95%CI (2.3-30.1), p<0.001. Lack of physical exercise is also associated with increased risk of non communicable disease when compared with patient with frequent physical exercise. The prevalence of no communicable disease in people without physical exercise was 48% vs 30% of those with physical exercise, OR of 2.1 (1.1-3.8) p values 0.013.Adverse drug reactions were associated with high risk of no communicable with prevalence of 50% vs 30% of patient without ADR, OR:2.2, 95%CI(1,2-4.1)P value 0.009.Alcohol consumption was also not significantly associated with NCD 45% vs 33%, OR: 1.6, 95%CI (0.8-3.1) P value 0.12.

Table11.Association of Non Communicable Disease and different predictors (n=222)

Predictor	Presence of NCD		OR (95% CI)	P value
	Yes	No		
Gender				
Male	28 (32.2%)	59 (67.8%)		
Female	52 (38.5%)	83 (61.5%)	1.3 (0.7-2.3)	0.338
Residence				
Rural	11 (50.0%)	11 (50.0%)	1.8 (0.7-4.6)	0.156
Urban	69 (34.5%)	131 (65.5%)		
Smoking				
Yes (n=20)	8 (40.0%)	12 (60.0%)	1.2 (0.4-3.10	0.699
Alcohol consumption				
Yes (n=51)	23 (45.1%)	28 (54.9%)	1.6 (0.8-3.1)	0.126
Age				
<35 years	6 (14.6%)	35 (85.450		
35-65 years	64 (39.0%)	100 (61.0%)	3.7 (1.5-9.4)	0.005
>65 years	10 (58.8%)	7 (41.2%)	8.3 (2.3-30.5)	0.001
BMI category				
<25	43 (33.1%)	87 (66.9%)		
>=25	37 (40.2%)	55 (59.8%)	1.3 (0.7-2.3)	0.276
Education				
None/Primary	25 (45.5%)	30 (54.5%)	1.7 (0.9-3.2)	0.095
Secondary/University	55 (32.9%)	112 (67.1%)		
Physical inactivity				
Yes (n=66)	32 (48.5%)	34 (51.5%)	2.1 (1.1-3.8)	0.013
Viral load measurements trend				
Suppressed	69 (37.3%)	116 (62.7%)	4.1 (0.9-18.8)	0.064
Not suppressed	2 (12.5%)	14 (87.5%)		
Adverse drug reaction				
Yes (n=60)	30 (50.0%)	30 (50.0%)	2.2 (1.2-4.1)	0.009
HIV duration				
≤10 years	28 (34.6%)	53 (65.4%)		
>10 years	52 (36.9%)	89 (63.1%)	1.1 (0.6-1.9)	0.73

3.2. Discussion

3.2.1. Study Participant

The prevalence of NCD in HIV population in Rwanda; Since the initiation of ART in 2005 there has been improvement in life style and significant decrease of mortality, so most of adult populations have now are aged more than 35 years with mean age of 47,1 and SD of 13.3. Study participants were predominantly female with female to male ratio of 1.5.These result are in same line of what found in a study done in Kwa Zulu where their HIV population were older than 46years of age and predominantly female more than two times affected than male (22). The majority of our study population was living with HIV for more than ten years and most of them have suppressed viral load with good adherence to antiretroviral therapy. This explain the efficacy of the program therefore most NCDs are not linked to HIV itself but reflect the prevalence of NCDs in normal population.

3.2.2. NCD prevalence in People living with HIV

HTN is high prevalent with 22% of prevalence and 80% of them were not known before the study; 9.9% were having DM with 41% of them newly discovered during the study; 9.9% were having renal impairment and 54% of them were not aware of the disease before the study. 7(3.2%) were having newly discovered dyslipidemia. According to these results, prevalence of NCD in our population were high when compared with the result found in the study done in Ethiopia where prevalence of DM, HTN, and dyslipidemia was 7.1%, 12.7% and 4.7% respectively(12), and other study done in Uganda where prevalence were 12.4% of HTN and 4.7% of diabetes mellitus(23).High NCD prevalence in our study population is due to the fact that that our population are more aged with mean age of 47.1± 13.3 when compared with Ethiopian population with mean age of 39±8(12) and they developed chronic disease related with ageing. 63% of our participants live with HIV on ART for more than 10 years compared to 60% from Ethiopian study living with HIV for 5years. HIV duration and ART exposure is also a risk of NCD. On the other hand, those patients living with known NCD were followed at different health facilities and more than half of them were not controlled because it was difficult for them to attend at two different health facilities with regular follow up and most of them do not have monitoring device for daily home monitoring especially for hypertension and diabetes.

3.2.3. Common non communicable diseases in study population

3.2.3.1.   Hypertension

Prevalence of hypertension in study population was 22.5% and 80% of them was newly diagnosed and 20% was known on Treatment, most of them were not controlled. This result was consistent with what found in study done in Uganda where 14% of participant were hypertensive with 79% previously undiagnosed and 85% of previously known were on treatment but 50% of them were uncontrolled and predictors were older age, male gender, higher BMI, lack of education and alcohol use (5) and in Cambodia study revealed non communicable disease prevalence of 47% where 90% of DM were newly diagnosed and 44% of hypertension were newly diagnosed(11). In our setting, we have high number of undiagnosed hypertension because in our HIV clinic, they do not routinely screen for hypertension. They used to ask if anyone has known hypertension before checking for blood pressure, and if not known, they do not check for it. The majority of those with known hypertension were discovered in health center or private clinic when they went there to consult for another complaint. HTN is high prevalent in HIV population comparing with its prevalence in general population which is ranging between 14 and 18%(28).

The predictor of high prevalence of hypertension in our population were gender; female were affected than male, age above 65 years, high BMI, physical inactivity, alcohol consumption, lack of education and living in rural region. These predictors were similar to those found in a study done in Nigeria which found 19.3% of HTN prevalence and risk factors were age and high BMI but contrary to our result male gender was most affected (4); in South-Africa HTN prevalence was 17.7% and was significantly associated with female than male and older age above 55years which is in same line with our result (29), and in Malawi where hypertension prevalence was 23% and more in people living in rural than urban. There is no clear explanation to that difference of HTN prevalence between urban and rural region. (30).

Home blood pressure monitoring prevalence was low. Only 8.7% of hypertensive patient were using blood pressure machine at home to monitor their blood pressure. This can be a reason why most of them are not controlled and not aware of their level of the hypertension, which can expose them to complications like cerebrovascular accident, coronary artery disease, retinopathy and nephropathy.

3.2.3.2.   Diabetes mellitus

Diabetes mellitus prevalence was 9.9 % with glycated hemoglobin above 6.5% and 41% of them were newly diagnosed and 59% was previously known on treatment and most of them were uncontrolled. There was no difference between female and male but there is strong association between hypertension and DM with 30% of prevalence. These result are in line of what found in study done in Ethiopia where DM prevalence was 7.1% associated with high BMI and high blood pressure(12); and DM prevalence is high in our population when compared with result found in South Africa, where diabetes mellitus prevalence was 5% and 20% of them newly diagnosed. This high prevalence of undiagnosed DM in our population is due to our population are poor, unable to afford healthy diet for life style modification and they didn't do routine checkup for NCD screening and our HIV clinic doesn't routinely screen for NCD at their visit (31). Blood sugar monitoring at home were low and only 62.6% of patient known with DM have glucometer machine which is important for home blood sugar monitoring and control. Lack of the glucometer machine and the strip is the risk of high prevalence of uncontrolled diabetes mellitus due to low drug compliance with fear of hypoglycemia because those on insulin fear to inject insulin without knowing their level of blood sugar.

3.2.3.3.   Renal impairment:

Renal impairment prevalence was 9.9% with 54.5% newly diagnosed and 45.5% previously known. There is strong association of renal impairment with adverse reaction on TDF, and (60 %) 12 out of 20 participants with adverse reaction on TDF developed renal function impairment. 34.6% of participant with HTN have renal function impairment. In a study done in Tanzania, CKD prevalence was 15% at baseline and 12% developed CKD during follow up on antiretroviral therapy. Low CD4 count less than 200cells/ul, older age and HTN were found to be associated with development of renal impairment(17) . In our study population the predictors of renal impairment were age above 65 years, OR: 12.3, alcohol consumption, smoking, hypertension and tenofovir. The association between levels of CD4 count was not known because they are not currently done for routine follow up and there is no correlation between level of viral load and development of renal impairment. High prevalence of undiagnosed renal impairment in our population is due to lack of regular control of renal function. Most of our patients have baseline screening test but no test done for follow up because patients have to pay for those tests, they did not have money, and others did not want to pay because they think that all services in HIV clinic are offered without payment.

3.2.3.4.   Dyslipidemia

Dyslipidemia prevalence was 3.2% newly diagnosed. There is no risk found to be associated with dyslipidemia in our study participant but 60% of participants with dyslipidemia have HTN and 15% of them have associated DM. Dyslipidemia was less prevalent when compared with result from study done in Sudan where dyslipidemia prevalence was ranging from 13 to 70 % and the predictors were low CD4, use of antiretroviral therapy especially protease inhibitors and stavudine, and fatty liver. HIV infection itself or HIV medication can induce dyslipidemia(14).

3.2.4.   Morbidity and multimorbidity in study participants

For 108 participants with NCD, 67.5% of them have only one NCD and 32.5% have more than one NCD and 92.4% of them with dual NCD and 7.6 % with triple NCD. Multi-morbidity is high when compared with the result found in a study done in Uganda where 20% have overall NCD and 4.7% have multi-morbidity with more than one NCD(23) and research done at Kwa Zulu in South Africa revealed multi-morbidity prevalence of 56% with two or more disease((22). Another study done in Cambodia revealed that 47% had one or more NCD with 81% having single disease, 17% with dual disease and 2% with triple disease(32). The association between HTN with renal disease is explained by their pathogenesis. In acute glomerulonephritis, HTN is driven by volume expansion, in vascular disease it is thought to result from ischemic activation of the Renin angiotensin Aldosterone System. High blood pressure can cause blood vessels damage then blood supply to kidney is reduced that lead to kidney injury; it damages also filtering unit in kidney. Injured kidney stop removing wastes and extra fluid from blood which cause raised blood pressure.(33). Diabetes mellitus can be associated with renal impairment through diabetic nephropathy. HTN is associated with DM as one of its cardiovascular complication. HTN and dyslipidemia are associated as they are sharing same risk factors which are obesity and high BMI and ART exposure(14).

3.2.5.   Risk factors associated with NCD in study participants

The risk factors associated with NCD were assessed by using logistic regression and age above 65years were strongly associated with NCD, OR:8,3; which explain the high incidence of non communicable diseases with ageing. Female gender was mostly affected OR: 1.3. This high NCD prevalence is due to our study population is aged and predominately female, though pregnant women were excluded, possible risks related to previous pregnancies which can explain high prevalence of NCD in female were not assessed. These results are similar to those found in a study done in South Africa, Kwa Zulu(22) where 33% had HTN, 4% had

DM with most predictor being older age above 45 years old and female gender and another study done in Zimbabwe where HTN and DM prevalence were 10.2% and 2.1% respectively and were strongly associated with age above 55years(AOR:5.45) and female gender(AOR: 2.12)(21).

Lack of physical activity was associated with increased risk of NCD when compared with those with regular physical activity; OR:2.1. It was in the same line with a study done in Congo where low physical activity was associated with increased risk of NCD, OR:2.47(15). As Congo is our neighboring country, there is no big difference between our populations and the baseline characteristics of study participants were similar.

Adverse drug reaction was associated with increased risk of developing non-communicable disease when compared with participant without adverse drug reactions. NCD prevalence in subject with drug adverse reactions was high comparing with subject without adverse drug reactions, OR2.2; this is consistent with a study done in Congo which found that protease inhibitor and stavudine containing antiretroviral therapy were associated with high risk of metabolic syndrome and NCD, OR2.57(15). Another study done in Ethiopia found that longer duration on antiretroviral was associated with high prevalence of HTN(12) and in Nigeria where HTN prevalence double after two years of starting antiretroviral therapy(4). The exact cause of increased risk of NCD with ART use was not identified. More studies are needed for more explanation.

Limitations: This study was not having fund and some investigations were not requested. HTN was based on only two reading taken the same day within 15minutes apart. Renal impairment was diagnosed based on only one measurement; therefore, we could not differentiate acute vs chronic kidney disease. As the design of this study was to give a hint on the burden of the NCDs Problem, there is a need of more study with enough budgets to go in deep of this public health concern.

Chap 4. Conclusion and recommendation

4.1. Conclusion

There is high prevalence of NCDs in people living with HIV

The commonest non-communicable diseases in this setting are hypertension and Diabetes

More than a half of NCDs in this population are undiagnosed

Renal impairment is the complication of longstanding undiagnosed and uncontrolled Hypertension, DM, antiretroviral and medications induced.

The most risk factors associated with NCD are age, female gender, and low physical exercise, high body mass index, alcohol consummation, and adverse drug reaction and low education level.

The lack of integration of NCDs in HIV care is contributing to increasing incidence and lead to poor regular control of NCDs in HIV population attending HIV clinics.

4.2. Recommendation

General recommendations

NCD and HIV are both chronic condition requiring regular follow up and team approach for good adherence and outcome.

Because non communicable diseases are silent killers without symptoms our HIV clinic have to take them into account for routine screening and treating NCD if indicated in people living with HIV at their regular scheduled visit.

To health professional

Information and communication of adult HIV population about NCDs in population in general and the impact of comorbities with HIV.

Initiation of regular NCD screening in people living with HIV in HIV clinic, and integration in reporting system

To general population

To do regular screening of NCDs because they are silent killer, asymptomatic and controllable if early recognized

To the patient

To have Blood pressure machine and glucometer for regular home monitoring

Regular follow up and good adherence to medication for NCD control in order to prevent long-term complications.

To the MOH

To assess the burden and the impact of NCDs and HIV in people living with HIV.

To create models of prevention and treatment of NCDS in HIV population.

Integration of NCDs programme in HIV care and treatment programme

To improve awareness of Health providers and community about the impact of HIV ageing and onset of NCDs in HIV population.

To create and put in place the reporting system of NCDs affecting people living with HIV to conduct prospective cohort observation research to assess much better the risk factors of NCDs in HIV population

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Appendix 1: Questionnaire

A. Patient general information

Date of enrollment:

1. Patient initials: ……   Code number: ………………………

2. CHUK ID: ………………..............................   TRAC NET NO: ....

3. Age: ………………………

4. Sex: M □/ F□

5. Marital status: single □ / married □ / widow □ / divorced □ or separated □

6. Residency: urban □ rural □   Tel: ……………………….

7. Education background: Primary □ / Secondary □ / University□ / N/A□

8. Occupation; yes□ or no□; specify: ………………………………

9. Instrumental Activities of Daily Living Activities (IADL): shopping □, cooking □, doing housework □, laundry □, using phone □, managing medications □, financial□, driving □ or others: ……

B. Life style modification

10. Did you ever smoke? Yes □ /no □ if yes quantify: ………cigarette/ day for how long:….year

11. Do you take alcohol? Yes □/ no □ if yes quantify: ………………bottle/day

12. Do you eat vegetables? Yes □ /no □ if yes quantify: daily □ / weekly □/ monthly □

13. Do you eat fruits? Yes □ / no □ if yes quantify: daily □ / weekly □ / monthly □

14. Do you eat salt? Yes □ / no □. Quantify per day: 1/2spoon □ / 1spoon □ / 2 spoon □, NA □

15. Do you do physical exercise? Yes □ /no □. If yes: once a week□/ twice a week□/ ≥3*/week □

C. Anthropometric measurement

Weight: ……………………….

Height: …..………………. …..   BMI…………………....

Vitals: BP1: ……..../……; BP2……. /……..

D. Psychometric measurement

Motor speed: …/4

Psychomotor speed: …/4

Memory recall: …/4

E. HIV information

16. Date of diagnosis of HIV: date/month/year …………./……./………

17. Known CD4/ VL at diagnosis? Yes □ /no □. If yes specify numbers

    1. CD4 count (cell/mm3): ………..

    2. VL at the time of diagnosis: ………………. …………………..

VL: □ suppressed   □   not suppressed

18. Treatments: a. Bactrim: yes □ /not □

b. ART: Yes □ / No □   c. which line (specify)………….

19. Any change of regimen yes □ / no □

 If yes specify reason………………………………………………………………………..

    Specify by order all regimen received up to current

        1……………………………………. 3…………………………………………

        2…………………………………..4…………………………………………

20. Current ART regimen: …………………………………………………………………………

21. Trend of Cd4 count

        1. Lowest……………………………year: …………………………………

        2. Highest …………………………...year: …………………………………

22.. Trend of VL

        1. Lowest ……………………………. year: ………………………………

        2. Highest ……………………………year: …………………………………

23. Duration: 1. Bactrim……………….   2. ART: ………………………………………….

24. Any ART interruption. Yes □/No □   if yes specify Why…………………………………

25. For how long………………days

26. 1. Current CD4 count………………………………2. current VL…………………………

27. ADR: Yes □/ Not □

If yes, 1. Specify the drug ……………………...2. Type of ADR………………………

28. Any disease prior or post HIV diagnosis: yes □ / no □

    If yes specify, 1. OI ……………. ………………….; 2. NCD…………………………

If NCD'S specify by selecting the NCD'S or combination below and year of diagnosis.

1. DM □   a. if yes   in which year: …………...

             b. Do you have a glucometer machine at home? Yes □ /no □.

             c. If yes how often do you use it? Daily □; weekly□; monthly□

 2. H TN □   a. year: ……….

          b. Do you have a BP machine at home? Yes □ /no □.

          c. If yes how often do you use it? Daily □; weekly□; monthly□

 3. CKD □   year: ……………

4. COPD □   if yes specify year: ………….

 5. ASTHMA □   if yes specify

6. BRONCHECTASIS yes □ / no □

7. HF: □ if yes specify etiology: VHD□; DCMP□; HCMP□; pericardial disease□; year:……

8. Other cardiac disease yes □ /no □   if yes specify…………………………………………

9. Thyroid disorder Yes □/ No □   if yes specify…………………………………………

10. Dyslipidemia YES □ /NO □

11. Known cancer yes □/ no □   if yes specify…………………………………………………

12. Stroke YES □ / NO □ if yes specify

13. Other vascular disease yes □ /no □ if yes specify …………………………………………

14. Neuropathy; yes □ /no □ ; if yes specify

 25. Which Treatment did you received..?

                    Duration of treatment...

F. Laboratory exam:

Test	Result
Fasting BG	
HbA1C	
Urea	
Creatinine	
Proteinuria	
TC LDL TG LDH	
FBC	WBC… N:…………,L:………….Hb:…………Plt:……

Appendix 2: Financial budget

Expense	Cost in Rwf
Communications	100,000
Transport	350,000
Data collection, labs and analysis	1,500,000
Printing and binding	50,000
Total	**2,000,000**

Appendix 3: Time frame of the study

Activity/Duration	Jan-April 2019	May-July2019	August2019-Feb2020	March-July2020
Proposal writing	√			
Getting approval and fundraising		√		
Data collection			√	
Data analysis and paper writing				√

Appendix 4: Informed Consent form (English)

Dear Participant,

I am called Dr TURIKUMWE Sylvie. I am a resident in UR, and I need to perform research on the prevalence of non communicable disease in people living with HIV. It is a cross sectional study of all adult HIV patients presenting at HIV clinic/ CHUK.

This study will be done on participants with 15years and above followed at CHUK / HIV clinic, an extensive physical exam will be done to identify associated symptoms, and complementary investigations will be performed for NCD screening. These might include taking a blood and/or urine sample for analysis and radiological exams if indicated. No extra investigations will be performed for this study.

Participation in this study is voluntary and you can choose to withdraw your data from the study at any time without penalty. However, we hope that you will participate in this study since it will help us to improve the care given in our and other institutions. Any information we collect will be kept strictly confidential. All data gathered is anonymized, hence no reference to your name or other family members will or can be made on publication of the study results.

We do not anticipate any harmful events as part of this study, but for any inquiry please contact the research committee (researchcenter@ac.ur.rw Tel +250 788563311).

Thank you.

I ……………………………………………understand the explanation given by Dr…………………………………………………... about the risks and benefits of this research on the prevalence of NCD in PLWHIV. I accept willingly to participate in the research.

Participant's signature   Researcher's signature

Parent or guardian signature if below 18 years old

Date: ……. /……. /2019

Appendix 6: Consent form (Kinyarwanda)

KWEMERA KWITABIRA UBUSHAKASHATSI

Nitwa muganga Sylvie TURIKUMWE, umunyeshuri muri Kaminuzay'u Rwanda mu ishami ry'ubuvuzi bw' indwara zo mu mubiri nkaba ndi gukora ubushakashatsi ku ndwara zitandura mu barwayi babana n' ubwandu bw' agakoko gatera SIDA.

Ni ubushakashatsi buzakorwa ku barwayi bose bafite ubwandu bw' agakoko gatera SIDA bakurikiranirwa muri CHUK bemeye gukorerwaho ubushakashatsi ku bushake.

Muri ubu bushakashatsi, umurwayi wese azajya abazwa kandi asuzumwe mu rwego rwo kugira ngo turebe ibimenyetso afite. Nyuma azafatirwa ibizamini by'amaraso, inkari, guca mu cyuma n' ibindi bizamini bishobora kudufasha kubona ubundi burwayi butandura bushora kujyana n'ubwandu.

Kwinjira muri ubu bushakashatsi ni ubushake bwawe, wemerewe no kubuvamo igihe ubishakiye kandi nta bihano uzafatirwa. Nta muntu wemerewe gutangaza amakuru ajyanye n'uburwayi bw' abari mu bushakashatsi kandi igihe cyo gutangaza ibyavuye mu bushakashatsi nta mazinay'abari mu bushakashatsi azagaragaraho. Twari twishimiye ko twabaha agahimbazamunsi ariko ntabwo bizashoboka kuko ubu bushakashatsi nta baterankunga bufite.

Ntabwo duteganya ko hari ikibi kizaba, ariko hari ikibazo mwahamagara kuri nomero Tel +250 788490522/+250783340040 cyangwa mukandika kuri email researchcenter@ac.ur.rw ushinzwe ubushakashatsi akabafasha.

Murakoze.

Njyewe……………………………………, maze gusobanurirwa na ……………………………. Ingaruka n'inyungu kuri ubu bushakashatsi, nemeye nta gahato kubujyamo.

Umukono…………………………….... Umukono w'uwamusinyishije……………………..……

Umukonow'uhagarariye umwana utarengeje imyaka 18: ……………………………………...

Itariki ……. /…….. /20…….

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 26/ March /2019
Ref: CMHS/IRB/129/2019

Dr Sylvie TURIKUMWE
School of Medicine and Pharmacy, CMHS, UR

Dear Dr Sylvie **TURIKUMWE**

RE: RECOMMENDATIONS FOR YOUR PROTOCOL

Reference is made to your application for ethics clearance for the study entitled *"Prevalence of Non-Communicable Diseases In People Living With HIV At CHUK/ HIV Clinic Cross-Sectional Study On PLWHIV Followed At HIV Clinic/CHUK".*

The ethics clearance shall be granted to your study after revising your protocol by considering the following recommendations from the IRB:

1. Is it fair to say that the link or association of HIV and NCDs is not known?
2. The title shall include and be limited only to most common diseases? Any NCD that you will see? Please be explicit in defining what is most common. Or most common can be removed
3. Describe the statistical methods that shall be involved in your study (descriptions, comparisons, tests…)
4. The title population of 2189 can have a reference
5. Exclusion of patients below 18 years may affect the results as it is one section of the population, an assent form can suggested to include them

You will be required:

- To answer in a word file all questions from IRB;
- To submit a new and complete application file where changes due to corrections addressing IRB comments will be highlighted in color.
- To submit the certificate for online ethics training for PIs who have not yet submitted it. Examples of online courses

a) Protection of Human Research Participants: https: //phrp.nihtraining.com
b) Research ethics training:http://www.fhi360.org/sites/all/libraries/webpages/fhi-retc2/index.html

Thank you

Professor GAHUTU Jean Bosco
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR
Cc:
- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Innovation, UR

Ethics Committee / Comité d'éthique

May 24th , 2019   Ref.: EC/CHUK/085/2019

Review Approval Notice

Dear TURIKUMWE Sylvie,

Your research project: "PREVALENCE OF NON COMMUNICABLE DISEASES IN ADULT PATIENTS LIVING WITH HIV AT CHUK."

During the meeting of the Ethics Committee of University Teaching Hospital of Kigali (CHUK) that was held on 24th May, 2019 to evaluate your request for ethical approval of the above mentioned research project, we are pleased to inform you that the Ethics Committee/CHUK has approved your research project.

You are required to present the results of your study to CHUK Ethics Committee before publication.

PS: Please note that the present approval is valid for 12 months.

Yours sincerely,

Dr.RUSINGIZA KAMANZI Emmanuel
The President, Ethics Committee,
University Teaching Hospital of Kigali

<<*University teaching hospital of Kigali Ethics committee operates according to standard operating procedures (Sops) which are updated on an annual basis and in compliance with GCP and Ethics guidelines and regulations*>>

B.P. :655 Kigali- RWANDA www.chk.rw Tél. Fax : 00 (250) 576638 E-mail :chuk.hospital@chukigali.rw

UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 29th /03/2019

Dr **TURIKUMWE Sylvie,**
School of Medicine and Pharmacy, CMHS, UR

Approval Notice: No 139/CMHS IRB/2019

Your Project Title *"Prevalence of Non-communicable Diseases in People Living With HIV At CHUK"* has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Yes	Absent	Withdrawn from the proceeding
			No (Reason)	
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asiimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS	X		
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

Note: "Involved in the decision" spans the Yes/Absent/Withdrawn columns.

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 29th March 2019, **Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months.**
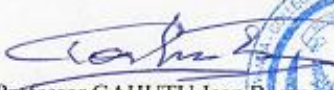
You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 29ᵗʰ March 2019

Expiration date: The 29ᵗʰ March 2020

Professor GAHUTU Jean Bosco
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Cc:
- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR