

**PREVALENCE OF THREE CARDIOMETABOLIC DISEASES AND THEIR
ASSOCIATED FACTORS AMONG PATIENTS ON ART AT THE HIV**

CLINIC IN MBALE REGIONAL REFERRAL HOSPITAL

BY

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DECLARATION

I the undersigned, declare that this dissertation is my original work, except where due acknowledgement has been made. I declare that this work has never been submitted to this University or any other institution for funding/partial fulfillment for any award.

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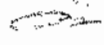
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This dissertation is, with our approval as academic supervisors, submitted in partial fulfillment of the requirements for the award of Master of Medicine in Internal Medicine of Busitema University.

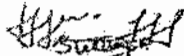
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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---------|---|
| ACTG | AIDS Clinical Trial Group |
| AIDS | Acquired immune deficiency syndrome |
| ART | Antiretroviral therapy |
| CCR5 | C-C chemokine receptor type 5 |
| CD4 | Cluster of differentiation 4 |
| CI | Confidence Interval |
| CMDs | Cardiometabolic diseases |
| cm | centimeter |
| CoLTART | Complication of Long Term Antiretroviral Therapy |
| CRP | C-reactive protein |
| CVD | Cardiovascular disease |
| D: A: D | Data collection on Adverse events of Anti-HIV Drugs |
| DALYs | Disability Adjusted Life Years |
| FSG | Fasting Serum Glucose |
| HAART | Highly Active Antiretroviral Therapy |
| HDL | High Density Lipoprotein |
| HIV | Human Immunodeficiency virus |
| LDL | Low Density Lipoprotein |
| mmHg | Millimeter of mercury |
| mmol/l | Millimole per liter |
| MRRH | Mbale Regional Referral Hospital |
| NNRTs | Non -Nucleoside Reverse Transcriptase Inhibitors |
| PI | Protease inhibitor |
| PLHIV | People living with HIV |
| RNA | Ribonucleic Acid |
| RR | Relative Risk |
| SD | Standard Deviation |
| SOPs | Standard Operating Procedures |
| SSA | Sub-Saharan Africa |

| | |
|-------|--|
| Tc | Total cholesterol |
| TG | Triglyceride |
| UNCST | Uganda National Council for Science and Technology |
| UPHIA | Uganda Population based HIV Assessment Survey |
| WHO | World Health Organization |
| WHR | Waist Hip Ratio |

OPERATIONAL DEFINITIONS

Cardiometabolic diseases (CMDs): also called cardiometabolic syndrome and its constellation of insulin resistance, impaired glucose tolerance, atherogenic dyslipidemia, hypertension and abdominal adiposity according to World Health Organization and National Cholesterol Education Program. For this study this included hypertension, diabetes and dyslipidemia.

Diabetes: defined as fasting plasma glucose (FSG) of ≥ 7 mmol/l or HbA1c of $\geq 6.5\%$ or being on treatment for diabetes.

Hypertension: defined as systolic blood pressure of ≥ 140 mmHg (SBP) and/or diastolic blood pressure (DBP) of ≥ 90 mmHg or being on antihypertensive treatment according to World Health Organization

Dyslipidemia: defined as total cholesterol (Tc) >5 mmol/L, high density lipoprotein (HDL) <1.2 mmol/L, low density lipoprotein (LDL) >3.0 mmol/L, triglyceride (TG) >1.7 mmol/L or total cholesterol to high density lipoprotein (Tc/HDL) ratio >4.1 mmol/L, non-HDL cholesterol >3.8 mmol/L or being on lipid lowering medicine.

Abdominal obesity: assessed using the waist circumference of >94 cm for men and >80 cm for non-pregnant women and over weight as body mass index (BMI) >25 kg/m².

Viral load: the amount of HIV in a PLHIV's blood. The results of a viral load test are described as the number of copies of HIV RNA in a milliliter of blood.

Suppressed viral load: reduced viral load (HIV Ribonucleic acid (RNA) to less than 1000 copies/ ml after being on ART more than six months

Virological failure: plasma viral load above 1000copies/ml based on two consecutive measurements with an interval of 6 month apart with adherence support in the between.

ABSTRACT

Background

There are currently 1.4 million people living with HIV (PLHIV) on ART in Uganda. PLHIV are currently living longer as a result of use of antiretroviral therapy (ART). The prevalence of cardiometabolic diseases (CMDs) is increasing among this population. These diseases increase the risk of development of cardiovascular disease (CVD) which is now emerging as one of the leading causes of morbidity and mortality among PLHIV. The increased CMDs and consequently increased CVD risk among PLHIV has been attributed to HIV infection itself, the effects of ARVs and shared lifestyle risk factors among others. Studies on CMDs among PLHIV in Uganda are few and those done generally been done in other parts of the country other than Mbale Regional Referral Hospital (MRRH). There is need to know the magnitude of CMDs among patients on ART in MRRH HIV clinic. The aim of this study was to determine the prevalence of CMDs and associated factors among patients on ART in MRRH.

Methods

This was a cross-sectional study conducted among PLHIV in MRRH. Data was obtained from chart reviews, participant interviews and analyzed blood samples collected from the participants. Participants were systematically sampled from the ART clinic in MRRH. Odds ratios (OR) were used as a measure of association and adjusted odds ratios (AOR) were calculated using logistic regression to explore the factors associated with CMDs. Ethical clearance was obtained from Mbale Regional Referral Hospital Research Ethics Committee.

Results

A total of 324 PLHIV were included in the study, two patients had incomplete data and were excluded from analysis. Majority (63.7%) were aged between 40-59 years with mean age 45 years. There were more females (64.5%) participants than the men. Cardiometabolic diseases were prevalent in this population of PLHIV on ART with hypertension at 32.4%, dyslipidemia 50% and diabetes at 1.8%. The majority of these PLHIV were not aware of these disorders. Known traditional risk factors were associated with cardiometabolic diseases such as age above 60 years was associated with hypertension adjusted odds ratio (AOR) =9.07 (95% CL, 0.5-15),

overweight (AOR =3.59, 95% CL: 1.31- 9.88) .Surprisingly patients with low salty diet were paradoxically more likely to have hypertension however most of these patients were among the 104 patients who knew their status (AOR=2.35, 95% CL: 1.36- 4.07). Past history of smoking was associated with 0.6 odds of reduction of hypertension. (AOR= 0.42, 95 %CL: 0.2-0 .90).

Dyslipidemia was strongly associated with being overweight, abnormal waist circumference, high salty foods and viral load. Those with high viral load >1000 copies had threefold increased odds of dyslipidemia with odds ratio (OR) = 3.46, 95% CL: 1.14-10.54). Overweight had 1.3 increased odds of being diagnosed with dyslipidemia (OR=2.26, 95% CL: 1.12- 4.59) while abnormal waist circumference had 0.7 increased odds of having dyslipidemia (OR=1.7 95% CL: 1.08-2.67). Patients who rarely added salt in their diet had increased odds of developing dyslipidemia with odds ratio (1.83, 95% CL: 1.18-2.85).Diabetes did not have any significant associations.

Conclusion

There is higher prevalence of cardiometabolic diseases among the patients on ART in Mbale RRH compared to the prevalence noted among the general population. A majority of the patients were not aware about their disease status. Dyslipidemia is the most prevalent followed by hypertension with diabetes the least prevalent. The traditional risk factors are associated with these diseases. The higher prevalence than in the general population suggests possible contribution of HIV to these diseases. Therefore, screening for these diseases should be emphasized among patients on ART.

CHAPTER ONE

INTRODUCTION

1.1 Background

Cardiometabolic diseases are becoming a major cause of morbidity among people living with HIV (PLHIV) (Chihana et al., 2012; Patel et al., 2018). The increase in three cardiometabolic diseases (hypertension, diabetes and dyslipidemia) among people living with HIV may be attributed to increased longevity due to the success of antiretroviral therapy (ART), toxicities from antiretroviral drugs (ARVs) and HIV itself among others (Dimala, Blencowe, & Choukem, 2018). Globally there are approximately 37 million people living with HIV, Three quarters of whom are in Sub-Saharan Africa. Twenty million of PLHIV globally were accessing HAART by 2017. (Patel et al., 2018). It is estimated that globally about 12-14million PLHIV potentially have NCDs. The burden in Sub Saharan Africa is noted to be on the increase, with higher prevalence noted among the PLHIV positive people as compared to HIV negative people (Dillon et al., 2013). Studies in Africa show prevalence of CMD's to be 21.5% among PLHIV compared to 12% in non HIV infected adults (Todowede, Mianda, & Sartorius, 2019). In Uganda, a sub study of the complications of long-term antiretroviral therapy cohort (coLTART) found the prevalence of hypertension to be 22.6%, diabetes at 3.4% and elevated total cholesterol at 30.2% among the PLHIV on ART. This prevalence is higher than that seen in Ugandan general population except that for hypertension, that is the general population prevalence of hypertension, DM, and dyslipidemia was 24.3%, 1.3%, and 6.7% respectively according to the non-communicable risk factor survey 2014 (MOH, 2014). The increased burden of CMDs among people PLHIV has led to increased morbidity and mortality from cardiovascular disease which is major end point of CMDs (HIV/AIDS, 2016) (Shah et al., 2018). Cardiometabolic diseases can occur individually or in combination and are often propagated by the same lifestyle factors such as smoking, sedentary life and high cholesterol diet among others. Acquisition of HIV in an individual does not only increase the risk of developing CMDs but also associated with worse disease outcomes (Freiberg et al., 2013). Despite the increasing burden of CMDs among PLHIV, few studies have been conducted on the subject in Uganda yet this information is crucial for long term planning and programing of HIV

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