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LIPIDEMIA STATUS AMONG HIV POSITIVE ADULT MALE ON HAART ATTENDING THE HIV CLINIC AT KERICHO DISTRICT HOSPITAL, KERICHO
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ABSTRACT

***Background*: It is unfortunate that while Highly Active Anti-retroviral Therapy (HAART) has become the standard of care among HIV positive patients, the medications have been associated with metabolic abnormalities recognised to cause lipidemia.**
***Objective*: To establish lipidemia status among HIV positive adult male patients attending HIV clinic at Kericho District Hospital.**
***Design*: A cross sectional analytical study.**
***Setting*: HIV clinic at Kericho District Hospital, Kenya.**
***Subjects*: HIV positive adult male patients**
***Results*: The results indicated that the mean age was 43.52 ± 9.17 years and out of which 82.27% were married. Primary Education level attained 40.97% .The mean lipid profile level was LDL 2.5 ± 1.05mmol/l, cholesterol 4.49 mmol/L ± 1.28 mmol/l, HDL 1.47 ± 0.58 mmol/l and triglycerides 1.96 ± 1.32 mmol/l, against the expected level of LDL (1.1. - 2.4 mmol/L), HDL (0.9 - 1.68 mmol/L) triglyceride (0.41 - 2.61 mmol/L) and total cholesterol (2.55 - 5.7 mmol/L).The prevalence lipidemia was 48.17%.**
***Conclusion*: The findings showed that the mean LDL was elevated with proportion of lipidemia at a significant higher level among HIV-positive adult patients on HAART with considerable improvement in the nutritional status. Future work should investigate the biological mechanisms and pathways through which micronutrients affects high density lipoprotein (HDL) and low density lipoproteins (LDL).**

INTRODUCTION

Infection with HIV is associated with subtle changes in lipid metabolism. Slight reductions in high density lipoprotein cholesterol occur early in the course of the infection. This is followed by an increase in the number of small, dense type B low density lipoprotein particles. Later on, as patients begin to develop symptomatic HIV disease, plasma triglyceride levels and Low Density Lipoproteins may rise (1). The initiation of antiretroviral therapy also affects lipid metabolism, with the protease inhibitors thought to further worsen the patient's atherogenic profile (1). However, Highly Active Antiretroviral Therapy (HAART) leads to lipid changes with increases in both total cholesterol and triglycerides (2).

HAART is indicated in all HIV-positive adults and adolescents with the following: WHO clinical stage 1 or 2 and a CD4 count ≤ 500 cells/mm; WHO clinical stage 3 or 4 regardless of CD4 count; HIV and TB co-infection regardless of the CD4 count; patients with HIV/HBV co-infection with evidence of active liver disease and cirrhosis or other evidence of chronic liver disease (3).

Evidence indicates that lifestyle changes such as diet and physical activity have a major influence on health. While many chronic diseases develop slowly, changes in lifestyle and dietary behaviours are occurring rapidly in the present population. It is possible that people who are already ill may be more likely to be physically inactive and change their diet as a result of prevalence of the diseases (4).

Although HIV infection can now be treated effectively with combination of anti-retroviral medications, significant toxicities such as lipidemia, as well as the potential for significant drug-nutrient interactions present new challenges to the clinical team in management of persons infected with HIV. However, clinical care practices for HIV infected patients are now complex, because while HAART has improved life expectancy, the nutrition profile of the patients is transitioning with manifestation of lifestyle related conditions (5).

Hyperlipidemia is a condition with abnormally elevated levels of any or all lipids and or lipoproteins in the blood. High-density lipoproteins (HDL) form a class of lipoproteins, varying somewhat in their size (8-11 nm in diameter) and contents, which carry

cholesterol from the body tissues to the liver. Because HDL can remove cholesterol from atheroma within arteries and transport it back to the liver for excretion or re-utilisation, they are seen as "good" lipoproteins. HDL is the smallest of the lipoprotein particles. Low-density lipoproteins (LDL), on the other hand are very-low density lipoprotein (VLDL), and lipoprotein (a) are the three major apolipoprotein-B–containing lipoproteins found in blood. Diagnosis of lipidemia is typically based on medical history, physical examination, and blood tests (done after overnight fasting) in order to determine the specific levels of low density lipoprotein cholesterol, high density cholesterol, and triglycerides.

Despite the tremendous benefits of highly active antiretroviral therapy (HAART) use on HIV disease progression and survival, micro and macronutrient malnutrition remain strong independent predictors of mortality among HIV-positive individuals in both high and low resource settings (6).

The consequences of HIV infection for societies, health and economies are devastating everywhere, but most especially so in poor, vulnerable and disadvantaged populations such as those already infected with HIV Virus in the developing countries. Research that evaluated the role of nutrition in HIV infection focused initially on loss of weight or Lean Body Mass (LBM) and wasting (8). The lean body mass and wasting was found to be associated with increased risk of opportunistic infections and death (9). Even in the era of Highly Active Anti-retroviral Therapy (HAART), unintentional weight loss is associated with increased risk of mortality (9). Debate continues regarding lipidermia whether deranged status is a direct result of the drugs alone or whether it is primarily from the course of HIV disease or from combination of HIV disease progression with HAART initiation. Other factors which have been identified as affecting the development of metabolic complications include the age of patient and economic status (10).

Unfortunately, while the HAART regimens are associated with the development of chronic metabolic complications, including peripheral lipoatrophy, centripetal fat accumulation and lipidemia (11), it is the only treatment option in the care and treatment of HIV. The HIV replication alone in human T-cells, without any influence of antiviral drugs or other factors, can stimulate the production of novel cellular enzymes and proteins that enhance fatty acid synthesis, increase the quantity of low density lipoproteins, secrete triglycerides, alter the lipid transport and metabolism, and oxidize lipids (12). The pathogenesis of hyperlipidemia is incompletely understood and appears to be associated with a number of factors. It is not possible to derive a precise incidence rate for lipidemia from this study (13) since the study used different observation period and cut off points for lipidemia and included patients with lipid disorders at baseline.

Nevertheless, the mechanisms that promote lipid alterations in HIV infected patients are still not completely understood (14). Kramer (15) reported in hist that dyslipidemia in the HIV patient who are enrolled are taking HAART as being characterized by increased VLDL (the greatest triglyceride transporter) and LDL-cholesterol levels and reduction of the HDL-cholesterol level. This study sought to establish the status of Lipidemia and associated factors among adult HIV positive male attending Comprehensive Care clinic at Kericho District Hospital.

MATERIALS AND METHODS

The study design was a cross-sectional analytical. Independent variables included factors associated with lipidemia status such as socio-demographic, economic and the patient's cultural characteristics and nutritional status. Dependent variable was lipid profile.

The study was conducted at Kericho District Hospital, located at the heart of Kericho County, Western region of Kenya, lying in the highlands of The Great Rift-Valley. The target population was mainly the HIV positive males receiving HAART in the last 6 months or more, patients who are considered to be experienced in the HAART care and treament. A total of 8000 HIV positive clients had been enrolled at the facility and were active on care and treatment. Out of this, 40% (3200) from the Hospital records were active adult male with 50% (1600) receiving HAART in the last 6 months or more (Kericho District Hospital CCC records, 2012).

The study excluded male confirmed HIV positive, Age < 18 years, Mental or physical incapacity leading to inability to provide informed consent, those who have been on HAART in < 6 months, those who did not consent and the male gender on post exposure prophylaxis since their HIV status was indeterminate until the patient completes the regiment and confirmatory HIV test is done.

The study included male confirmed HIV positive, aged ≥18 years, receiving HAART in the last six months or more, willing and able to provide informed consent. Six months period was used as criteria to ensure that we were enrolling HAART experienced patients into the study.

Purposive sampling was used to select study hospital and study participants. Systematic sampling was used to select the individual study subjects. Every 5th Sample was selected until the desired sample was achieved. The required sample size (n = 310) was determined and adjusted.

Prior to data collection, ethical approval was obtained from the ethical review committee of postgraduate studies, Kenyatta University. The research permit was obtained from the Ministry of

Higher Education Science and Technology. Written Permission was obtained from Kericho District Hospital ethical review committee for the study to proceed. The researchers ensured that the participant signed consent after full disclosure on the nature and benefit of the study.

Biochemical method was validated through the internal and external quality control with the blood samples collected and analysed at Kericho district Hospital and KEMRI / Walter Reed with both sample test –retest giving similar results. Lipid profile assessment was performed on fasting blood sample taken from the vein. The blood sample was collected using 4ml purple for analysis of lipid profile by a qualified laboratory technologist. A 5 mls syringe was used to bleed and 4mls purple tube used to collect the blood sample for analysis. The medical records through chart review in the patient file were used to collect data on the type of HAART regimen.

Triglyceride and cholesterol levels were evaluated using the enzymatic method. HDL-C was measured using selective precipitation of the low and very low density lipoproteins (LDL and VLDL). LDL cholesterol was measured using the preparative ultracentrifuge. After centrifugation, LDL was measured in the supernatant, using the enzymatic method. All measurements were analysed in the COBAS MIRA PLUS spectrophometer (Roche Diagnostics) equipped with calibration filters and DIASYS serum control. The result of the test was entered into the questionnaire and laboratory results sheet pinned to each questionnaire according to the patient's unique identification code.

Biochemical analysis involved measures of central tendency using the mean and standard deviation and the display of proportion for Low Density Lipoprotein (LDL) and High Density Lipoprotein (HDL) with cut-off points indicated in relation to its effect on health.

RESULTS

Majority of the respondents (Table 1) in the study were adults above 40 years (n=179) engaging in small business and therefore low level of income. The choice of small business could have been due to education level that was mostly primary and secondary grade. The results indicated that there were bigger proportion of patients on HAART with basic education, primary (40.97%) and Secondary level (45.17%) as opposed to university education (1.29%). The respondents who reported to be earning salary were engaged in the informal employment with minimum returns. Majority of the respondents (82.26) were married male indicating that the burden of HIV could be higher among the married population.

Table 1

Distribution of respondents by demographic, social and economic characteristics

Variable	Description	Freq	Percentage
Age	18-24 year	3	0.97
	25-40 year	128	41.29
	>40 years	179	57.74
Education Level	College	33	10.65
	None	3	0.97
	Primary	127	40.97
	Secondary	140	45.16
	University	4	1.29
	Vocational	3	0.97
Marital Status	Married	255	82.26
	Separated	12	3.87
	Single	24	7.74
	Widowed	19	6.13
Religion	Catholic	63	20.32
	Muslim	3	0.97
	Protestant	202	65.16
	SDA	2	0.65
	Other	40	12.9

Occupation	Business	56	18.06
	Casual Laboratoryour	78	25.16
	Farmer	59	19.03
	None	1	0.32
	Other	7	2.26
	Salaried	94	30.32
	Unpaid work	15	4.84

Table 2
Mean and proportion of Lipid profile of adult HIV Positive male on HAART

Lipoproteins	Mean profile	*Reference Values
LDL mmol/L	2.5 ± 1.05	1.10 – 2.40
HDL mmol/L	1.47 ± 0.58	0.90 – 1.68
Triglycerides (mmol / L)	1.96 ±1.32	0.41 - 2.61
Cholesterol, Total (mmol / L)	4.50 ±1.28	2.55 - 5.70
LDL	Frequency	Percentage
Low	15	4.84
Normal	144	46.45
High	151	48.71
HDL		
Low	45	14.52
Normal	178	57.42
High	87	28.06
Triglyceride		
Low	8	2.58
Normal	161	51.94
High	141	45.48
Total Cholesterol		
Low	6	1.95
Normal	164	52.90
High	140	45.16

Gahutu J.B. and Wane J., (2006). Reference values for serum protein and electrolytes study from Rwanda. East African Medical Journal

The HAART therapy in this study was grouped into protease containing regimen and non-protease regimen and the mean LDL was analysed for variance within the group and among the group using the one way ANOVA as demonstrated in Table 2. The results showed that there was no significant statistical difference in the mean LDL levels among the groups and within the groups for the HAART regimen. The results suggested that irrespective of the regimen, the mean LDL remains significant higher among male HIV adult patients receiving protease and non-protease regimen. Significantly, the LDL level remained elevated; indicating that almost one in every two patients on HAART has deranged lipid profiles. LDL levels increases the risk of cardiovascular diseases while HDL is a vessel protective agent preventing the formation of atherosclerotic changes.

DISCUSSION

HIV infection in a population structure affects the prime age, who are mostly adults, most productive (17)

in the society. The greatest impact of the epidemic is felt at a household level, where socio-economic factors combine with socio-cultural and epidemiological variables to influence prevalence (18). The present study through a measure of central tendency for the variable social economic characteristics demonstrated that HIV burden is high among adults in a stable relationship such as marriage. The study by Almeida observed significant increase in total cholesterol, triglycerides and glucose in 110 patients after the treatment with the HAART. The glucose levels were increased due to the HAART in this study. The present study agrees with a recent study in which the results and literature, documented a number of metabolic abnormalities including dyslipidemia which can be used as prognostic markers and may predict cardiovascular risk in HIV seropositive individuals (1).

This study corroborates with Kramer who reported dyslipidemia in his study among the HIV positive patients who are initiated on HAART. The dyslipidemia is characterised by increase in VLDL (the greatest triglyceride transporter) and LDL-cholesterol levels and reduction of the HDL-cholesterol level. Similar study documented a number of metabolic abnormalities including dyslipidemia; with suggestions of using lipid profile as prognostic markers in predict cardiovascular risk in HIV sero-positive individuals (20). The study suggests that before initiating HAART, the patients' haematological and other biochemical parameters are to be evaluated and regularly monitored during the therapy. A study by Rasheed *et al*., pointed out the role of HIV infection by itself, irrespective of HAART therapy in the development of metabolic disorders including altered lipid metabolism (12).

The present study did not show statistical association between lipid profile and anti-retroviral containing protease inhibitors and non protease inhibitors contrary to other documented studies (21; 22). This can be attributed to optimal clinical care practice and ability to treat opportunistic infection coupled with periodic nutrition assessment. The cross-sectional nature of the study could not establish the cause and effect relationships between lipidemia and HAART among HIV positive adult male on antiretroviral treatment. Many social and economic issues around the epidemic are still clouded by uncertainty and described on the basis of assumptions and hypotheses. There is much scope for further investigation, to enrich the breadth and depth of existing work.

Although we have reported association between HAART treatment and risk of lipidemia, the cross-sectional nature of the present study could not determine a causal relationship between lipidemia and categories of HAART, which are the protease inhibitors and non protease inhibitors.

In conclusion, the present study demonstrated that LDL levels of patients receiving HAART treatment are significantly elevated even when greater proportion of the patient are having anthropometric assessments (Body Mass Index) within their normal nutritional status as defined by the body mass index according to the world health organization classification. However, these findings are limited by the use of a cross sectional analytical design, describing the status of lipidemia only at a point in time. Despite its exploratory nature, this study presents significant insight on the status of lipidemia among the patients receiving HAART and therefore highlights the need to monitor the lipid profile routine for these patients.

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