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Full Length Research Paper

Metabolic disorders in HIV-associated lipodystrophy: A comprehensive examination of biochemical markers

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Human Immunodeficiency Virus (HIV) which was first reported in the United States in 1981 has the potential to cause catastrophic medical and social effect because of its Immunosuppressive effect (Sabatier, 1987; Abimuku et al., 1995; Blattner, 1991; National STD, AIDS Control 1992). Lipodystrophy is a defective fat metabolism of Lipoatrophy and lipohypertrophy experienced by HIV patients on Anti-Retroviral therapy (ARV) (Grunfeld, 2001). The aim of this study was to determine the Lipid profile, total protein and glucose concentration in 14 HIV patients on ARV with Lipodystrophy. 28 HIV patients were recruited randomly in the outpatient clinic of the infectious disease unit of the Jos University Teaching Hospital (JUTH), their blood samples collected, centrifuged and analyzed. The lipid profile, albumin and bilirubin were increased while glucose and total protein concentration were decreased in patients with Lipodystrophy. 62.8% of females and 37.2% of males, and 59% of married victims and 41% of singles were affected. 47.8% attended tertiary institution, 31.2% of secondary schools and 21% primary school level. Patients with Lipodystrophy were on ARV treatment for a period of 17 – 24 months while those without Lipodystrophy were on ARV for a period of 8 – 12 months. This study showed increase in the mean concentrations of HDL-Cholesterol, total cholesterol, triglyceride, albumin and bilirubin and decrease in the mean concentration of glucose and total protein in patients with Lipodystrophy.

Keywords: HIV patient, ARV, Lipodystrophy

INTRODUCTION

According to UNAIDS (December 2005), 38 million adults and 2.3 million children were living with HIV globally and in Sub – Sahara Africa 25.8 million adult and children were living with HIV. The treatment of HIV can be specific or non-specific. Non specific is aimed at eradicating opportunistic infections while specific treatment involves the use of Anti-Retroviral Therapy (ARV) (Serile et al, 2001; www.avert.org/introtrt.htm/2005)

Lipodystrophy is defective fat metabolism which includes Lipoatrophy; loss of subcutaneous fat and lipohypertrophy; characterized by hypertrophy, fat accumulation, insulin resistance, diabetes mellitus and hyperlipidemia. The clinical signs associated with Lipodystrophy include;

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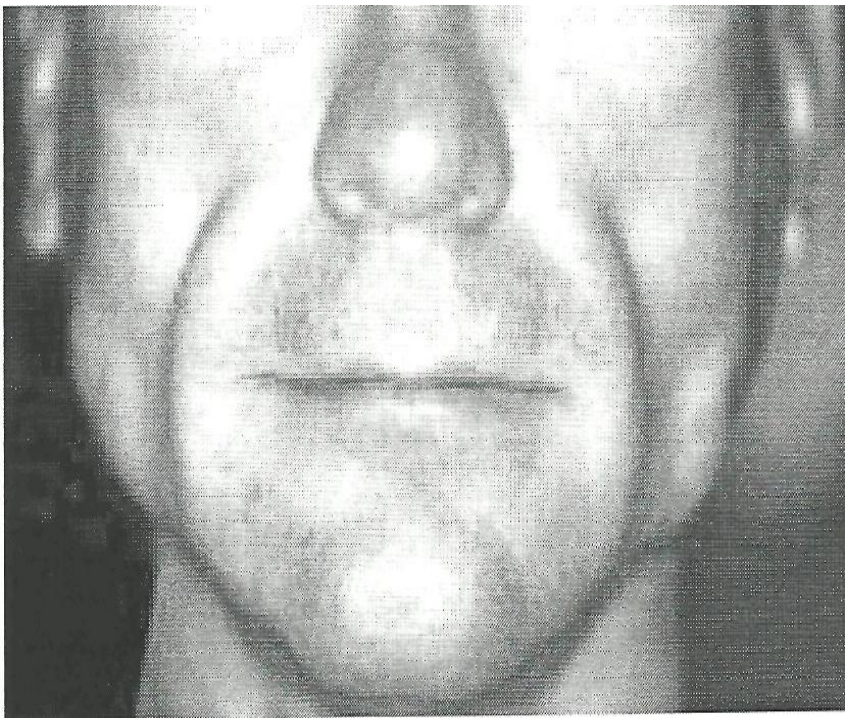

Figure1. Picture showing face of lipodystrophic patient

i. Sunken checks
ii. Increased fat deposits on the face
iii. Prominent veins in the legs
iv. Loss of fats in the legs and arms
v. Loss of shape in the buttocks
vi. Breast enlargement
vii. Fat pad on back of neck (Sometimes called buffalo hump)
viii. Lipoma
ix. Increased in fat around the trunk (called trunchal or central obesity), (Grunfeld, 2001; Center for Disease Control, 2002).

MATERIALS AND METHOD

The study was conducted in the out patient Clinic of the infectious diseases of the Jos University Teaching Hospital, Jos, Plateau State, Nigeria.

Included in the study were 28 HIV patients on Anti Retroviral Therapy for a period of 8 to 24 months and who accepted our written informed consent in the out patient clinic. Excluded in the study were HIV Patients on ARV treatment for period below 8 months and above 24 months and those who did not give their consent for participation.

Ethical Clearance was sought from the Ethical committee of Jos University Teaching Hospital (JUTH). The study population comprised 28 HIV patients on ARV treatment who presented at the out patient clinic for their routine appointments for ARV treatment. Five milliliters of venous blood was collected from the patients into EDTA bottles and then centrifuged at 1500rpm for five minutes and the serum stored at 20^0c. The Blood glucose concentration was determined using glucose colour reagent and phenol reagent at 37^0c for 10 minutes.

Total protein was analyzed using Biurelte reagent at 37^0c for 10 minutes while serum albumin was determined using Bromocresol Green (BCG) reagent at 37^0c for 15minutes. Bilirubin was estimated using diazo reagent with two different test tubes labeled A and B.

Lipid profile estimation; total cholesterol was determined using concentrated sulphuric acid (H_2SO_4) after the sample was allowed to stand for five minutes (Liberman Butchard Method).

Serum HDL – Cholesterol was estimated using the CHOP-PAP methods where the sample was allowed to stand for 10 minutes at room temperature then centrifuged at 400rpm for 10minutes and after 2hours, clear supernatant was separated. Serum LDL-Cholesterol was estimated using the same method.

RESULTS

The analysis of the Biochemical parameters in the 14 HIV patients on ARV treatment for a period of 17 to 24 months with Lipodystrophy and 14 HIV patients on ARV treatment for a period of 8 to 12 months without Lipodystrophy was carried out.

Table 1. Showing Biochemical parameters of HIV patients with Lipodystrophy and those without Lipodystrophy.

Parameter	Sample	N	Mean (+SD)
LDL – Cholesterol	Test Control	14	120.14+58.74 57.79 + 46.67
		14	
HDL Cholesterol	Test Control	14	232.79+64.73 227.86 + 72,51
		14	
Total Cholesterol	Test Control	14	231.93+75.88 164.43+41.15
		14	
Triglyceride	Test Control	14	216.14+99.29 151.93 + 101.45
		14	
Albumin	Test Control	14	52.07+21.71 30.36 + 17.19
		14	
Bilirubin	Test Control	14	3.60 + 3. 019 2.97 + 2.47
		14	
Glucose	Test Control	14	4.96 + 1.14 6.13 + 3.571
		14	
Total Protein	Test Control	14	85.37+11.159 86.91 +27.098
		14	

Test - with lipodystrophy
Control - without lipodystrophy

The following results were obtained;

This table shows the mean + SD, of HDL, LDL, total cholesterol, Protein, Glucose, Albumin, Bilirubin and Triglyceride concentration of HIV patients presenting with Lipodystrophy and those without Lipodystrophy

DISCUSSION

The finding of our study suggests that HIV patients on ARV treatment for a period of 17 to 24 months with Lipodystrophic features have a mean albumin concentration of (52.07 $\pm$ 21.71g/l) which are higher than those of HIV patients on ARV treatment for a period of 8 to 12 months without Lipodystrophy (30.36 $\pm$ 17.19g/l). This could be due to the effect of Lipodystrophy on serum concentration of albumin and the mean difference is statistically significant.

The level of bilirubin and total protein did not show significant difference, though the bilirubin concentration in the test and control are within the normal range, the mean total protein (85.37 $\pm$ 11.16g/l) is lower than the control (86.91 $\pm$ 27.098g/l) which could be attributed to the effect of HIV on the immune system (Anekwe, 2005).

The total cholesterol and LDL-Cholesterol concentration showed significant statistical difference but the total cholesterol concentration in the test and control groups are within the normal range while LDL-cholesterol for the test (120.14 $\pm$ 58 .74mg/100ml) is higher than the control (57.798 $\pm$ 46.67mg/100ml) which could be attributed to the effect of Lipodystrophy on the LDL-Cholesterol (Nelson and Cox, 2000).

HDL – Cholesterol and blood Glucose concentration showed no significant statistical difference but the Glucose concentration of the experimental group (4.96 $\pm$ 1.14mmol.l) and control (6.13 $\pm$ 3.58mmol/l) is within the normal range of (4.5-5.6mmol/l), while the HDL-Cholesterol is higher in the experimental group (232.79 $\pm$ 64.73mg/100ml) than in the control (2227.86 $\pm$ 64.73mg/100l).

The study has also revealed that more females (62.8%) and married victims (59%) stand at higher risk of presenting with Lipodystrophy features than males (37.2%) and the singles (41%). This agrees with the work of Onwuliri and Mohammed (2001).

Higher percentage of Lipodystrophy victims attained tertiary education (47.8%), Civil Servants account for 39% and had being on ARV treatment for a longer duration of 17-24 months as compared to others 31.2% secondary schools, 21% primary school, 26.19, businessmen and women, 13.4% house wives, 9.7% students, 9.3% drivers, 7.1% applicants and had being on ARV for 8-12 months.

CONCLUSION

There was an increased HDL-Cholesterol, total cholesterol, triglyceride, albumin, bilirubin and a decreased total protein and blood glucose concentration in HIV patients with Lipodystrophic features. Also married female subjects, civil servants and HIV patients on prolonged ARV treatment were the victims that stood at higher risk of presenting with Lipodystrophy features.

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