



Received: 30<sup>th</sup> Mar-2013

Revised: 4<sup>th</sup> April-2013

Accepted: 15<sup>th</sup> April 2013

Research article

## METABOLIC DERANGEMENT IN DIABETIC AND PATIENTS INFECTED WITH HUMAN IMMUNE DEFICIENCY VIRUS.

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**ABSTRACT:** Many Diabetic and Patients Infected with Human Immune Deficiency Virus Show a number of Metabolic Derangements. It was based on this that we decided to employ some biochemical parameters(High density lipoprotein (HDL),Triglyceride, Low density lipoprotein (LDL), Glycated hemoglobin and microalbumin) to investigate possible Metabolic variables in these patients .The HIV patients assessed were on antiretroviral drugs (triviro-LNS-Lamivudine, Nevirapine and Starvudine) 1-2 pills daily depending on the CD4 count. Also the diabetic patients have been on drugs for the duration of 2- 3 years. One hundred and twenty subjects aged 30-55 years comprising 50 Type 2 Diabetes, 50 HIV –infected and 20 apparently healthy subjects served as control. The patients' blood was collected and serum separated and used for the analysis. The biochemical parameters were determined using routine standard methods. The results obtained were subjected to statistical analysis using one-way analysis of variance. The result showed a slight increase in the levels of all the parameters monitored in Diabetic patients except the the level of triglyceride which was significantly high in HIV infected patients. (P<0.05). The study has revealed a number of metabolic abnormalities in both Diabetic and Patients Infected with Human Immune Deficiency Virus. Equally established was poor glycaemic control among the diabetic patients patients. Given the importance of Glycated hemoglobin determination in the management of diabetes mellitus. The patent should therefore be well educated on its relevance in the control and management of the blood sugar.

**Key words:** Triglyceride, Low density lipoprotein, High density lipoprotein, Glycated hemoglobin, microalbumin, Diabetes, HIV and AIDS.

## INTRODUCTION

HIV and diabetes remain two major clinical conditions of high morbidity and mortality particularly in developing countries [3, 28]. And HIV has become a world wide epidemic expanding in scope and magnitude infecting people through all the geographic regions particularly very young adults between the age of 24-44 years. Unfortunately many of the victims have died. Obviously, the major route of transmission of HIV is through sexual contact, contaminated sharp objects, blood products and body fluids and mother to child. [2]. Numerous studies have shown that both HIV and antiretroviral drugs are linked with metabolic abnormalities. These include insulin resistance ,metabolic syndrome and hyperlipidemia. This is of much concern since blood lipid abnormalities are associated with increased risk of atherosclerosis and cardiovascular disease [7, 24]. In the case of Diabetes mellitus, it is the third leading cause of death after heart disease and cancer and a clinical condition characterized by increased blood glucose (hyperglycemia) due to either insulin deficiency or insulin resistance. [22, 19].

However, the increasing incidence of diabetes in developing countries follows the trend of urbanization and life style changes, perhaps most importantly a “Western- style diet [25, 16]. In 2000, according to the world health organization, atleast 171 million people world wide would suffer from diabetes, or 2.8 % of the population. But, it should be noted that type 2 diabetes mellitus is relatively common and suffered by those in population enjoying affluent lifestyle [20, 10]. Incidentally, with insulin deficiency or resistance, glucose will no more be metabolized instead it combines non enzymatically with hemoglobin to form Glycated haemoglobin or glycosylated haemoglobin(HbA1C) which is a form of hemoglobin used primarily to identify the average plasma glucose concentration over the life span of the red blood cell. Unfortunately, Glycated hemoglobin has been associated with cardiovascular diseases, nephropathy and retinopathy in diabetes. [6, 8, 2]. Once a hemoglobin molecule is glycated, it remains that way. A build up of glycated hemoglobin within the red cells, therefore reflects the average level of glucose to which the cell has been exposed during its life –cycle. Hence the measurement of glycated hemoglobin reflects the effectiveness of therapy by monitoring long –term serum glucose regulation. Higher level of HbA1C is found in people with persistently elevated blood sugar as in diabetes mellitus. A diabetic patients with good glucose control has a HbA1C level that is close to or within the reference range [5, 21, 13, 12, 20]. Furthermore, in poorly controlled diabetic patients the finding of microalbumin in the urine often indicates the development of renal disease(diabetic nephropathy).Normally, only a few small amount of albumin is excreted usually below that which can be detected by the routine protein reagent strip test or chemical test.[14].

Glycated hemoglobin is suspected to be one of the causes of diabetic complications such as neuropathy, retinopathy, nephropathy etc. The study of [11, 23, 1] correlated the greater microalbuminuria to risk of cardiovascular disease. Though, there is little data on the relationship between glycated hemoglobin and the risk of neuropathy [15]. In order to assess the metabolic abnormalities in diabetic and HIV infected patients we measured the serum levels of the following biochemical parameters - High density lipoprotein (HDL), Triglyceride, Low density lipoprotein (LDL), Glycated hemoglobin and miccroalbumin.

## MATERIAL AND METHODS.

Many Diabetic and Patients Infected with Human Immune Deficiency Virus

Show a number of metabolic abnormalities. It was in this instance that we decided to employ some biochemical parameters(High density lipoprotein (HDL),Triglyceride, Low density lipoprotein (LDL), Glycated hemoglobin and miccroalbumin) to investigate Metabolic Derangement in these patients. HIV patients used for this study were on antiretroviral drugs (triviro-LNS-Lamivudine, Nevirapine and Starvudine) 1-2 pills daily depending on the CD4 count. Equally, the diabetic patients have been on drugs for the duration of 2- 3 years. One hundred and twenty subjects aged 30-55 years which comprising 50 Type 2 Diabetic, 50 HIV –infected and 20 apparently healthy subjects (which served as control) and all were attending Usmanu Danfodiyo University Teaching Hospital at the time of this study. The patients' blood was collected and serum separated and used for the analysis. The biochemical parameters were determined using routine standard methods. The results obtained were subjected to statistical analysis using one-way analysis of variance. [17].

## RESULTS AND DISCUSSION

**Table-1: Serum Levels of HDL-C, LDL-C, Triglyceride, FBS, Glycated Hemoglobin and Microalbumin of HIV Infected and Diabetic Patients.**

Parameters	Control	HIV Infected	Type 2 Diabetics
HDL-C (mmol/L)	1.17± 0.10	0.81 ± 0.36*	0.92± 0.54**
Triglyceride(mmol/L)	1.28 ± 0.23	2.40 ± 0.54**	2.08 ± 0.56*
LDL-C (mmol/L)	2.10 ± 0.39	3.59 ± 1.04*	3.63± 1.60*
FBS(mmol/L)	4.77 ± 0.93	8.40 ± 2.46*	9.45 ± 2.59**
HbA1C(%)	4.87 ± 1.23	5.06 ± 1.59*	10.66 ± 3.39**
Microalbumin(mg/L)	NIL	NIL	190.90±70.07*

\* Significant difference at P< 0.05

From the results, it was observed that there was a significant increase in the serum levels of Low density lipoprotein (LDL), Fasting blood sugar and Glycated hemoglobin in diabetic patients compared to either control or HIV infected patients(  $P < 0.05$ ) (Table-1). The level of microalbumin obtained in the study was relatively high in the diabetic (control Mmol/L; nil vs  $190.90 \pm 70.07$ ). The increase in the serum levels of microalbumin in diabetics compared to other groups could be a sign of diabetic nephropathy .This elevation can be attributed to accumulation of glycated hemoglobin which has been indicted in the formation of nephropathy .Conversely, the increase in fasting blood glucose is not surprising considering that in diabetes mellitus which invariably, is as a result of either insulin deficiency or resistance, prevents glucose from be utilized as principal energy source instead the body falls back on the energy reserve of the body , which is the fat stored in adipose tissues. This leaves glucose unutilized. Consequently, this free sugar combines non enzymatically with hemoglobin to form glycated hemoglobin. And for body to use alternative energy source, fat has to be mobilization from adipose tissue. Considering that high-density lipoproteins (HDL) donate apolipoprotein C-II (APOC2) and apolipoprotein E (APOE) and cholesteryl esters which are quite essential in the metabolism of fat. It is not surprising then that the levels of Low density lipoprotein (LDL) and High density lipoprotein (HDL) are all elevated in diabetics as obtained in our study. Though, numerous studies have shown that both HIV and antiretroviral drugs are linked with metabolic abnormalities such includes insulin resistance, metabolic syndrome and hyperlipidemia. This is of much concern since blood lipid abnormalities are associated with increased risk of atherosclerosis and cardiovascular disease [7, 24] and in this study we obtained related high levels of Low density lipoprotein (LDL) and triglyceride in Diabetic and HIV patients respectively. [4] in their study observed higher rates of cardiovascular disease (CVD) and renal dysfunction in patients with diabetes and the value of microalbumin in diabetic patients tend to indicate nephropathy. In a similar study carried out by [18], it was shown that fasting blood glucose, total cholesterol and LDL-Cholesterol were all raised and this increased the incidence of developing cardiovascular diseases. However in our study, the Diabetic patients exhibited high level of LDL-Cholesterol. Although LDL and cholesterol levels have been indicated to rise with age [9]. Conversely, the reduction in level of High density lipoprotein in HIV infected patients could be attributed to an increase in the production of pro-inflammatory cytokines—IL-1, IL-6, IL-8. These cytokines are part of the innate immune response, which initiate the acute-phase response.

The study has revealed a number of metabolic abnormalities in both Diabetic and Patients Infected with Human Immune Deficiency Virus. Equally established was poor glycaemic control among the patients. Considering the importance of glycated control in such patients' .Both the patients and health care givers need to be properly educated and appropriate attention given in the control and management of these patients.

#### ACKNOWLEDGMENT.

The authors are grateful to the management and staff of Excellence Diagnostic laboratory for their technical assistance.

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