

## GLUCOSE AND AMYLASE ACTIVITY IN HIV AND DIABETIC PATIENTS

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**ABSTRACT:** Diabetes Mellitus which develops as a result of insufficient insulin level in the body or insulin resistance to glucose, ultimately progresses to various complications like retinopathy, nephropathy, angiopathy and neuropathy. Abnormalities in the levels of glucose and amylase have always been linked to pancreatic diseases. We decided to venture into other possible disease conditions which might affect the two biochemical parameters (Glucose and amylase activity). We therefore looked at the effect of Diabetes and HIV on blood amylase activity and glucose concentration by assessing two hundred and twenty subjects who were randomly selected. Fifty patients were used for each group of diabetic not on drugs, diabetic on drugs, HIV patients not on drugs and HIV on drugs. Twenty healthy individuals served as control. The age of the subjects used was of  $50 \pm 15$  years all within Aba Metropolitan. Five ml of blood was collected for the analysis of Glucose and amylase activity using standard biochemical methods. Data were analyzed for the statistical significance using one way ANOVA. In our study, we found that the concentration of glucose declined significantly in HIV patients not on drugs but the activity of amylase was remarkably increased in the same patients compared to control  $< 0.05$ . Apparently, the activity of amylase was highest in diabetic individuals on drug compared to other groups studied. In conclusion serum amylase activity was remarkably elevated in diabetic patients and so estimation of serum amylase may possibly aid in the diagnosis of diabetes mellitus. Again from the result, there is need for both the diabetic and HIV patients to regularly check their blood sugar to prevent either hyperglycemia or hypoglycemia.

**Key words:** Amylase activity, Blood Glucose, Diabetes and HIV

## INTRODUCTION

In the developing region of the world, non-communicable diseases are replacing the traditional enemies such as infection as a leading cause of disability and premature deaths in adults (Christopher and Aam, 1996). In Africa diabetes has long and interesting history and appear to be the most common endocrine disease even in Nigeria. (Fumuyiwa, 1993, Nigel, et al, 2001, Wierus- Wysocka et al, 2001). Diabetes Mellitus which develops as a result of insufficient insulin level in the body or insulin resistance to glucose, ultimately progresses to various complications like retinopathy, nephropathy, angiopathy and neuropathy. (William and Pickup, 1998).

The clinical features established in diabetic neuropathies are presence of persistent proteinuria, hypertension as a result of renal failure due to alteration of salt and water metabolism and an inflammatory reaction in the wall of any blood vessel (vasculitis) to mention but a few. (Cattel, 1993 and Benjamin and Sacks, 1994). Conversely, the rate of progression of incipient and establishes nephropathy can be slowed and the associated mortality may be reduced by aggressive antihypertensive treatment. It has been stressed that cardiovascular disease (CVD) is the most prevalent and detrimental cause of morbidity and mortality in people with diabetes and hypertension.(Lawoyin et al, 2002, Malcolm et al, 2002, Murphy et al 2002). Amylase is enzyme responsible for the hydrolysis of carbohydrate after which insulin acts on different sugars, converting it to the form usable by the body. Incidentally, insulin is secreted by the pancreas though we have salivary amylase too. As a result, serum amylase determination provided a convenient approach to the diagnosis of acute pancreatitis. Patients with chronic pancreatitis have normal levels of amylase between attacks and even attacks amylase elevation may not occur. Carcinoma of the pancreas is not generally associated with a raised amylase level unless the disease has caused some form of destructive lesion. Pancreatic pseudocysts occasionally cause prolonged elevation of serum amylase. Several other conditions can cause the amylase level to become abnormal. Though, elevated state is not a specific indicator for disease of the pancreas. Burtis and Ashwood in 2001 reported that there was an increase in the level of serum amylase activities in diabetic individuals due to pancreatic insufficiency caused by repeated attack of acute pancreatic especially when the islet cells become damaged. HIV infected persons not on drugs experience hypoglycemia which is the most common cause of fatigue in them. Though this is not the only cause of fatigue in HIV patients. However, hypoglycemia is usually experienced at the first stage of infection. Study on abnormalities of glucose metabolism in the early 1990's show no evidence of insulin resistance or glucose intolerance in HIV (FD,1997). Kathleen(2003)observed that the glucose levels in HIV patients on drugs and those not on drugs, there was no significant difference in the glucose levels. Though some HIV patients who received antiproteases may develop lipodystrophy with central obesity, insulin resistance, glucose intolerance and sometimes diabetes(like in syndrome X). Increased availability of lipid to muscle may be one of the mechanisms that induce insulin resistance(Ducobu et al, 2000 Gan et al 2001, Ware et al, 2002 and Behrens et al, 2002). Impaired glucose phosphorylation and transport in skeletal muscle cause insulin resistance in HIV-1-infected patients with lipodystrophy(Behrens et al, 2002). Ert Kiin et al, (2005) reported that lamivudine may impair oral glucose tolerance test.

It was based on these findings that we decided to ascertain the diagnostic relevance of serum amylase assay in diabetic individuals and whether HIV infection may result to any change in glucose and amylase levels. Where possible the effect of the antiretroviral drugs on glucose and amylase levels as well.

## MATERIAL AND METHODS

The effect of Diabetes and HIV on blood amylase activity and glucose concentration were assessed using two hundred and twenty subjects who were randomly selected. Fifty patients were used for each group of diabetic not on drugs, diabetic on drugs, HIV patients not on drugs and HIV on drugs. Twenty healthy individuals served as control were employed in the study. The age of the subjects used were of  $50 \pm 15$  year's all within Aba Metropolitan. Five ml of blood was collected for the analysis of Glucose and amylase activity using standard methods. Glucose was determined using Trinder, 1969 method and Amylase activity was estimated using Somogyi 1960 method all adopted from Monica(1998). Data were analyzed for the statistical significance using one way ANOVA.

## RESULT AND DISCUSSION

In our study, we found that the concentration of glucose was significantly declined in HIV patients not on drugs but the activity of amylase was remarkably increased in the same patients compared to control  $<0.05$  Table-1. Apparently, a significant increase in level of serum amylase activity in diabetic individuals on drug which was highest compared to other groups studied. Though, this is in consonance with earlier report of Camerson et al (1975) and Amman et al (1979) who also observed increase in activity of this enzyme in diabetic individuals. However, the diabetes mellitus suffered by these individuals was as result of pancreatic insufficiency induced by alcohol.

Burtis and Ashwood in 2001 equally reported an elevated serum amylase activity in diabetic patients due to pancreatic insufficiency caused by repeated attack of acute pancreatitis especially when islet cell become damaged.

**Table-1: Glucose and Amylase Activity in HIV, Diabetic Patients and Controls**

Parameters	FBS(mmol/L)	Amylase activity (U/L)
Diabetic(Not on drugs)	10.8± 3.5	308 ± 43.1
Diabetic(On drugs)	9.6± 3.1	373±.64.6
HIV Patients(Not on drugs)	4.9± 1.40	231 ±18.8
HIV Patients(on drugs)	5.1± 1.5	287 ± 22.20
Control	5.2± 1.6	204 ±13 .9

\*Significant difference P <0.05

The finding of elevated serum amylase in HIV infected patients could be of salivary origin and possibly as a result of the effect of HAART drugs. Also hypoglycemia was observed in HIV patients which could be attributed to lack of appetite experience by these patients. HIV infected persons not on drugs usually experience hypoglycemia and this is the most common cause of fatigue in them. Though this is not the only cause of fatigue in HIV patients. However, hypoglycemia is normally being experienced at the first stage of infection. Study on abnormalities of glucose metabolism in the early 1990's show no evidence of insulin resistance of glucose intolerance in HIV (FD,1997). However, Kathleen(2003) observed that there was no significant difference in the glucose level in HIV patients on drugs and those not on drugs. Though, some HIV patients who received antiproteases may develop lipodystrophy with central obesity, insulin resistance, glucose intolerance and sometimes diabetes(like in syndrome X). Increased availability of lipid to muscle may be one of the mechanisms that induce insulin resistance(Ducobu et al ,2000 Gan et al 2001, Ware et al ,2002 and Behrens et al ,2002). Impaired glucose phosphorylation and transport in skeletal muscle cause insulin resistance in HIV-1-infected patients with lipodystrophy(Behrens et al ,2002). Ert Kiin et al ,(2005) reported that lamivudine may impair oral glucose tolerance .

In conclusion serum amylase activity was remarkably elevated in diabetic patients and so estimation of serum amylase may possibly aid in the diagnosis of diabetes mellitus. Again from the result, there is need for both the diabetic and HIV patients to regularly check their blood to prevent either hyperglycemia or hypoglycemia.

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