

# Micro Albuminuria and Hyper Lipidemia in Long Standing Diabetes Mellitus

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## ABSTRACT

Diabetes mellitus is a fairly common disease among Sudanese population. There are so many complications resulting from this disease, which lead to other chronic diseases contributing to high morbidity and mortality, due to this and other reasons, the study was conducted in Gabir Abu Aliz center for diabetic care, for patients who have the disease for a period more than ten years, aiming to monitor complications resulting from hyperlipidemia and Microalbuminuria due to diabetes during this period. The study was investigated about 200 individuals, 20 healthy (control) group and 180 suffered from diabetic patients group which is subdivided into three sub-groups according to age. Study was indicated that existence of hyperlipidemia and microalbuminurias proportional to disease duration and chronicity which lead to complications related to the disease such as infectious diseases, renal diseases and heart diseases.

**Keywords:** Diabetes, chronic disease, Microalbuminuria, Gabir Abu Aliz center

## 1. INTRODUCTION

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia which result from defects in insulin secretion, insulin action or both. Common complications resulting from uncontrolled diabetes such as heart diseases, stroke, blindness periodontal diseases, nervous system damage and kidney dysfunction. The economic and social costs of diabetes are enormous, both for health care services and through loss of productivity. In developed countries, 1% or more of the total health budget is spent on the management of diabetes and its complications (10,23). Microalbuminuria represents an abnormally elevated urine albumin level that cannot be detected with the use of a urinalysis dipstick. The presence of Microalbuminuria predicts worsening of renal disease to overt diabetic nephropathy and an elevated risk of cardiovascular disease (7, 21, 14, 3). Hyperlipidemia is term which used to denote raised serum levels of one or more of total cholesterol low-density lipoprotein, cholesterol and triglyceride or both total cholesterol and triglyceride. The hyperlipidemia are common in patients with diabetes and further increase the risk of ischemic heart disease, especially in type 2 diabetes (11). Patients with diabetes are predisposed to infections specially pneumonia, pylonephritis, soft tissue infections such as diabetic foot, necrotizing fasciitis and candida infections, invasive (malignant) otitis media, rhino cerebral mucormycosis and emphysematous infections. Diabetic adults are at a greater risk for infection-related mortality and that excess risk may be mediated by cardiovascular disease. Infections also cause considerable morbidity and mortality in patients with diabetes. They may precipitate metabolic derangements and, conversely, the metabolic derangements of diabetes may facilitate infection. Several, function factors are related to this increased risk (20).

## 2. MATERIAL AND METHODS

### 2.1 Study Population

The target group for this study was males, females and pediatrics group attending, referred or admitted to Jabir Abu Aliz Center for Diagnostic, treatment and follow-up purposes. The number of samples (patients) available for this study was two hundred, including one hundred and eighty patients and twenty subjects as control group. The patients (180) were subdivided into three sub-groups according to age as follows: Sub-group 1(10-14years) , which about 76 patients, sub-group 2(15-19 years) which about 51 patients, sub- group 3(> 20 years) which about 53 patients.

### 2.2 Study Duration

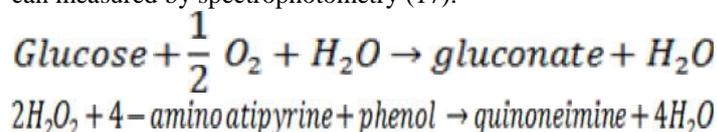
The study was done for a period of two years from October 2005 to July 2007.

### 2.3 Collection of Samples

The samples were collected understanding guidelines for blood collection. The patients were informed to come the day for testing at fasting state, 5cc syringes are used and sometimes vacuoliner (10cc) procedure was followed. The sample was taken into fluoride oxalate containing either serum or plasma which are both suitable for testing glucose, cholesterol, triglycerides as lipid profiling, LHD, LDL, urine sample was also taken for detection of sugars, Microalbuminuria and infections.

### 2.4 Measurement of Glucose

Glucose is the sample originate by means of the coupled reaction describes below, a colored complex that can measured by spectrophotometry (17).



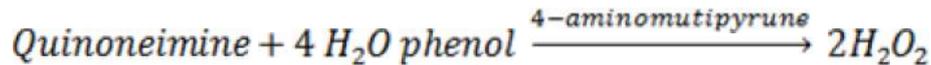
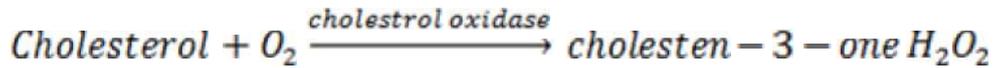
<http://www.ejournalofscience.org>**2.5 Measurements of Albumin (Microalbuminuria)**

Albumin in the sample causes agglutination of the latex proteins coated with anti-human albumin. The agglutination of the particles is proportional to the

albumin concentration and can be measured by turbidimetry (4,6).

**2.6 Measurement of Cholesterol**

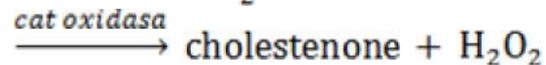
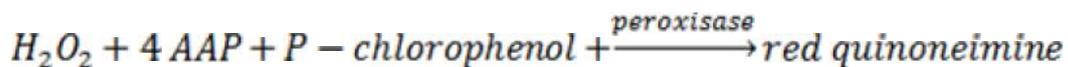
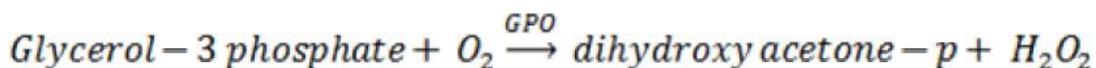
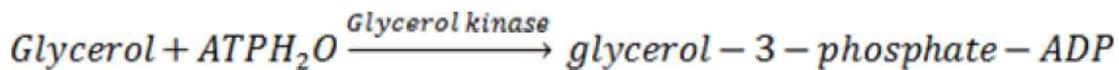
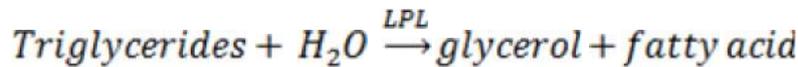
Enzymatic determination of total cholesterol, according to (1) as following reactions:



Samples: serum, heparin or EDIA plasma from fasting patients.

**2.7 Measurements of Triglyceride (16):**

Enzymatic determination of triglycerides according to (16) as following reactions:

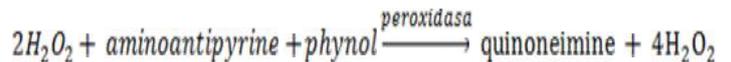


4-AAP = 4-aminomutipyrine

LPL = Lipoprotein Lipase

GPO = Glycerol-3- Phosphate oxidase

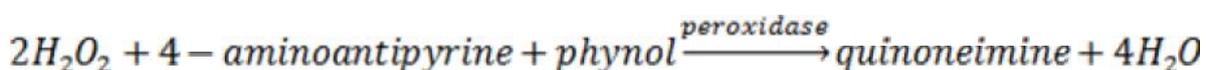
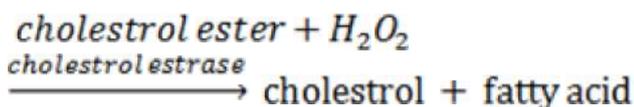
Specimen: serum and heparin or EDTA plasma from fasting patients. Collect the samples in tubes and stoppers free of glycerol.



Specimens: serum collected by standard procedures. LDL cholesterol serum is stable for 24 hours at 2-8°C.

**2.8 Measurements of Cholesterol LDL**

Low density lipoproteins (LDL) in the sample precipitate with polyvinyl sulphate (2). The concentration of LDL is calculated from the difference between the serum total cholesterol and the cholesterol in the supernatant by means of the coupled reactions described below:

**2.9 Measurements of Cholesterol HDL**

Very low density lipoprotein (VLDL) and low density lipoproteins (LDL) in the sample precipitate with phosphotungstate and magnesium ions.

The supernatant contains high density lipoproteins (HDL).

The HDL cholesterol then spectrophotometrically measured by means of the coupled reaction described below (5, 8).

### 2.9.1 Specimens

Serum or plasma collected by standard procedures. HDL cholesterol in serum or plasma is stable for 7 days at 2-8°C. Heparin, EDTA, oxalate and fluoride may be used as anticoagulants.

### 2.10 Isolation of Microorganism from Diabetic Patients

#### 2.10.1 Specimens

Urine, wound swabs and sputum were collected from all diabetic patients in the study.

#### 2.10.2 Methods

The specimens were examined microscopically after doing gram-stain and also specimens cultured on blood agar and MacConkey incubated for 24-48 hours at 37°C.

## 3. RESULTS

One hundred and eighty patients with significant diabetes mellitus were enrolled in the study. Twenty normal individuals were enrolled in study for control. In sub-group 1, the mean value of glucose was found 199.75 mg/dl and in sub-group 3 (>50 years) was found 186.91 mg/dl, the mean value of glucose for control group was found 98.95 mg/dl. Diabetic patients showed higher values of glucose when compared with healthy individuals. The mean level of Microalbuminuria in sub-group 1, 2 and 3 was found 25.775, 27.3667 and 34.066 mg/min, respectively. The mean of Microalbuminuria level of patients (< 50 years) was found 24.98 mg/min while in patient (> 50 years) was found 27.06 mg/min, but for controls group it was found 5.3 mg/min. The level of Microalbuminuria was found to have increased significantly with duration of disease and old age. The mean level of cholesterol in sub-group 1, 2 and 3 was found 193.91, 199.43 and 203.36 mg/dl, respectively. The mean of cholesterol level of patients (<50 years) was found 178.32 mg/dl while in patients (>50 years) was found 199.71 mg/dl. The cholesterol level is found to be increased significantly with duration of disease and old age. The level of triglyceride in group 1 was found 164.25 mg/dl, in group 2 143.71 mg/dl and group 3 166.85 mg/dl. The mean level of triglyceride in patients (<50 years) was found 148.91 mg/dl while in patients (>50 years) was found 157.2 mg/dl. The triglyceride level for control group was found 111.10 mg/dl. That means triglyceride level for control group is lower than both patient with less than 50 years and patient with more than 50 years in this study.

The mean values of LDL in sub-group 1, 2 and 3 was found 113.67, 121.84 and 122.53 mg/dl, respectively. The mean of LDL level of patients with less than 50 years was found 109.60 mg/min while in patients with more than 50 years was found 120.35 mg/dl. The mean LDL value of control group was found 99.60 mg/dl. The level of LDL was found to be increased significantly with duration of disease and old age. The mean level of HDL in sub-group 1, 2 and 3 was found 50.91, 51.88 and 50.53

mg/dl, respectively. The mean values of HDL of patients with less than 50 years were found 49.85 mg/min while in patients with more than 50 years was found 50.74 mg/min. The mean values of HDL for control group were found 42.95 mg/dl. Diabetic patients showed higher levels of HDL when compared with healthy individuals. The organisms (Bacteria), which were isolated from diabetic patients, are *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli* and *Proteus mirabilis*. The old patients with more than 50 years were more infected by these organisms.

## 4. DISCUSSION

It was proved that the long duration of diabetes affects the glucose level in different ways, according to compliance of the patient to treatment or resistance to treatment. However, diabetes mellitus complications are related to the duration, gender and compliance to treatment (9,19). In our study it was noticed that the levels of glucose increased with the increase in the duration of disease and with advanced age similar to that study in the Caucasians population in the United States and Europe, hyperglycemia cause more complications such as renal failure, infections, gangrene etc. It is quite evident that the longer the duration of diabetes, the higher level of Microalbuminuria. An elevation in level of Microalbuminuria leading to functional changes in diabetic nephropathy (22). Also in this study was observed that the level of Microalbuminuria increased significantly with old age. In Nigeria other study showed that the earliest clinical evidence of diabetic nephropathy is Microalbuminuria (12). Cholesterol level has a linear rise according to the duration of diabetes, in this study it was found that the level of cholesterol was significantly increased with the age and also cholesterol accumulation in the body may lead to complications like cardiovascular transient ischemic attacks and cerebrovascular strokes (15). Triglyceride level was higher in patients group rather than control group. Also in this study was found that the level of triglyceride was increased significantly with duration of age. This may lead to arteriosclerosis and atherosclerosis in patients with long standing diabetes. HDL level in patients group was found to be higher than control group. Also found to be increased significantly with duration of age. LDL level in the patients group was found to have a linear rise with the duration of disease and also with old age. Great rise in the levels of lipids in the body makes the individuals more prone to develop diseases such as dyslipidemia, hypertension, diabetes, cardiovascular diseases and hyperinsulinemia (13). Many microorganisms (mainly bacteria) were isolated from diabetic patients mainly the old ones, indicated that infections can be caused by *Staphylococcus aureus* and gram-negative organisms are more frequent in diabetes (18), in our study the main bacterial strains isolated were *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli* and *Proteus mirabilis*.

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