LIPID ALTERATION;
DIABETIC AND OBESE (NON-DIABETIC) PATIENTS

ORIGINAL
PROF-1760

DR. KAMAL ELDIN AHMED ABDELSALAM
Faculty of Medical Laboratory Sciences,
Omdurman Islamic University-Sudan

DR. SHAZA SALIH TAHA
Faculty of Medical Laboratory Sciences,
Omdurman Islamic University-Sudan

DR. MANAHIL ALI SHARWANI
Faculty of Medical Laboratory Sciences,
Omdurman Islamic University-Sudan

ABSTRACT... Objective: determine serum lipid profile in diabetic and obese non-diabetic patients. **Materials:** 300 subjects comprising three groups, the first group included 100 diabetic patients (non-obese) with duration of diabetes over 5 years, the second group (obese) included 100 obese subjects (non-diabetic) with duration of obesity over 5 years, and the third group (control) included 100 healthy subjects. **Methods:** Lipid profile on the serum was performed with an auto analyzer using standard methods. **Study design and period:** Prospective Analytical Cross Sectional Study conducted in period from September 2006 to January 2008. **Results:** A significant (p value<0.05) increase in lipid profile results of diabetic and obese patients comparing to control while HDL-C showed significant decreasing. The cholesterol is significantly increased in females than males in diabetic patients, while the triglycerides are significantly decreased in diabetic females. The parameters showed insignificant variations between males and females in obese patients. **Conclusions:** In comparison to control group, DM & obese groups showed significantly increase in TG, TC, and LDL-C, but significantly decrease in HDL-C. Females showed significant increasing in TC and significant decreasing in DM group, while in obese group females showed insignificant decreasing in TG and TC.

Key words: Total cholesterol, triglyceride, low density lipoprotein cholesterol, high density lipoprotein cholesterol, diabetes, obese

INTRODUCTION

Diabetes and obesity currently threaten the health, well-being and economic welfare of virtually every country in the world[1]. Today, over 150 million people are suffering from diabetes worldwide (90% of them having type 2 diabetes) while over 300 million people are estimated to be obese. As a result, up to 1.7 billion of the world's population is at an increased risk of other life-threatening diseases such as heart attack and stroke[2]. Diabetes is spreading worldwide as an epidemic. Diabetes mellitus is a group of metabolic diseases characterized by high blood glucose levels, which result from defects in insulin secretion, or action, or both. In type 2 diabetes, patients can still produce insulin, but do so relatively inadequately for their body's needs, particularly in the face of insulin resistance[3]. It is estimated that about 80% of those who develop type 2 diabetes are obese. When insulin attaches to the receptor protein, the receptor responds by adding a chemical called a phosphate group onto the IRS (insulin receptor substrate) molecules due to which the IRS molecules turn into action[4].

Obesity means accumulation of excess fat on the body. Obesity is considered a chronic (long-term) disease, like high blood pressure or diabetes. It has many serious long-term consequences for health, and it is the second leading cause of preventable deaths in many countries (tobacco is the first)[5]. Obesity is defined as having a body mass index (BMI) of greater than 30. The BMI is the body weight in kilograms divided by the square of the height in meters (weight (height)^2). Healthy weight is defined as a BMI between 19 and 25 kg/m^2. The National Institutes of Health recommends four BMI Categories:

Underweight	(BMI <18.5).
Normal weight	(BMI = 18.5-24.9).
Overweight	(BMI = 25-29.9).
Obesity	(BMI = 30 or greater)[6].

Although the exact biochemical mechanisms responsible for the association between obesity and the above diseases have not been completely elucidated, it is known that increase in triglyceride stores is associated with a linear increase in the production of cholesterol which in turn is associated with increased cholesterol secretion in bile and an increased risk of gallstone formation and the development of gall bladder diseases[7]. Similarly, increased levels of circulating triacylglycerol in obesity are associated with decreased concentrations of high-density lipoprotein, which may account for the increased risks for cardiovascular disease and heart

attack in obese patients[8]. Cardiovascular risk factor reports in obese individuals have recently demonstrated a remarkable number of metabolic abnormalities that embrace differences in lipids, glycemia, insulin, blood pressure, and hematologic function[9]. Diabetes and obesity, both, accelerate hardening of the arteries (atherosclerosis) of the larger blood vessels, leading to coronary heart disease (angina or heart attack), strokes, and pain in the lower extremities[10].

The aim of this study was to determine and compare serum T.C, TG, HDL-C and LDL-C levels between diabetic and obese non-diabetic patients.

MATERIALS AND METHODS

Study area
The study was conducted in Khartoum state, Sudan.

Types of study
Prospective Analytical Cross Sectional Study

Sample size and Study population
This study was approved by the ethical committee of International Africa University. Informed consent was obtained from each participant.

Samples were taken from 300 subjects comprising three groups. The first group (DM) included 100 diabetic patients (non-obese) with duration of diabetes over 5 years, the second group (obese) included 100 obese subjects (non-diabetic) with duration of obesity over 5 years, and the third group (control) included 100 healthy subjects (non-diabetics and non-obese). The age of all participants was between (31-59) years, chosen among male and female with no history of smoking or biochemical evidence of hypertension, hyperlipidaemia, renal or liver disease or cancer.

Study period
September 2006- January 2008

Samples collection
5ml of overnight fasting blood collected from the antecubital vein, by venipuncture without venous stasis, in serum separator tube. Serum was separated after 20minutes and analyzed immediately after separation.

Methods
The concentration of total cholesterol (TC), triglyceride (TG), low density lipoprotein cholesterol (LDL-C) and high density lipoprotein cholesterol (HDL-C) were measured using direct kit methods (from Bio-Diagnostics Kits, Spain)

Statistical analyses of data
Statistical analyses were performed using SPSS (Statistical Package for Social Sciences). Differences in mean values between groups were evaluated by a one-way analysis of variance (ANOVA) and Student's t-test. Two-tailed P-values were used and statistical significance was considered at $P<0.05$.

RESULTS

Table-I. Lipid profile levels in DM, obese and control group

Parameters (m.mol/L)	Control	DM	Obese
Triglyceride	1.4	2.2	2.5*
Cholesterol	3.1	6	5.4*
HDL	1.3	1	0.9*
LDL	1.5	3.4	3.6*

** Significant changes*

Table-II. Compare the results of lipid profile in DM and obese subjects according to sex

Parameters (m.mol/L)	DM		Obese	
	Male (N=60)	Female (N=40)	Male (N=71)	Female (N=29)
Triglyceride	2.3	4.7	5.7	5.5
Cholesterol	5.3	6.1	5.7	5.2
HDL	1	1.1	0.9	0.9
LDL	3.4	3.3	3.6	3.6

DISCUSSION
Hyperlipoproteinemia is regarded as one of the most important risk factors for the development of atherosclerotic diseases especially when cofounded

with diabetes and/or obesity[11]. Studies indicate that in addition to the routine determinations of triacylglycerol and cholesterol, quantitative determination of the corresponding apolipoproteins is also important[12]. It has been stated that these lipid abnormalities are often present before the clinical onset of diabetes and are known to become worse with the development of diabetic long-term complications such as nephropathy[13].

In this study, in comparison to control group, both study groups (DM & obese) showed significant (p vale<0.05) increased levels of triglyceride (TG), total cholesterol (TC), and low density lipoprotein cholesterol (LDL-C), while the level of high density lipoprotein cholesterol (HDL-C) significantly (p vale<0.05) decreased. Our results were in agreement with those reports of Must et al[14], and McNamara et al[15].

Also as in table (I) the comparison between the DM and obese subjects revealed that there were no significant changes in HDL-C and LDL-C, while the TC is significantly increased in DM patient, and a significant increased in TG in obese group. Some studies were agreed with these findings[16] but Wendy et al[17] reported that the hyperlipidaemia in obesity is less severity than in diabetes mellitus and Sniderman et al[18] reported that HDL-C does not decreased significantly in obese persons compared to normal healthy persons

The study groups (DM and obese) are classified according to sex. As consistent with other studies[19] this study demonstrated that insignificant variations (p value >0.05) were observed in HDL-C and LDL-C in the serum of both study groups between men and women. In DM group, males showed significant higher results in TG while TC in females is significantly increased. But in obese group the cholesterol in men is significantly raised than in female, while TG showed insignificant changes. Smith et al[20] report were agreed with our findings.

CONCLUSIONS

In comparison to control group, DM & obese groups showed significantly increased in TG, TC, and LDL-C, but significantly decreased in HDL-C. Females showed significant increasing in TC and significant decreasing in DM group, while in obese group females showed insignificant decreasing in TG and TC.

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Correspondence Address:
Dr. Kamal Eldin A Abdelsalam
Assistant Professor
Department of Chemical Pathology
Faculty of Medical Laboratory Sciences
Omdurman Islamic University, Sudan
PO Box: 504 Khartoum - Sudan
kamaleldin55@yahoo.com

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