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Pattern of Lipid Profile Abnormality in Type 2 Diabetic Patients in Shendi Locality- Sudan

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ABSTRACT

In type 2 Diabetes mellitus lipids abnormalities are almost the rule. This study was conducted to investigate the impacts of lipid abnormalities on type 2 diabetic patients. This cross-sectional study was conducted at Shendi locality from February 2011 to July 2012. The patients underwent a clinical assessment, included history (a questionnaire) and clinical examination. (100) diabetic Patients were categorized in this group. The age limits was (40 to 60) years.This study determines the lipid abnormalities among a group of (100) type 2 adult diabetic patients (32males and 68 females). The mean age (49.5 ± 10.3) years (range 39–60 years). The mean duration of diabetes among the patients was (6.3 ± 4.7) years (range 1.6-11 years), and (46.0%) of patients had poor glycaemic control. Compared to the control group, a detected a statistically significant increase in triglycerides level and a decrease in HDL-C levels observed. Other lipid values showed a slight increase compared to control.

There was a statistically significant association between triglycerides and HDL-C with increasing levels in female, physical inactivity and poor glycaemic control of diabetes. The levels of total cholesterol, triglyceride and LDL-C were higher among patients than control. The difference for total cholesterol was statistically significant (P < 0.05).Increasing lipid profile abnormalities in diabetes is associated with higher incidence of atherosclerosis and cardiac disease.
Key words: Type 2 Diabetes Mellitus, Lipids Profile and Sudanese.

INTRODUCTION

Diabetes mellitus (DM) is the most common endocrine disorder and a major cause of mortality and morbidity worldwide. It is estimated that about forty million people worldwide are suffering from this disease. DM has strong association with dyslipidaemias in relation to glycaemic control and duration of the disease (**Basit et al., 2004 and Naheed et al., 2003**). Dyslipidaemias make diabetic patients (**Naheed et al., 2003, Toto, 2005 and Mathura et al., 2005**) times more susceptible to coronary artery disease (CAD) which is the major cause of increased mortality and morbidity in these patients (**Toto, 2005**). Among various dyslipidemias in diabetics the most common is hyper triglyceridaemia followed by decrease levels of serum HDL-cholesterol, raised serum LDL-cholesterol and lastly increased serum cholesterol levels (**Mathura et al., 2005**). Impaired action of insulin in diabetic patients increases the rate of intracellular hydrolysis of triglyceride (TG) with the release of non-esterified fatty acids (NEFA) which act as substrate for liver. Impaired insulin action and relative insulin deficiency causes complex alterations in plasma lipids resulting in raised plasma very low density lipoprotein (VLDL) levels and decreased serum HDL-cholesterol level both causing increased rate of atherosclerosis and hence contributing to CAD (**Krentz, 2003**). Early diagnosis, good glycaemic control and dietary modifications are primary preventions to avoid hyper triglyceridaemia in DM. Exercise not only reduces the serum lipid levels but also potentiates the effects of diet and drug therapy of glucose metabolism in diabetic patients (**Khattak et al., 2004**). Nowadays, in Sudan and elsewhere in Africa, diabetes is no longer a “rare” or “Western” disease and deserves some of the attention and resources that are now diverted to communicable diseases. The causal association between atherosclerosis and dyslipidaemia is well established. In diabetes the associated hyper glycaemia, obesity and insulin changes highly accelerate the progression to atherosclerosis (**O’Brien et al., 1998**) Atherosclerosis accounts for up to (80%) of deaths in diabetic patients due to coronary heart disease (CHD) and cerebro vascular or peripheral vascular disease (**O’Brien et al., 1998 and Colhoun et al., 2004**) , this study was undertaken to determine the ECG abnormality in diabetic patients so as to prime the treating clinicians of this important risk factor and to formulate treatment guidelines for the prevention of CAD in diabetic patients.

MATERIALS AND METHODS

This study was conducted at Shendi locality to estimate the lipids abnormality among diabetic type 2 patient’s in the period February 2011 to July 2012. The study included (100) patients. Their ages range from (40-60) years. Blood samples were obtained after an overnight fast. Five ml of venous blood were taken from antecubital vein by plastic disposable syringes. Blood samples were collected

from all volunteers after (**Colhoun et al., 2004**) hours fasting (time specified). The blood was then transferred into a plane glass tubes. After one hour at room temperature (after clot retraction) centrifugation of the blood was done at a relative centrifugal force of (1000) g for (**Krentz, 2003**) minutes. Afterward, sera were removed by disposable pasture pipettes and transferred into glass containers. Sera were stored at (-20 C) to be analyzed in patches. Serum total cholesterol (TC), high density lipoprotein-cholesterol (HDL – C), low density lipoprotein - cholesterol (LDL - C), triglyceride (TG) and plasma fasting glucose were done for all participants in this study. Clinical data were collected through a questionnaire the (SPSS) version (11.5) program was used for data analysis. All the data were presented as the (mean SD).

Inclusion criteria: Diabetic type 2, peoples of age between (40 -60) years of either sex.

Exclusion Criteria: No smokers, non-hypertensive.

RESULTS

These study determinants the lipid abnormalities among a group of 100 type 2 adult diabetic patients (32males and 68 females). The mean age (49.5 ± 10.3) years (range 39–60 years) and mean duration of diabetes among our patients was (6.3 ± 4.7) years (range 1.6-11 years) table (**Basit et al., 2004**), and (46.0%) of patients had poor glycaemic control. Compared to control group a detected a statistically significant increase in triglycerides level and a decrease in HDL-C levels. The levels of total cholesterol, triglyceride and LDL-C were higher among patients than controls. The difference for total cholesterol was statistically significant ($P < 0.05$). Other lipid values showed a slight increase compared to controls table (**Naheed etal., 2003**). There was a statistically significant association between triglycerides and HDL-C with increasing levels in female (table 3), physical inactivity (table 4) and poor glycaemic control of diabetes.

Table 1. Age, duration of diabetes and anthropometric characteristic of study population.

anthropometric	Mean ± SD
Age (year)	49.5 ± 10.3
Duration (year)	6.3 ± 4.7

Table 2. Correlation parameters of patients compared with control group.

Parameter		Study Group (n=100)	
		Mean ± SD	P value
Pair 4	Total cholesterol	5.5 ± 1.2	.000*
	Total cholesterol (Control)	4.7 ± 1	
Pair 5	HDL	1.5 ± 1.4	.824
	HDL (Control)	1.3 ± 0.9	
Pair 6	LDL	3.1 ± 1.6	.109
	LDL (Control)	3.1 ± 1.2	
Pair 7	TG	1.7 ± 0.9	.167
	TG (Control)	1.5 ± 0.7	
Pair 8	Fasting glucose	10.2 ± 4.5	.000*
	Fasting glucose (Control)	5.2 ± 1.2	

t- test P<0.05 is significant

Table 3. Association between lipid profile and sex in study group.

Sex	Total cholesterol		HDL-C		LDL-C		TG	
	Mean ±SD	P value	Mean ±SD	P value	Mean ±SD	P value	Mean ±SD	P value
Male N= 32	5.1±1.2	.05*	1.7±1.8	.240	3.1±1.5	.764	1.4±0.8	.05*
Female N=68	5.7±1.3		1.4±1.1		3.2±1.7		1.8±.9	
Total N = 100	5.5 ±1.2		1.5±1.4		3.1±1.6		1.7±.9	

t- test P<0.05 is significant

Table 4. Association between lipid profile and regular exercises in study group.

Do you engage in regular exercise ?	Total cholesterol		HDL-C		LDL-C		TG	
	Mean ±SD	P value	Mean ±SD	P value	Mean ±SD	P value	Mean ±SD	P value
Yes N= 19	4.7± 1	.003*	1.8±1.7	.295	2.6±1.1	.142	1.3±0.7	.039*
No N=81	5.6±1.3		1.4±1.2		3.2±1.7		1.7±0.9	
Total N = 100	5.5 ±1.2		1.5±1.4		3.1±1.6		1.7±.9	

t- test P<0.05 is significant

DISCUSSION

The present study was undertaken to assess lipids abnormalities in Type 2 diabetic patients in Shendi locality- Sudan. Diabetes mellitus is a metabolic disease characterized by hyper glycaemia resulting from defects in insulin secretion, insulin action, or both. Diabetes causes about (5%) of all deaths globally each year. The chronic hyper glycaemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels. (50%) of people with diabetes die of cardiovascular disease (primarily heart disease and stroke). Diabetic patients with accompanied (but often unnoticed) dyslipidaemia are soft targets of cardiovascular deaths. Patients with (T2DM) often exhibit an atherogenic lipid profile, which greatly increases their risk of (CVD) compared with people without diabetes. An early intervention to normalize circulating lipids has been shown to reduce cardiovascular complications and mortality. The Patients with diabetes have a higher degree of atherosclerosis burden due to dyslipidaemia than people without diabetes (**Mohsin et al., 2007**). New National Cholesterol guidelines raise the risk factors of patien tswith diabetes without known CHD to CHD equivalent, a

guideline substantiated by the results of numerous studies (**Alexander et al., 2003**). For example in Finnish East West Study, patients with diabetes, without known heart disease had (20%) chance of having a cardiac event over a (**O'Brien et al., 1998**) years time period (**Haffner et al., 2000**). In Canadian patients with type 2 diabetes a Chart audit study revealed that (55%) of patients with a diagnosis of (<2) years had dyslipidaemia. This population rose to (16%) in patients with diabetes for (>15) years (**Harris et al., 2005**). The United Kingdom Prospective Study (UKPDS) calculated risk scores for CVD, which indicates both the duration and the degree of glycaemic control (**Guzder et al., 2005**). Total cholesterol and (TG) were significantly increased (P <0.05) in female rather than male in diabetic patients, this might be due to the social behavior in our country that most of female stay at home and have no physical activity. This result is consistent with the results of other studies in Saudi Arabia (**Habib, 2006**); a total of (507) Saudi type 2 diabetic patient was randomly selected. Selection criteria includes Saudi Nationals of any sex aged (>25) years. It was found that (56.6%), (23.6%), (77.1%) and (48.9%) percent of diabetic subjects had borderline to high risk levels of (TC), (TG), (LDL-C) and (HDL-C) respectively. In Tunis (**15**) study of (708) patients (375) (53%) women and (333) (47%) men in (**O'Brien, 1998**) departments of diabetes, cardiovascular risk factors: Obesity is showed in (32.8%) of patients, fat android distribution is noted in (92.5%) and smoking in (68.5%) of patients. Hypertension is confirmed in (59.1%) of patients, (31.9%) of patients have hyper triglyceridaemia and (26.8%) have hyper cholesterolaemia.

Other result in Tehran (**Ghoddusi et al., 2008**). A total of (9632) adults (4013 men and 5619 women) matched the inclusion and exclusion criteria. There were (1059) people with diabetes (425 men and 643 women); the prevalence of any type of dyslipidaemia in the total study population was (68.5%) (n = 6598). This was slightly higher in men (72.3%, n = 2901) than women (65.8%, n = 3697). The prevalence of dyslipidaemia in diabetics was (88.9%) (n = 941), which was significantly higher than in the general population (P < 0.05) and among the diabetics in study, the frequency of hyper cholesterolaemia was (45.9%), high (LDL-C) was (24.9%), low (HDL-C) was (34.1%) and hyper triglyceridaemia was (11.5%).

All of these rates were significantly higher than in the general population, and in USA (**Egede and Zheg, 2002**). Diabetes mellitus was more prevalent in adults aged (55) and older and in blacks and Hispanic or other ethnicities (both P<.001). Modifiable (CVD) risk factors, such as hypertension (56% vs. 22%), high cholesterol (41% vs. 20%), obesity (78% vs. 57%), and insufficient physical activity (66% vs. 56%), were more prevalent in adults with (DM).

This suggests an important influence of diabetes on lipid profile in the diabetics in this study, lack of appropriate advice on diet and exercise and the shortage availability of regular drugs prescribed for dyslipidaemia. Other study in Rawalpindi Islamabad showed that (120) out of (150) patient's, were dyslipidaemic. Hyper triglyceridaemia was presented in (120) (80%) patients, raised (LDL-C) in (94) (62.7%) patients, decreased (HDL-C) in (88) (58.7%) patients, and raised levels of total cholesterol in (60) (40%) patients.

Management of dyslipidaemia in this study, diabetic patients must receive more attention, as these patients are already at higher risk of (CVD). It has been suggested that using lipid-lowering agents is very important and to be more effective and cost-effective than treating hyper

glycaemia. In a study on Indian type 2 diabetic patients, high prevalence of atherogenicdyslipidaemias has been reported (**Udawat et al., 2001**).

The prevalence of dyslipidaemias is also very high in Kuwait and it is reported that diabetic patients with mixed hyper lipidaemia benefit from tight glycaemic control (**Akanji, 2002**). It has been suggested that inspite of ethnic and cultural differences diabetics have significantly higher prevalence of dyslipidaemias (**Bermudez et al., 2002**). In terms of benefit for cardiovascular protection, treatment of hyper lipidaemia has been reported to be more beneficial than blood pressure or glycaemic control (**Hyman and Pavlik, 2001**).

CONCLUSION

Increasing lipid profile abnormality of diabetes is associated with higher incidence ofhigher degree of atherosclerosis and cardiac disease.

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