Pattern of ECG abnormality in Type 2 diabetic patients in Shendi locality- Sudan

Eltigani MA[1], Asia Abbas[2], Masud Ishag[3]

[1]Department of biochemistry, [2]Department of Nursing, [3]Department of medicine , Faculty of Medicine, Shendi University, Shendi, Sudan.

E-mail:eltiganima@gmail.com

ABSTRACT

Background: *In type 2 diabetes mellitus ECG abnormalities are almost the rule. This study was conducted to know the impact of ECG abnormality on lipid profile in type 2 diabetic patients.*

Material & Methods: *This cross-sectional study was conducted at Shendi locality. The patients underwent a clinical assessment, which included history (a questionnaire) and clinical examination. 100 Diabetic Patients were categorized in this group. The age limits between 40 to 60 years.*

Results:

There was (23%) are abnormal (ECG), in diabetic patients; (17%) with ischaemic changes and (4%) with old myocardial infarction (2%) other changes. The total cholesterol level was higher among diabetic patients group compared to control group (5.5 ± 1.2)

Conclusion: *Increasing lipid profile abnormality of diabetes is associated with higher incidence of ECG abnormality.*

Key words: Type 2 Diabetes Mellitus, ECG abnormality, Lipid profile.

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 dyslipidemias in relation to glycemic control and duration of the disease (1,2). Dyslipidemias make diabetic patients 2-4 times more susceptible to coronary artery disease (CAD) which is the major cause of increased mortality and morbidity in these patients (3). Among various dyslipidemias in diabetics the most common is hypertriglyceridemia followed by decrease levels of serum HDL-cholesterol, raised serum LDL-cholesterol and lastly increased serum cholesterol levels (4). 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 (5). Early diagnosis, good glycemic control and dietary modifications are primary prevention to avoid hypertriglyceridemia in diabetic patients. Exercise not only reduces the serum lipid levels but also potentiates the effects of diet and drug therapy of glucose metabolism in diabetic patients (6). 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 nowdiverted to communicable diseases. The causal

association between atherosclerosis and dyslipidaemia is well established. In diabetes the associated hyperglycaemia, obesity and insulin changes highly accelerate the progression to atherosclerosis (7) Atherosclerosis accounts for up to 80% of deaths in diabetic patients due to coronary heart disease (CHD) and cerbrovascular or peripheral vascular disease (7,8) , 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 measure the ECG abnormality among diabetic type 2 patients. 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 (8) 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 5 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 measured. Height, weight, blood pressure and electrocardiogram (ECG) 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

Our study included 100 patients the mean age (49.5 ± 10.3) years (range 39–60 years). The mean duration of diabetes among our patients was 6.3 years (range 1.6 - 11 years). There was (23%) are abnormal (ECG), in diabetic patients; (17%) with ischaemic changes and (4%) with old myocardial infarction (2%) other changes. The total cholesterol level was higher among diabetic patients group compared to control group.

Table (1): Age, duration of diabetes and anthropometric characteristic of study population

anthropometric	Diabetic patients
Age (year)	49.5 ± 10.3
Duration (year)	6.3 ± 4.7
Weight (k)	71.1 ± 13.7
Height (m)	1.61 ± 0.08

Table (2): Distribution of patients according to *(ECG)* normal and abnormal

Groups	Normal	Ischemic changes	Old myocardial infarction	Total
	Frequency (%)	Frequency (%)	Frequency (%)	N (%)
Diabetic patients	77	17	6	100

Table (3): Correlation parameters of patients compared with control group

Parameter		Group1	
		Mean ± SD	P value
Pair 1	Total cholesterol	5.5 ± 1.2	.000*
	Total cholesterol (Control)	4.7 ± 1	
Pair 2	HDL	1.5 ± 1.4	.824
	HDL (Control)	1.3 ± 0.9	
Pair 3	LDL	3.1 ± 1.6	.109
	LDL (Control)	3.1 ± 1.2	
Pair 4	TG	1.7 ± 0.9	.167
	TG (Control)	1.5 ± 0.7	
Pair 5	Fasting glucose	10.2 ± 4.5	.000*
	Fasting glucose (Control)	5.2 ± 1.2	

**t- test P <0.05 is significant*

Table (4): Association between lipid profile and *(ECG)* result in study group

ECG	Total cholesterol		HDL-C		LDL-C		TG	
	Mean ±SD	P value	Mean ±SD	P value	Mean ±SD	P value	Mean ±SD	P value
Normal N=77	5.3 ±1.3	.038*	1.5 ±1.5	.635	3±1.5	.354	1.6±.8	.489
Abnormal N=23	5.9 ±1.2		1.4 ±.4		3.4±1.9		1.8±1	
Total	5.5±1.2		1.5±1.4		3.1±1.6		1.7±.8	

**t- test P <0.05 is significant*

DISCUSSION

The present study was undertaken to measure ECG abnormality in Type 2 diabetic patients in Shendi locality- Sudan. Half of the diabetic patients had some disorder in their lipid profile. This figure is to some extent lower than that reported in international studies. For example, 70% of the Americans and up to 85% of Finnish diabetic patients were reported to have lipid abnormalities (9,10). The Canadian Heart Association reported that up to half the diabetic patients had low HDL-C (9). The difference in dietary habits and climate are claimed to justify the difference in lipid profile between our study and international studies. The findings of other regional studies are somewhat similar to our study. Nigerian and

Kuwaiti studies show an incidence of lipid disorders of around 50% among diabetic patients (11,12).

In accordance with other studies, the most common recognized abnormality was hypertriglyceridaemia (which was reported in nearly half the patients). Some studies on triglyceride levels showed a significant

CONCLUSION

Increasing lipid profile abnormality of diabetes is associated with higher incidence of ECG abnormality.

REFERENCES

1. Basit A, Hydrie MZI, Hakeem R, Ahmedani MY, Masood Q. Frequency of chronic complications of type II Diabetes. J Coll Physicians Surg Pak .83-14:79;2004
2. Naheed T, Khan A, Masood G, Yunus BB, Chaudary MA. Dyslipidemias in type II diabetes mellitus patients in a teaching hospital of Lahore,Pakistan. Pak J Med Sci 2003;19:283-6.
3. Toto RD. Heart disease in diabetic patients. Semin Nephrol 2005 ;25:372- 8
4. Mathura KC,Vaidya B,Gurbacharya DL. Study of serum lipid profile in type 2 diabetic patients attending KMCTH. Nepal Med Coll J.100-7:97;2005
5. Krentz AJ. Lipoprotein abnormalities and their consequences for patients with type 2 diabetes. Diabetes Obes Metab 2003;5 Suppl 1:S19-27.
6. Khattak MI, Rehman FU, Javaid M, Khattak Z. Hyperlipidemia in diabetes mellitus.J Postgrad Med Inst 2004;18:261-8.

7. O'Brien T, Nguyen TT, Zimmerman BR. Hyperlipidemia and diabetes mellitus. Mayo Clinic proceedings, 1998, 73:969–76.
8. Colhoun HM et al. Primary prevention of cardiovascular disease with atorvastatin in type 2 diabetes in the Collaborative Atorvastatin Diabetes Study (CARDS:(multicentre randomised placebo-controlled trial. Lancet, 2004, 364:685–98.
9. O'Brien T, Nguyen TT, Zimmerman BR. Hyperlipidemia and diabetes mellitus. Mayo Clinic proceedings, 1998, 73:969–76.
10. Harris MI. Hypercholesterolemia in diabetes and glucose intolerance in the U.S. population. Diabetes care, 1991, 14:366–74.
11. Akanji AO. Diabetic dyslipidaemia in Kuwait. Medical principles and practice, 2002, 11:47–55.
12. Erasmus RT, Olujeopa O, Adelowo O. Correlation between glycosylated haemoglobin and serum lipids. Central African journal of medicine, 1987, 32:231–6.