Dyslipidemia in Patients with Type2 Diabetes Mellitus

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Abstract: <u>*Context*</u>*: Diabetes mellitusis one of the most diseases of life threading through its completing complexes such as dyslipidemia is one of the major risk factors for cardiovascular disease and metabolic disorders in diabetes mellitus.* <u>*Aims:*</u> *The primary objective of our study was to evaluate and assess the control of dyslipidemia in diabetes mellitus. The importance of the study was that the lipids disorders affect approximately 14% of patients with diabetes mellitus whereas in non-diabetics the prevalence is approximately 6%.* <u>*Settings and Design*</u>*: A case- control and hospital- based analytical study was conducted from January 2016 to November 2017 in Khartoum state.* <u>*Methods:*</u> *Two hundred Sudanese adult with T2DM were selected as test group and 100 apparently healthy volunteers as controls both groups were age and sex matched. Venus blood samples were after overnight fasting from all participants, the following parameters were surveyed: Total cholesterol (T.CH), Triglycerides (TG), High density Lipoprotein (HDL-C) and Low density Lipoprotein (LDL-C). Statistical Analysis Used: The quantitative variables were expressed as a mean and standard deviation and the qualitative variables incontinency tables. Student's t⁻test and x2 tests were used to assess the differences between the groups. The level of significance was established as P < 0.05.* <u>*Results:*</u> *means of serum levels of T.CH, TG, & LDL-C were statistically significant increased in diabetic patients in compression to controls (190.24 ± 30.53) versus (164.63 ± 13.37), p=0.00 (138.68 ± 40.851) versus (100.28 ± 24.869), p=0.02 and (122.37 ± 39.39) versus (95.06 ± 13.14) p=0.013 respectively. But result of HDL-C was statistically decreased in diabetic when compared to control group,(40.30 ± 10.099) versus (53.95 ± 8.170)p=0.021 respectively. Also these was moderate strong correlation between (T.CH, TG, HDL-C & LDL-C) and duration of diabetes (r 0. 69, p=0.029), (0. 69 p=0.010) (r 0. 5, p=0.043) and (0. 69 p=0.022) respectively.* <u>*Conclusions:*</u> *Serum level ofT.CH, TG, HDL-C & LDL-C is important tests for monitoring diabetic patients and prevent cardiac disorders. Early detection of dyslipidemia provides a prognostic value for the prediction of CVD in type 2 diabetes mellitus and the duration of disease should be consider.*

Keywords: Dyslipidemia, duration, type 2 diabetes mellitus (DM2).

1. Introduction

Dyslipidemia is one of the major risk factors for cardiovascular disease (CVD) in diabetes mellitus. The characteristic features of diabetic dyslipidemia are elevated plasma triglyceride, low high density lipoprotein cholesterol (HDL-C) and increased Diabetes is a major risk factor for (CVD) [1].Lipid concentrations are strongly related to the risk of CVD in adults with diabetes[2], It is well documented that reduced HDL cholesterol levels are associated with an increased risk of coronary heart disease (CHD)[3].HDL-C has variety number of functions,may cholesterol efflux and direct antioxidative and anti-inflammatory properties. Moreover, low HDL cholesterol levels are often accompanied by elevated triglyceride levels [4], and the combination has been strongly associated with an increased risk of CHD [5].

Patients with diabetes are also prone to arterial thrombosis due to persistently activated thrombogenic pathways and impaired fibrinolysis. This combination of increased arterial disease and prothrombotic milieu in diabetes is a major underlying cause of acute ischemic coronary heart disease (CHD) [6].Duration of the diabetes mellitus plays an important role in these lipids disorders.

2. Materials and Methods

Patients selected had a history of diabetes. 200 patients and100 healthy volunteers were selected as controls, written informed consent was obtained from all participants, all of them were age and weight-matched, Blood was obtained to determine levels of serum insulin and lipid parameters. The blood samples were drawn after overnight fasting in the morning (between 0800 and 1100 h). Five ml of blood from each individual of study population were collected from both cases and control, the blood was centrifuged at 3000 rpm for 10 minutes and serum was obtained, samples were stored in +4 C until analyzed during the same day. enzymatic colorimetric methods used to determine total cholesterol, TGS, HDL-C and LDL-C Levels. All these parameters were investigated, recorded, and then a comparison was made between diabetic patients and control participants. Later, the results were collected and presented in graphs and tables, showing the values as mean ± standard deviation. Data were analyzed by computer program (SPSS) version IBM 20. Student T. test was used for the Calculation. P≤0.05 was considered significant. All chemical reagents were purchased from Bio system company (Spine Company for Analytical material and chemical Reagents).

3. Results

The mean ages of test subjects and control group were 60.72± 9.1 and 59.75 ± 12.36 years respectively. Results of serum lipids showed that the mean values for total cholesterol (TC), triglyceride (TG), high density lipoprotein cholesterol (HDL-C) and low density lipoprotein cholesterol (LDL-C) in diabetic patients were190.24±30.53mg/dl, 138.68±40.851mg/dl, 40.30±10.099mg/dl, 122.37 ± 39.39 mg/dl. respectively. The mean values for TC, TG, HDL-C, LDL-C in controls were 164.63 ± 13.37 mg/dl, 100.28 ± 24.869 mg/dl, 53.95 ± 8.170 mg/dl, 95.06±13.14mg/dl respectively [table1]. Levels of serum lipids were increased except that of HDL-C was decreased in diabetic TC, TG, HDL-C and LDL-C showed significant

moderate positive correlation with duration of diabetes [table2].

Table 1: Characteristics of diabetic patients and control group

Variable	Test group (n=200)	Control s (n=100)	P value
Age (years)	60.72± 9.1	59.75 ± 12.36	0.489
Weight (Kg)	77.30 ± 14.85	69.89 ± 14.33	0.013
Height (Cm)	164.86 ± 13.18	162.20 ± 14.50	0.068
BMI(Kg/m2)	32.92 ± 5.29	23.86 ± 3.91	0.005
T. cholesterol (mg/dL)	190.24 ± 30.53	164.63 ± 13.37	0.000
Triglycerides(mg/dL)	138.68 ± 40.851	100.28 ± 24.869	0.020
HDL-c (mg/dL)	40.30 ± 10.099	53.95 ± 8.170	0.021
LDL-c (mg/dL)	122.37 ± 39.39	95.06 ± 13.14	0.013

* The means is a significant difference between different values, ($P<0.05$)

Table 2: Correlation between Lipids and duration of diabetes

Lipids	Duration	
	r. value	p. value
Total cholesterol	0.69	0.029
HDL-C	-0.59	0.043
LDL-C	0.69	0.022
Triglyceride	0.69	0.010

* The means is a significant difference between different values, ($P<0.05$)

4. Discussion

Type 2 diabetes mellitus is the most common form of diabetes. It is characterized by disorders of insulin7 action and insulin secretion [7] and constitutes the majority of the diabetes cases. However, these patients are at an increased risk of developing macro vascular and micro vascular complications [6]. Cardiovascular diseases (CVD) are the main cause of increased mortality in patients with diabetes, and remains the leading cause of death in patients with diabetes mellitus, accounting for 50% of all deaths [6].Damage of endothelial wall plays the key role in the development of diabetic complications. Hyperglycemia, oxidative stress, genetic factors,disturbances of lipid metabolism, hypertension, obesity, smoking, sedentary lifestyle and various growth factors are among the major causes of chronic diabetic complications[8].The current study showed a significant elevation of the means of the serum levels of total cholesterol of the test group when compared with the control group, this agrees with the result of Idogun et al, in a study done in Nigeria.[9] Dyslipidemia is a known risk factor for coronary atherosclerosis [10].According to George et al, who reported a two to three time higher risk for coronary heart disease rate in diabetic patients with lipid abnormalities [11],also agrees with a study done by Taskinem, who reported that the mean of the serum level of total cholesterol was significantly higher in diabetic patients than in healthy control subjects [12].Our study shows a significant moderate positive correlation between the serum levels of total cholesterol and the duration of diabetes, this agrees with that reported by Jones, et al[13], who found a significant moderate positive correlation between the duration of diabetes and the serum levels of the total cholesterol.In this study the diabetic patients have a significant reduction in the means of the

serum levels of HDL cholesterol when compared to the control group, this result agrees with that reported by Reaven, [14]who found the mean of the serum levels ofHDL-C was significantly lower in diabetic patients than in the control subjects.

The present study shows a significant moderate negative correlation between the serum levels of HDL cholesterol and the duration of diabetes, Pihlajamaki et al [15], reported that hypertriglyceridemia and decreased HDL-C level are recognized cardiovascular risk factors. The Canadian Heart Association [16], reported that up to half the diabetic patientstype2havelow HDL-C. Park et al (17observed that Low HDL-C is a common lipid disorder in obesity, and this agrees with that reported by Garfagnini, et al[18] ,who found a significant moderate negative correlation between serum levels of HDL-C and the duration of type 2 diabetes.

The present study shows a significant elevation of the mean of the serum levels of LDL cholesterol of the test group when compared with the control group, this result agrees with that reported by Grundy et al[6] , who showed elevated levels of LDL-C, low levels of HDL-C , and high triglyceride levels to make up the condition known as diabetic dyslipidemia.

The current study shows a significant moderate positive correlation between the serum levels of LDL-C and the duration of type 2 diabetes, this agrees with that reported by Garfagnini, et al.[18], who found a significant moderate positive correlation between the duration of diabetes and the serum level of LDL-C.

The current study shows a significant elevation of the mean of the serum levels of triglycerides among the diabetic patients when compared to the control group ,this agrees with a study done by Taskinem, who found the mean of the serum levels of triglycerides of the test group was significantly raised when compared with the control group [12].In addition the current study shows a significant moderate positive correlation between the serum levels of triglycerides (mg/dL) and the duration of diabetes .There for the duration of diabetes seems to play only a minor role in modifying these factors [19].

5. Conclusions

Dyslipidemia is very clear in our study hypercholesterolemia, hypertriglyceridemia and elevated LDL-C. Those are factors of this condition; Results suggest a high prevalence of dyslipidemia which its life threating increasing cardiovascular risk diabetic patients should regular monitoring of blood sugar and serum lipid profile. Further research is needed to fully understand this condition.

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