Research Article

Dyslipidemia among Type 2 Diabetic Patients in Zakho, Kurdistan Region, Iraq

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Abstract

Objective: Dyslipidemia contribute to considerable increased risk of atherosclerosis and consequent mortality in diabetic patients. An early detection of atherogenic dyslipidemia in type 2 diabetes can help in the management and prevention of atherogenic cardiovascular and cerebrovascular disease. In this article we analyzed the pattern of dyslipidemia and its prevalence in a sample of patients with type 2 diabetes in Zakho, Iraq.

Methods: Total cholesterol (TCh), high-density lipoprotein cholesterol (HDL-c) and triglycerides (TG) were measured in 1138 adult patients with type 2 diabetes mellitus, Atherogenic dyslipidemia is defined according to the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (adult Treatment Panel III).

Results: Significantly higher cholesterol and triglycerides levels ($p<0.001$ and $p=0.001$ respectively) were found in age group (36-65 years) compared to younger age group (19-35 years). ASignificantdifference was found with respect to the prevalence of combined dyslipidemia between theage groups (TCh $p<0.001$, TG $p=0.002$ and HDL-c $p<0.001$).Out of 1138 patients, 523(46.7%) were found with combined dyslipidemia. No significant difference was found with respect to the prevalence of isolated dyslipidemia between the age or sex groups.

Conclusions: The results confirm that atherogenic diabetic dyslipidemia was seen in about half of the studied patients.Efforts to control combined dyslipidemia by means of drug intervention may be beneficial in type 2 diabetes.

INTRODUCTION

Diabetes mellitus (DM) is an important risk factor for cardiovascular disease (CVD).It is a common secondary cause of dyslipidemia in patients with poor glycemic control [1]. Dyslipidemia contribute to considerable increased risk of atherosclerosis and consequent mortality in diabetic patients, often precedes onset of diabetes particularly type 2 DM and may persist in spite of adequate control of blood sugar [2]. The combination of hypertriglyceridemia (TG) and low high density lipoprotein-cholesterol(HDL-c) and high levels of low density lipoprotein –cholesterol(LDL-c), termed as "Atherogenic Dyslipidemia" [3].The distinctive pattern of atherogenic diabetic dyslipidemia is characterized by the atherogenic triad of high plasma TG, low HDL-c and increased concentration of small dense LDL-c particles [4]. This form of lipoprotein is existent even before the commencement of diabetes that proposed to be more atherogenic, implying that even normal lipid concentration might to be more atherogenic in diabetic than non-diabetic subjects [5]. The disorder in lipid metabolism and altered lipid levels isexisted into two distinctive patterns, isolated or combined dyslipidemia.Isolateddyslipidemia is defined as one of the lipid fractionsout of the target normal level. Combined dyslipidemia is two or more lipid levels were out of the target level [6], since hyperglycemia and hyperlipidemia is established risk factors of CVD, it is important to analyze the pattern of dyslipidemia and its prevalence among type 2 diabetic patients in a sample of the general population from Zakho city, Iraq.

MATERIALS AND METHODS

This was an observational cross-sectional study included 1138 patients with type 2 DM attending a Private Medical laboratory in Zakho city, Duhok, Kurdistan Region, Iraq over a period of 17 months(January 2017 to May 2018). Patients data enrolled were irrespective of duration of diabetes or dyslipidemia, presence of any complications and any treatment being taken. Inclusion criteria were all blood samples were taken for atleast 12 hours fasting.Lipid parameters included TCh, TG and HDL-c were investigated and interpretation was done according to the cutoff normal values reported by National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (adult Treatment Panel III) [7].

Atherogenic dyslipidemia was divided into two types: Type I isolated dyslipidemia as one of the lipid parameters is out of the target level, isolated hypercholesterolemia –serum

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cholesterol >200mg/dl and triglycerides <150 mg/dl or isolated hypertriglyceridemia-serum triglycerides >150 mg/dl and cholesterol<200mg/dl [8]. Type II combined dyslipidemia is two or more lipid levels were out of the target level [9]. The study sample was categorized in different subgroups by age and gender.

Blood samples were collected between 9:00-11:30 a.m., about 5 ml of blood were withdrawn by venipuncture from the antecubital vein and collected in a gel tube tubes. the sera were separated by centrifugation using a HITACHI centrifuge (model O5P-21) at 5000 rpm for 10 minutes and used for measuring serum total cholesterol, triglyceride and HDL-c by standard laboratory procedure using clinical chemistry analyzer Cobas 6000 Roche (open, automated, discrete and random access).

The research protocol ethical clearance was taken from the Ethics Committee of the College of Medicine-University of Duhok.

Statistical analysis

All data were analyzed using the Statistical Package for Social Sciences (SPSS 25, IBM: USA) .The values of the laboratory parameters are presented as Mean and standard deviation. Variables were compared by Chi-square test and Independent t-test was used for comparison of variables between the groups. The results were considered statistically significant when $P \leq 0.05$.

RESULTS

Table 1 shows the baseline characteristics of the study subjects. They were 521(45.78%) males and 617(54.21%) females with a mean age of 46.63 years .Significantly higher TCh (p<0.001) and TGlevels (p=0.001) were observed in the age group (36-65 years) compared to younger age group (19-35 years). No significant differences were found concerning TCh, TG and HDL-c between males and females. Table 2 shows the mean difference of cholesterol and triglycerides to age groups. A significantly higher mean difference was found in the subjects aged 36-65 years compared to age group of 19-35 years.The prevalence of dyslipidemia among study sample is presented in Table 3. Of the 1138 patients, 523(46.7%) were found with combined dyslipidemia, 736(64.7%) of them were havinghypertriglyceridemia. The association between age groups, sex distribution and combined dyslipidemia showed a significant difference in the prevalence of hypercholesterolemia, hypertriglyceridemia and high-density lipoprotein cholesterol

(p<0.001, p=0.002 and p<0.001 respectively). Isolated dyslipidemia as one parameter of lipid profile was found in 369(32.4%) patients mostly isolated hypertriglyceridemia compared to Isolated hypercholesterolemia 123(9.5%). Analyzing the association between age, sex and isolated dyslipidemia, we found no significant difference in isolated dyslipidemia between age or sex groups (Table 4).

DISCUSSION

As expected, age is associated with unfavorable changes in the lipid profile. The results of this study showed significantly higher TCh and TG levels in age group (36-65 years) compared with levels in younger age group (19-35 years).The results confirms a prominent combined dyslipidemia among type 2 diabetes, as the prevalence observed was about 1.4 times higher than that of isolated hypertriglyceridemia and about 4.8 of isolated

Table 2: Multiple comparisons for age groups (Bonferroni)

Dependent variable	Age groups	age groups	Mean Difference	p
TCh	19-35	36-50	-17.127	<0.001
		51-65	21.604	<0.001
		>66	-8.655	0.826
	36-50	51-65	-4.477	1
		>66	8.461	0.726
	51-65	>66	12.939	0.148
TG	19-35	36-50	-35.987	0.004
		51-65	-43.71	<0.001
		>66	-34.236	0.197
	36-50	51-65	-7.723	1
		>66	1.752	1
	51-65	>66	9.475	1

Table 3: Association between age, sex and Combined dyslipidemia

Parameter	TCh>200mg/dl n(%)	TG>150 mg/dl n(%)	HDL-c <40mg/dl n(%)
Age(years)			
<40	168(33.8)	265(36.0)	140(31.5)
>40	329(66.2)	471(64.0)	305(68.5)
P	<0.001	0.002	<0.001
Gender			
Male	224(45.1)	325(44.2)	201(45.2)
Female	273(54.9)	411(55.8)	244(54.8)
P	0.671	0.129	0.789
Total	497	736	445

P-value are based on Chi Square Test

Table 1: Characteristics of studied sample

Characteristic TChHDL-cTG							
Age (years)		No.Mean+SD	p*	Mean+SD	p*	Mean+SD	p*
19-35	262	188.4±46.7		40.2±17.2		183.0±119.5	
36-50	486	205.5±40.8		40.4±10.4		218.9±142.1	
51-65	291	210.0±51.7	**<0.001**	39.8±17.3	**<0.962**	226.7±136.7	**<0.001**
>66	99	197.0±47.9		39.8±8.0		217.2±121.3	
Gender							
Male	521	200.5±46.9	<0.365	39.7±12.3	<0.573	210.1±129.5	<0.556
Female	617	203.2±52.6		40.4±15.2		214.8±139.4	

*Based on one way ANOVA

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Table 4: Association between age, sex and isolated dyslipidemia

Parameter	TCh>200mg/dl n (%)	TG>150 mg/dl n (%)
	TG<150 mg/dl n (%)	TCh<200mg/dl n (%)
Age (years)		
<40	47(38.2)	144(39.0)
>40	76(61.8)	225(61.0)
P	0.715	0.927
Gender		
Male	60(48.8)	164(44.4)
Female	63(51.2)	205(55.6)
P	0.488	0.548
Total	123	369

P-value are based on Chi Square Test

hypercholesterolemia. These results are in accordance with previous studies [10,11], that reported the most common type of dyslipidemia was combined dyslipidemia (37.1%), with high triglycerides and low HDL-c (19.0%).

Moreover, we reported no significant relationship between dyslipidemia and sex. In this study, the prevalence of combined dyslipidemia as well as isolated dyslipidemia is nearly similar in both the male and female groups. These results may indicate that treatment and control were similar for both sex groups. The link between sex and dyslipidemia has been studied, but the results are controversial yet. Sarfraz et al. [12], observed a direct link between sex and lipid parameters, While others did not find this kind of association [13] .The results of this study confirm a lack of relationship between sex and lipid levels in diabetes. The possible explanation for this discrepancy may be attributed to the similar effectiveness of stain treatment in both sexes. A study by XW Ji, 2021 supported this observation, since it reported the highest serum cholesterol and triglycerides levels were among middle age diabetic patients even after sex adjustment [14]. However, these results may suggest an important mechanism through diabetes can influence higher risk of hyperlipidemia in Zakho population, although, measurement of the other relevant variables such as body weight, exercise, alcohol consumption and smoking habits has not been determined, which is a limitation of this study Moreover, we conducted the study in a private medical laboratory which is a health facility and health facility based studies are more likely to be biased than population based randomized studies regarding sampling, so the data present are less likely to be representative of the general population actual data and of the same individual at other times. Despite these limitations, our study descriptive study interpreted with suitable caution can offer some useful insight to complement the data from the forthcoming studies using randomization.

CONCLUSION

The results confirm that hyperlipidemia characterized by high prevalence of combined dyslipidemia may be the most prominent type among type 2 diabetic patients in Zakho city, Iraq. This finding may have clinical implications due to the increased risk of future metabolic disease. Therefore, a primary prevention model of controlling combined dyslipidemia by means of drug intervention may be beneficial in type 2 diabetes.

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