Significance of Lipid Profiles and Glycemic Control in Children with Diabetes Mellitus in Baqubah City

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Abstract

Background: Diabetes mellitus (DM) is associated with a high risk of cardiovascular disease.to evaluate the relationship between long diabetic control ,the HbA1c and lipid profile parameters owning diabetic children and that with healthy ones

Method :Forty seven patients with DM were evaluated by history and data about each patient included age, gender, family history of Diabetes, member of the family with DM and time were diagnosed as Diabetes Miletus. Result was revised for HbA1c and Lipid profile (total cholesterol, triglycerides, HDL-C and LDL-C) was performed. Fifty healthy children were included as control for both lipid profile and HbA1c.

Results :From47 patients with DM (15, 31.9%) were males and (32, 68.1%) were females. The mean ± SD for age of patients with diabetes mellitus was (9.49 ± 3.804) year. Dyslipidemia and elevated HbA1c were significantly more frequent among DM children and adolescents compared to control subjects. Cholesterol, HDL, LDL and HbA1c P - value (P=0.003), (P=0.001), (P=0.036) and (P=0.000) respectively.Triglycerides it was statistically non-significant P - value (P=0.135).

Conclusion :Diabetic children with poor control are at higher risk of developing dyslipidemia.

Keywords: Diabetes mellitus, Dyslipidemia, HbA1c, cholesterol.

Introduction

Diabetes mellitus (DM) is a group of metabolic diseases characterized by increasing blood glucose level resulting from defects in insulin secretion or insulin action or both. [1]

It is estimated that 194 million people had diabetes in the year 2003, and about two-thirds of these people lived in developing countries. [2]

The world health organization estimates that between 2000 and 2030, the world population will increase by 37% and the number of people with diabetes will increase by 114%. [3]

In 2013, the top 10 countries with higher prevalence of diabetes are Tokelau (37.5%), Federated States of Micronesia (35%), Marshall Islands (34.9%), Kiribati (28.8%), Cook Islands (25.7%), Vanuatu (24%), Saudi Arabia (23.9%), Nauru (23.3%), Kuwait (23.1%) and Qatar (22.9%). [4]

The major forms of diabetes are differentiated by insulin deficiency vs insulin resistance: type 1 diabetes mellitus

(T1DM) results from deficiency of insulin secretion because of pancreatic β-cell damage; type 2 diabetes mellitus (T2DM) is a consequence of insulin resistance occurring at the level of skeletal muscle, liver, and adipose tissue, with various degrees of β-cell impairment. [5]

T1DM accounts for approximately 10% of all cases of diabetes, affecting up to 3 million people in the United States and more than 15 million people in the world. [5]

Peaks of presentation occur in 2 age groups: at 5-7 yr of age and at the time of puberty.

Diabetes mellitus is not a single entity but rather a heterogeneous group of disorders in which there are distinct genetic patterns as well as other etiologic and pathophysiologic mechanisms that lead to impairment of glucose tolerance. [5]

The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction and failure of various organs, especially the eyes, kidneys nerves, heart and blood vessels. Patients with type-2 diabetes have increased risk of cardiovascular disease associate with atherogenic dyslipidaemia. Coronary artery disease, especially myocardial infarction is the leading cause of morbidity and mortality worldwide. [6]

Persistent hyper glycaemia causes glycosylation of all proteins, especially collagen cross linking and matrix proteins of arterial wall. This eventually causes endothelial cell dysfunction, contributing further to atherosclerosis. The prevalence of dyslipidemia in diabetes mellitus is 95%. [7]

The cardiovascular disease is a cause of morbidity and mortality in patients with diabetes mellitus because of disturbance in lipoproteins i.e. serum triglycerides (TC) 69%, serum cholesterol 56. 6%, low-density lipoprotein cholesterol (LDL) 77% and high density lipoprotein of cholesterol (HDL) 71%. [8, 9]

Diabetes mellitus is characterized by hyperglycemia together with biochemical alterations of glucose and lipid peroxidation. [10]

Accumulation of lipids in diabetes is mediated through a variety of derangements in metabolic and regulatory processes, especially insulin deficiency, thereby rendering the diabetic patient more prone to hypercholesterolemia and hypertriglyceridemia. [11]

The aim of this study is to find a correlation of Lipid profile and HbA1c

between DM children patients and control healthy children.

Patients and Methods

This is a case control study included 47 cases who attended to the endocrine ward in the causality outdoor department at Al-Batool Teaching Hospital for Maternity and Children in Baquba City during the period between 1st of August 2015 to the 1st of February 2016, 47 of the cases with diabetes miletus (DM) and 50 cases control normal without DM .

History and data about each patient include age, gender, family history of Diabetes, member of the family with DM, time was diagnosed as diabetic patient and all routine investigations were performed. An informed consent was taken from every patient after full explanation of procedure .

All patients and control was advice to be fasting for overnight. Next morning (before breakfast) 5 ml of fasting blood was obtained by venipuncture, and analyzed by INTEGRA 400 Plus for lipid profile and on HPLC VARIANT for HbA1c .

Lipid profile measured with such techniques include serum level for cholesterol, high density lipoprotein (HDL), low density lipoprotein (LDL) and triglyceride, fasting serum glucose and HbA1c .

All the parameters which were under investigation were determined in the serum of the subjects by using commercially available reagent kits. The values of all the parameters were given in mg/dl and they were expressed as mean ± SD. Frequency of dyslipidemia was evaluated while the pattern were determine by serum level for cholesterol, HDL, LDL, triglyceride and HbA1c.

Analysis of data was carried out using the available statistical package of SPSS-22 (Statistical Packages for Social Sciences-version 22). Data were presented in simple measures of frequency, percentage, mean, standard deviation. The significance of difference of different means (quantitative data) was tested using student-t-test for difference between two independent means, while different percentages (qualitative data) were tested using pearson Chi-square test. Statistical significance was considered whenever the P-value was less than 0.05.

Results

During six month study period, total 47 patients with diabetes mellitus were evaluated for lipid profile. The mean ± SD for age of patients with diabetes mellitus was (9.49±3.804) year.

Table 1 shows the distribution of gender in diabetic patient. Out of 47diabetic patients (15, 31.9%) were males and (32, 68.1%) were females.

Summer is most common seasonal (30, 63.8%), winter (13, 27.7%), spring (3, 6.4%) and autumn (1, 2.1%).

Table 3 shows the correlation of lipid profile & HbA1c diabetic & control. For diabetic patients cholesterol mean± SD (162.95±37.561) P - value (P=0.003) it was statistically significant, triglycerides mean± SD (100.10±64.350) P - value (P=0.135) it was statistically non-significant, HDL mean± SD (57.73±12.560) P - value (P=0.001) it was statistically significant, LDL mean± SD (91.95±34.430) P - value (P=0.036) it was statistically significant and HbA1c mean± SD (10.70±2.861) P - value (P=0.000) it was statistically significant.

Discussion

Patients with diabetes mellitus have many lipid abnormalities. In the present study the mean ± SD for age of patients with diabetes mellitus was (9.49 ± 3.804) years. Which is lowest than other studies in Rahma et al. (2006) [12] which was (11.8± 3.6) years and in Al-Naama et al. (2002) [13] was (11.9 ± 3.7) years, in Hassan M. Mona et al. (2015) [14] was(12.8 ± 2.6) year.

The seasonal variation at time of diagnoses shows predominant of summer other than the rest of seasons , summer (30, 63.8%), winter (13, 27.7%) , spring(3,6.4%) and autumn (1,2.1%) which disagree with Kalliora et al. (2011) [15]which more in winter while it is variable in Moltchanova et al. (2009)[16]which some center predominant in winter other in summer .

The seasonality pattern appears to be dependent on the geographical position.[16]

In this study, total cholesterol level, HDL and LDL was statistically significant P-value were (P=0.003), (P=0.001), (P=0.036) respectively, significantly higher in diabetic children as compared to the control group.

These are in agreement with Al-Naama et al. (2002) [13] P-value are (P=0.00001), (P=0.02), (P=0.0001) respectively.

Also agree with Hassan M. Mona et al. (2015) [14] P- value (P=0.007), (P=0.023), (P=0.001) respectively.

The present results also agree with Wiltshire et al. (2002) [17] in which P-value (P=0.001), (P=0.009), (P=0.001) respectively.

While with Rahma et al. (2006) [12], total cholesterol and LDL only were

statistically significant p-value (P=0.001), (P=0.001) respectively while HDL was nonsignificant.

Also in Alrabaty et al. (2009) [18] total cholesterol and LDL only were statistically significant P-value (P= 0.01), (P=0.02) respectively while HDL was nonsignificant P-value (P=0.052).

While , triglycerides level found to be non-significant P- value (P=0.135) this is not agree with Al-Naama et al. (2002) [13] P- value (P=0.06) , Rahma et al. (2006) [12] in which P- value (P=0.05), Alrabaty et al.(2009) [18] in which P- value (P=0.00),Hassan M. Mona et al. (2015) [14] in which P- value (P=0.002) and Wiltshire et al. (2002) [17] P–value (P=0.01)

Possible explanation for variation between reports include; duration and severity of diabetes, degree of glycemic control, diet, and different laboratory methods.

Although we did not observe such study corrélations agree with our triglycerides result.

HbA1c level was highly significant in diabetic patient compared with control in which mean ± SD (10.70± 2.861) while P value (P=0.00).

This agree with Rahma et al. (2006) [12] in which mean ± SD (9.8±4.2) while P-value (P=0.001).

Also agree Al-Naama et al. (2002) [13] in which mean ± SD (9.8±4.2) while P-value (P=0.00001).

Also agree with Moayeri et al. (2006) [17] in which mean ± SD (9.3 ± 1.8) P - value (P=0.001).

Also agree with Petitti et al. (2007) [20] and Kim et al.(2014) [21] in which P-value (P=0.001), (P=0.002) respectively.

But it is not agree with Hassan M. Mona et al. (2015) [14] who found that there is no significant difference between both groups regarding mean HbA1c.

This study has several limitations. First, repeated measurements of fasting lipids were not made over time in individual subjects. Second, the number of patients included was small compared with the number of risk factors evaluated; thus, compromising the power of both the univariate and the multivariate analyses.

Conclusion

Diabetic children's with poor metabolic control are at higher risk of developing dyslipidemia.

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اهمية معاملات الدهون وتنظيم السكري للاطفال المصابين بداء السكري في مدينة بعقوبة

الملخص:

الخلفية: ويرتبط داء السكري مع ارتفاع مخاطر الإصابة بأمراض القلب والأوعية الدموية

الموضوعية : ايجاد علاقة بين الدهون و الهيموغلوبين التراكمي (HbA1c) في كل من الاطفال المصابين بداء السكري و الاصحاء .

طريقة العمل :

تم تقييم سبعة وأربعون من المرضى الذين يعانون من داء السكري ، التاريخ و بيانات عن كل مريض التي شملت العمر والجنس و التاريخ العائلي لمرضى السكري، و وجودعضو في الأسرة مصاب بداء السكري و الوقت الذي تم تشخيصها على أنه مصاب بداء السكري . تم اجراء قياس الهيموغلوبين التراكمي (HbA1c) وكذلك تم إجراء قياس الدهون (الكوليسترول والدهون الثلاثية (TG)، (HDL)و(LDL)). وقد تضمن العينة خمسون أطفال أصحاء غير مصابين بداء السكري شملتهم نفس الفحوصات .

النتائج :

من 47 مريض مصاب بداء السكري الذكور (15 ، 31.9 ٪) و الإناث (32 ، 68.1 ٪) . وكان المتوسط ± SD لعمر المرضى الذين يعانون من مرض السكري (9.49 ± 3.804) سنة .

اضطراب شحوم الدم و نسبة الهيموغلوبين التراكمي(HbA1c) كان بشكل ملحوظ أكثر شيوعا بين الأطفال والمراهقين المصابين بداء السكري مقارنة بالمجموعة الغير مصابة .

الكوليسترول و الدهوان الاخرى (HDL) ، (LDL) والهيموغلوبين التراكمي (HbA1c) القيمة الاحصائية كانت (P=0.003) ، (0.001) ، (P= 0.036) و (P= 0.000) على التوالي .

اما الدهون الثلاثية (TG) القيمة الاحصائية كانت (P=0.135) احصائيا غير هامة .

الاستنتاج:

داء السكري في الأطفال الذين يعانون من سوء تنظيم السكري هم أكثر عرضة لتطوير اضطراب شحوم الدم .

الكلمات المفتاحية:

داء السكري ، اضطراب الدهون ،الهيموغلوبين التراكمي(HbA1c) ، والكولسترول.

Table 1: Distribution of gender in diabetic patient

Gender		No.	%
	Male	15	31.9%
	Female	32	68.1%

Table 2 show the seasonal variation of first time diagnosed diabetic patient

Table 2: Seasonal variation of first time diagnosed diabetic patient

Season		No.	%
	Winter	13	27.7%
	Autumn	1	2.1%
	Summer	30	63.8%
	Spring	3	6.4%

Table 3: Relation of lipid profile & HbA1c of diabetic and control

		Mean	Std. Deviation	P value
Cholesterol (mg/dl)	DM	162.95	37.561	0.003*
	Control	123.58	33.535	
Triglycerides (mg/dl)	DM	100.10	64.350	0.135
	Control	67.75	41.679	
HDL (mg/dl)	DM	57.73	12.560	0.001*
	Control	41.57	14.807	
LDL (mg/dl)	DM	91.95	34.430	0.036*
	Control	67.09	26.111	
HbA1c	DM	10.70	2.861	0.000*
	Control	5.65	1.101	

**Significant difference using t-test for two independent means at 0.05 level of significance*