Biomedical Research 2017; 28 (19): 8402-8405 *ISSN 0970-938X*
www.biomedres.info

Dyslipidemia frequency and related factors to blood in children suffering from type 1 diabetes.

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Abstract

Background: Diabetes is linked to an extreme risk of Cardiovascular Disease (CVD). Diabetes is certainly one of the most disorders of public health in Mediterranean area. All diabetic patients are at risk for heart attack, renal and auditory problems and etc. In this study frequency distribution of dyslipidemia and related blood factors were measured in children under 15 y old with type I diabetes in Babol.

Patients and methods: 256 under 15 y old patients with type I diabetes that referred to our hospital were selected. Other information such as duration of disease, age and sex of patients were collected by special check list.

Results: The mean of cholesterol, LDL, TG were higher than Nelson standard and mean of HDL were statistically lower than Nelson standard (P<0.05). Also there is a relation between HbA1c and TG. In addition the prevalence of dyslipidemia by age groups was statistically different (P<0.05), but no statistically relation between sex and dyslipidemia and between duration and dyslipidemia was found. Finally, there was no statistically relation between dyslipidemia and insulin therapy methods. There was no meaning relation between BMI and LDL, TG, cholesterol but there was meaningful relationship between BMI and HDL.

Conclusion: Developing alternative and simple strategies is needed to improve the results. Education programs for diabetic patients and facilities such as complete insurance coverage for providing the best route for insulin therapy and monitoring of the patients are recommended.

Keywords: Diabetes type I, Cholesterol, Triglycerides (TG), Low density lipoprotein (LDL), High density lipoprotein (HDL), HbA1c, Dyslipidemia.

Accepted on Sep 25, 2017

Introduction

It has been estimated that dyslipidemia is mainly responsible for approximately 4.4 million deaths around the world [1,2]. Within recent years, the predicament of diseases from infectious problems has reduced. Similar alterations in lifestyle and dietary plan have introduced an increase in life expectancy and a significantly enhanced burden of cardiovascular system problems along with other chronic diseases [3,4]. Dyslipidemia-unusually high level of lipids in the blood gets started in childhood and adolescence, and then causes early atherosclerosis and premature CVD even in young adults [5-7]. In addition, dyslipidemia is regularly found to be profoundly related to many other cardiovascular system risk factors, including hypertension, obesity, while smoking history, not only in grown people but as well with children and adolescents [8,9].

Adults with diabetes are at high risk for CVD. Since the blend of diabetes and dyslipidemia quickens atherogenesis, forceful lipid administration is recommended for such patients [10]. While the American Diabetes Association has expressed lipid objectives for grown-ups with diabetes [11], no comparable rules exist for kids. Early diagnosis of raising blood cholesterol levels in asymptomatic individuals enables the recognition of an essential modifiable risk factor for Coronary Artery Disease (CAD). Cholesterol level testing during the period of childhood has actually attained increased interest in recent years.

The diagnosis of raising blood cholesterol in times of childhood is of potential significance in defining those children that might be at enhanced risk for developing CAD as adults and who may possibly get profit from more serious dietary interventions. Small number Brazilian reports have evaluated lipid profile and in addition, over-weight as a protective factor in naming the individual risk of increasing CAD in adolescents and children [12-14]. Children detected to have type 1 diabetes have a significant risk of primitive subclinical and clinical cardiovascular disease (CVD) [14].

The aim of this study was Identifying the pattern of dyslipidemia in children and adolescent with type 1 diabetes

mellitus in children under 15 y and to detect its relation to different risk factors.

Patients and Methods

In this case-control study, 256 children under 15 y old (140 girls and 106 boys), by history of type 1 diabetes that were referred to our hospital were selected by simple random sampling, during 2015 September to December 2016. The levels of blood glucose and fats of these children was determined by referring to their profile or the physician examinations and also a set of questions were constructed by talking to the parents and details related to medical history, drug consume and lifestyle points such as physical work out and demographic data were listed. The exclusion criteria were: secondary hyperlipidemia from renal, liver or thyroid disease and coronary artery disease. The frequency of disorder was measured by passing time and the relationship between disorder severity and HbA1C amount also was assessed.

Biochemical analysis

One murder sample (5 ml) was poised into vacutainer tubes and the serum was unconnected from red cells by centrifugation to valuate complete sterol, HDL-cholesterol and triglycerides concentrations. These biochemical parameters were observed by measure enzymatic methods on a spectrophotometer. LDL cholesterol was measured in accordance with Friedwald et al.

Statistical analysis

Statistical analyses were completed by using the SPSS 18 statistical program. All of the continuous variables, except triglycerides, were typically distributed. All lipid quantities were analyzed independently by gender, and re-structured for age and BMI by linear regression analysis. Dissimilarities in mean lipid values between genders were examined using the Student's t-test. Dyslipidemic and normolipidemic patients were compared using Fisher's exact test. The significance level considered as $P<0.05$.

Results

After dividing all patients according to gender, the relative abundances of dyslipidemia were defined. Table 1 shows the prevalence rate of dyslipidemia, On the basis of sexual separation. Also, dyslipidemia data was arranged according to 3 age categories (under 5 y old, 5-10 y old and 10-15 y old) in Table 2. The relationship between HbA1C and dyslipidemia and the disease duration is shown in Table 3. There was only significant relation between HbA1C with TG levels with correlation coefficient rate of -0.187 and p-value of 0.043.

Table 1. *Prevalence rate of dyslipidemia between diabetic type 1 children under 15 y old, based on gender separation.*

Gender	TG	LDL	HDL	TC
Female	40/140	28/140	22/140	82/140
	0.286	0.2	0.157	0.586
Male	20/106	24/106	12/106	48/106
	0.189	0.226	0.1132	0.453
Total	0.2365	0.2125	0.135	0.525

HDL: High Density Lipoprotein; LDL: Low Density Lipoprotein; TC: Total Cholesterol; TG: Triglycerides.

Table 2. *Prevalence rate of dyslipidemia between diabetic type 1 children under 15 y old, based on 3 age categories (under 5 y old, 5-10 y old and 10-15 y old).*

Age	TG	LDL	HDL	Cholesterol
Under 5 y old	0.9	1.9	1.9	6.9
	0	0.111	0.111	0.67
5-10 y old	32.57	14.59	14.59	32.57
	0.56	0.237	0.237	0.56
10-15 y old	2.55	11.55	2.55	27.56
	0.36	0.2	0.36	0.48

Table 3. *Relationship between HbA1C with dyslipidemia and disease duration.*

Variable	Correlation coefficient	P- value
Cholesterol	-0.94	0.543
TG	-0.187	0.045
LDL	-0.087	0.526
HDL	0.078	0.436
Disease duration	0.123	0.346

Discussion

There is no detailed information about prevalence of type 1 diabetes mellitus in Middle East, but according to evidences predicate increasing of diabetes type 1 due to increasing its occurrence and increased longevity of the patients [15,16]. Based upon the World Health Organization, nearly 84% of the adolescents (10 to 19 y old) are in developing countries such as Iran and their percentage in regard to other groups has grown [17]. The National Cholesterol Education Program advised the selective screening of children and adolescents (after 2 y of age) whose mothers and fathers or grandparents had myocardial infarction, angina pectoris, peripheral vascular disease, cardiovascular disease or sudden vascular disease at age 55 or before [18]. Risk of CAD in diabetic individuals is 2-4 times more than normal people [19]. Anderson et al. showed that diabetes is one of the predisposing agents for increasing serum lipids and atherosclerosis, and there are evidences which show atherosclerosis even begins at childhood [20]. Moayyeri et al. [21] resulted that the prevalence and mid-serum lipids in diabetes mellitus type 1 patients which had poor metabolic control were higher than those patients with

good metabolic control, which had conformity with the present study, but there was not significant relation between levels of HbA1C and disease duration. Kabbah et al. [22] resulted that the blood fat levels in children with type 1 diabetes were significantly higher than normal children that was similar to the current study. Verma et al. showed that there is a significant relation between diabetes duration and levels of HbA1C in patients, which had conformity with our study [23].

In this study, there was no significant difference between serum lipid levels and patient's age, but there was a significant relationship between HbA1C and TG levels but its relation with disease duration was not significant. There was no significant relation between disease duration and HbA1C condition, but there was relationship between BMI and HDL levels. There were not significantly differences in dyslipidemia prevalence between two sexes and 3 age categories. The most amount of dyslipidemia was related to hypercholesterolemia. The mean serum lipid concentrations in 3 age categories were compared with the mean standard of nelson and the recommended mean levels of cholesterol, LDL and TG were higher than nelson standard and HDL was lower than standard. A significant percent of diabetes mellitus type 1 patients have metabolism disorders of fat and without appropriate care and continuous screening of blood sugar, these disorders may lead to serious complications such as dyslipidemia and intensify diabetic children problems.

Conclusion

Due to high prevalence of dyslipidemia in type 1 mellitus diabetes patients and its harmful effects in occurrence of atherosclerosis and other diseases, the recognition of elevating blood cholesterol in childhood is important in defining those children that can be at high risk for developing CAD. So, we suggest that dyslipidemia should be monitored from early ages, especially in children suffering from type 1 diabetes mellitus and it should set in retraining programs of physicians. Also parents should be trained to control and care about their children dyslipidemia.

Authors' Contribution

Whole authors were in the same.

Financial Disclosure

There is no conflict of interest.

Funding/Support

This study was financially supported by Student Research Committee, Babol University of Medical Sciences, Babol, IR Iran.

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