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Original Research Article

Determining the Effective Factors on the Control of Type 1 Diabetes in Adolescents Under 18 Years of Age in Tabriz

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ABSTRACT

Many factors affect the control of type 1 diabetes in the age leading to puberty, which have been reported differently based on different ethnicities. The aim of this study was to determine the effective factors on the control of type 1 diabetes in adolescents under 18 years of age in Tabriz. In this descriptive-analytical study conducted in 2019 at Tabriz University of Medical Sciences, 410 adolescents under 18 years of age with type 1 diabetes were evaluated. Findings related to diabetes control based on HbA1c results showed that out of the total patients, 22.9% had poor control, 54.6% had moderate control and 22.4% had good control over diabetes. In terms of drug adherence, according to the Morisky scale, 2.4% had good adherence, 64.2% had moderate adherence and 35.2% had poor adherence to drugs. The correlation between fasting blood sugar and the number of annual visits to the clinic was negative and significant; But there was no statistically significant relationship between diabetes control and age, duration of disease, number of children in the family, number of controls per week and BMI. Increased anxiety, depression and stress in patients with type 1 diabetes lead to poor disease control and increased fatherhood, family support and more visits to the clinic increase disease control. Swat mentions that the degree of drug adherence, patients 'sex and gender, parents' education, duration of illness, family remarriage and BMI have no effect on diabetes control.

Keywords: Diabetics , BMI , Adolescents

Introduction

Diabetes is a complex metabolic disorder characterized by persistent hyperglycemia (higher than normal blood sugar levels) that results from impaired insulin secretion or function, or both, and can lead to morbidity and disability [1-3]. There are two broad categories of diabetes: type 1 diabetes and type 2 diabetes. Type 1 diabetes is inherited and can be dealt with from birth or childhood. Type 2 diabetes, which results from insulin resistance at the level of skeletal muscle, liver, and adipose tissue, is associated with varying degrees of beta cell destruction. The most common type of diabetes in children and adolescents is type 1 diabetes, which, due to its autoimmunity to beta cells, produces insulin and leads to insufficient or near-complete insulin deficiency [4-6]. The average age of onset of diabetes is 7 to 15 years; But it can occur at any age. Due to the fact that type 1 diabetes occurs most often in children, a person from an early age is involved with its acute and chronic complications. This disease is multifactorial and genetic and environmental factors play a role in its occurrence [7-9]. Optimal monitoring of blood glucose includes: Evaluation of short-term control of blood glucose by measuring plasma glucose by the patient and evaluation of long-term control by HbA1c. Due to the importance of the above cases, the present study was conducted to determine the factors affecting the control of type 1 diabetes in adolescents so that by identifying these cases, effective interventions can be performed to better control diabetes and prevent its risk factors [10-12].

Methods

The present descriptive cross-sectional study was performed on adolescents with type 1 diabetes referred to the Children's Hospital (Tabriz-Iran) in 2019. For this study, 410 patients of both sexes (male and female) were selected. These individuals had referred to the endocrine clinic of the relevant hospital at least 4 times and at least one year had passed since the onset of their disease. Prior to participation in the study, participants were informed.

Then the questionnaires were completed by patients with accuracy and sufficient time. In the case of illiterate and illiterate patients, or if there is any ambiguity in the questions, the interviewer completed the questionnaires in accordance with the information received through interviews with adolescents or their parents. In order to monitor the control of diabetes, mean blood sugar and

HbA1c percentage were extracted from patients' files. HbA1c levels between 6 and 7.5 were considered good controls, and HbA1c levels between 7.6 and 9.9 were considered poor controls. The data collection tool consisted of three parts. The first part consisted of a questionnaire that included demographic questions, duration and type of treatment, number of referrals, body mass index (BMI), family support, access to medication, and other required information. In the second part, in order to assess drug adherence, the Scale Morisky Medication Adherence (MMAS8) eight-item drug adherence questionnaire was used.

This questionnaire was designed by Morisky et al. In 2008. Specialists, its reliability was reported to be 0.68 using Cronbach's alpha method, and in the third part, the DASS Depression, Anxiety and Stress Scale Questionnaire was used, and in the studies, the retest validity of this questionnaire for the subscales was 0.81, respectively. For stress, 0.79 was calculated for anxiety, 0.71 for depression, and the validity of anxiety and depression was obtained using correlation coefficients between 0.81 and 0.74. Data were analyzed using SPSS 16 software and descriptive statistics. To compare diabetes control based on the qualitative results of HbA1c percentage, Fisher's exact test and chi-square test were used, and one-way analysis of variance and Kruskal-Wallis test were used to compare quantitative variables. The significance level of the tests was considered less than 0.05.

Results

The mean and standard deviation of age of 410 patients was 11.63 ± 3.33 years. 240 of the patients were girls and the rest were boys. The mean and standard deviation of the disease in individuals was 4.98 ± 1.64 years. All patients received insulin injections and none of them were treated orally. Other basic and demographic characteristics of the subjects are shown in Table 1.

Table 1: Basic information of patients with type 1 diabetes

	Variable levels	Number (%)	Variable	Mean± SD
habitat	City	324 (79.0)	Check times a week	11.21 ± 2.16
	Village	86 (21.0)		
	Total	410 (100.0)		
Accompanying disease	No disease	362 (88.3)	Number of visits to the clinic per year	3.18 ± 0.25

	Hypothyroidism	36 (8.8)		
	Other	12 (2.9)		
	Total	410 (100.0)		
Father's education	Under diploma and diploma	268 (65.4)	BMI	20.41 ± 3.16
	Above diploma to bachelor	108 (26.3)		
	Master and above	34 (8.3)	HbA1c	8.22 ± 1.98
	Total	410 (100.0)		
Mother's education	Under diploma and diploma	326 (79.5)	FPG	158.85 ± 14.51
	Above diploma to bachelor	78 (19.0)		
	Master and above	6 (1.5)	PG	205.96 ± 20.67
	Total	410 (100.0)		

Findings related to diabetes control based on HbA1c results showed that out of the total patients, 22.9% had poor control, 54.6% had moderate control and 22.4% had good control over diabetes. In terms of drug adherence, according to the Morisky scale, 2.4% had good adherence, 64.2% had moderate adherence and 35.2% had poor adherence to drugs (Table 2).

Table 2: Frequency distribution of diabetes control status in adolescents with type 1 diabetes by demographic characteristics and family support status of patients

	Variable	levels of diabetes control N(%)			P Value
		Weak	middle	Good	
Sex	Girl	38 (22.4)	94 (55.3)	38 (22.4)	0.925 *
	Boy	56 (22.3)	130 (54.2)	54 (22.5)	
habitat	City	66 (20.4)	184 (56.8)	74 (22.8)	0.345 *
	Village	28 (32.6)	40 (46.5)	18 (20.9)	
Mother's education	Under diploma and diploma	66 (24.6)	148 (55.2)	54 (20.1)	0.665 *
	Above diploma to bachelor	24 (22.2)	56 (51.9)	28 (25.9)	

	Master and above	4 (11.8)	20 (58.8)	10 (29.4)	
Father's education	Under diploma and diploma	84 (25.8)	170 (52.1)	72 (22.1)	0.549 *
	Above diploma to bachelor	10 (12.8)	52 (66.7)	16 (20.5)	
	Master and above	0 (0.0)	2 (33.3)	4 (66.7)	
Family support	Weak	2 (33.3)	2 (33.3)	2 (33.3)	0.012 **
	middle	42 (36.2)	60 (51.7)	14 (21.1)	
	Good	50 (24.4)	162 (56.2)	76 (17.4)	
*: Chi-square **: Fisher's exact test					

According to the results presented in Table 2, there was a statistically significant relationship between father employment and family support with diabetes control; But patients' gender, place of residence, parents' education and mother's occupation were not significantly associated with diabetes control. The correlation between fasting blood sugar and the number of annual visits to the clinic was negative and significant; But there was no statistically significant relationship between diabetes control and age, duration of disease, number of children in the family, number of controls per week and BMI (Table 3)

Table 3. Variable levels, R and P Value

Variable levels	R *	P Value
Age	-0.089	0.352
Duration of infection	0.001	0.995
Number of children in the family	0.041	0.522
Check frequency per week	-0.148	0.148
Visits to the clinic per year	-0.314	0.003
BMI	-0.080	0.318
*: Correlation: rho spearman		

The results showed that the correlation between fasting blood sugar level and the score of mental health problems (depression, stress and anxiety) was positive and significant. Based on the overall

DASS-42 score, there was a relationship between these problems and diabetes control ($R=0.459$, $P=0.001$)

Discussion

The results of the present study showed that there is a relationship between depression, stress and anxiety with diabetes control, which is consistent with the findings of the study by Mann et al. And Liu et al.; But it contradicts the results of a study by Schmitt et al. The difference between these studies was that the target population in the study of Liu et al. Was patients with type 2 diabetes.

On the other hand, in the study of Schmitt et al., The stress associated with diabetes and depression was also examined, which was associated with poor control of hyperglycemia. The results of the present study showed that the average and good drug adherence rate in patients is about 65%. This rate is reported to be between 40 and 91% based on the results of other studies, which is consistent with the results of the present study; However, in this study, no statistically significant relationship was observed between HbA1c and drug adherence.

In the present study, there was a significant relationship between father's employment status (employed or unemployed) with diabetes control, but there was no significant relationship between parents' education, access to drugs and diabetes control. Illiteracy of working mothers was found to increase the chances of lack of control. A study conducted by Nielsen et al. Found that the economic and social conditions of parents of patients with type 1 diabetes and higher education of mothers of patients The researchers attributed the difference to better monitoring of blood sugar in highly educated mothers. In the present study, the correlation between diabetes control status based on HbA1c and the number of annual visits to the clinic was negative and significant. Consistent with this issue, in the studies conducted in this field, a statistically significant relationship was observed between diabetes control and the number of annual visits to the clinic; In other words, the mean level of HbA1c was significantly lower in patients who referred more. The results of the present study showed that there is a significant relationship between family support and diabetes control. In line with the results of the present study, family studies evaluated family support as effective in better control of diabetes.

In the present study, among other demographic variables (such as gender, age, place of residence, number of children and duration of the disease) No significant relationship was observed, but in other studies, factors such as female gender and younger age were associated with poor glycemic control and increased HbA1c, and in another study, female gender, older age and increased disease duration were associated with poor glycemic control. In addition, another study found that increasing the age of patients, living in rural areas, the duration of the disease period of more than five years and increasing the number of children increase the chances of uncontrolled glycemia. The sample and the statistical population are present in the study, and in this regard, it is suggested that more studies be conducted in this field in the future.

Conclusion

Increased anxiety, depression and stress in patients with type 1 diabetes lead to poor disease control and increased fatherhood, family support and more visits to the clinic increase disease control. Swat mentions that the degree of drug adherence, patients 'sex and gender, parents' education, duration of illness, family remarriage and BMI have no effect on diabetes control.

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