Do we care about eating problems sufficiently in adolescent Type 1 Diabetes?

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Abstract

Background

Eating problems have been shown to be common in adolescents with T1DM. We aimed to examine the association of eating problems with emotional problems, behavioral attitudes towards treatment and diet adherence.

Method:

The study was conducted with 132 participants, of them 72 were with T1DM (T1DM group) and 60 were healthy controls group. Participants were evaluated using a data form and self-report scales which were Children's Depression Scale (CDI), Screen for Child Anxiety Related Disorders (SCARED) and the Eating Attitude Test (EAT).

Results

Rates of having significant scores for CDI, SCARED and EAT in the T1DM group (52.8%, 36.1%, 30.6%, respectively) were higher than control group (21.7%, 8.3%, 3.4,) ($p < 0.01$). Patients with separate parents, lower parental education, irregular outpatient follow-up, hospitalization in the previous 3 months, diabetes complications and history of refusing insulin injections had higher rates of having significant scores for CDI and/or SCARED ($p < 0.05$). Having significant scores for EAT was related to person who makes the insulin injections ($p < 0.05$) and the child's diet adherence ($p < 0.01$). There was a positive correlation between EAT and CDI scores ($r = 0.309$; $p = 0.008$; $p < 0.01$).

Conclusion

Adolescents with T1DM have an increased risk of eating and emotional problems. Increasing age, low parental educational level, not taking the responsibility of insulin treatment, strict adherence to diabetic diet and depressive symptomatology were associated with increased risk for eating problems. Identifying the risky cases for eating problems will improve the clinical outcome.

Level of Evidence:

Level II, Prospective Cross-sectional Clinical Study

Introduction

Type 1 Diabetes Mellitus (T1DM) is characterized by insufficient endogenous insulin production. Today, with its increasing prevalence T1DM is defined as a public health problem in children and adolescence [1]. According to the International Diabetes Federation's (IDF) Diabetes Atlas 9th edition, in the world 1.1 million children and adolescents under the age of 20 have a diagnosis of T1DM [2]. Because it causes serious complications and leads significant reduction the life quality, its effective treatment is essential. Treatment of T1DM includes exogenous insulin usage, physical exercise, and a restrictive diabetic diet [3,4]. Today, despite the advances in Type1DM

treatment, at least two-thirds of adolescents and young adults have insufficient treatment adherence [3]. Besides the biological determinants, psychosocial factors have important roles in adherence to the nutritional regimen during adolescence, and stress and psycho-physiological processes may result in impaired disease control [5].

Studies on adolescents with T1DM demonstrate that, these patients have poorer psychosocial adjustment and higher rates of psychiatric disorders such as depression, anxiety, and eating disorders compared to healthy peers [6,7]. Two mechanisms have been thought to cause these negative psychological and psychiatric outcomes. These are the impaired brain functions caused by the micro and macrovascular complications of the disease, and the increased psychosocial burden of the disease [8]. The disease's psychological burden is associated with its chronic course and its treatment requiring frequent invasive procedures and restrictive diet. A restrictive diet in terms of content and timing is a challenging stressor especially in adolescence which is characterized by increased autonomy, withdrawal from parental authority, weakness in impulse control and increased self-focus in body appearance [9].

Eating disorders (ED) are behavioral conditions characterized by severe and persistent disturbances in eating behaviors and associated distressing thoughts and emotions. The major risk factors associated with ED are; adolescence period, female gender, higher physical activity, low self-esteem, and concerns and even preoccupations about being underweight [10,11]. Limited number of studies have shown that eating-related problems are more common in adolescents with T1DM. The standard treatment regimen for T1DM requires a focus on eating habits, which can result in eating-related preoccupations. It has been reported that these factors combined with the psychological burden of chronic disease management and depression may contribute to ED in adolescents with T1DM [12,13]. Commissariat et al reported that problems in psychosocial adjustment are important causes of eating problems in adolescents with T1DM [14]. However studies on ED frequency specifically in adolescence period is limited in number and existing ones show inconsistent results in terms of the association of ED with emotional problems and treatment attitudes in T1DM.

In this study, we aimed to examine the frequency of emotional and eating problems in adolescents diagnosed with T1DM. We hypothesized that compared to their healthy peers these patients had higher levels of eating problems and depression, anxiety. Our second hypothesis was that eating problems were associated with depression and anxiety.

Method

This cross-sectional descriptive study was conducted in the Pediatric Endocrinology Outpatient Clinic with T1DM diagnosed adolescents. Inclusion criteria were; being at 13–18 years of age, using insulin treatment for at least 6 months, and being volunteered to participate in the study (both participants and their parents). Patients with another chronic disease, genetic/syndromic disease or severe psychiatric disease (such as ASD, MRI, psychotic disorder, bipolar affective disorder, substance use disorder) leading cognitive impairment were not included in the study. Participants were evaluated using a data form and self-report scales which were Children's Depression Scale (CDI), Screen for Child Anxiety Related Disorders (SCARED) and the Eating Attitude Test (EAT).

Data collection tools

1. **1. Data form:** It contains questions related to sociodemographic information including the age, gender, education level of the parents, socioeconomic level of the adolescent, as well as questions about the disease

and its treatment. During the patient's clinical interview informations were recorded on the data form.

2. **2. Children's Depression Inventory (CDI):** It is a self-assessment scale with 27 items developed by Kovacs [15]. Each item is scored between 0–2. Higher scores indicate high levels of depression. Its Turkish validity and reliability study was done by Oy [16]. Scores of at least 19 means significant scores for depression.
3. **3. Screen for Child Anxiety Related Disorders (SCARED) - Child form:** This self-report scale consisting of 41 items was developed by Birmaher to screen childhood anxiety disorders [17]. Its Turkish validity and reliability study was conducted by Cakmakci [18]. The total anxiety score is also obtained from the scale, which has different subscales such as Phobic anxiety, Social anxiety, Separation Anxiety, Pervasive anxiety and school-related anxiety. Higher scores on the scale indicate higher anxiety symptom levels. Scores of at least 25 means significant scores for anxiety.
4. **4. Eating Attitude Test (EAT):** It is a six-point likert-type self-report scale developed to evaluate possible in eating behavior in individuals with and without eating disorders. It was developed by Garner and Garfinkel [19]. It includes 40 items. It is thought to be a good screening tool for eating behavior disorders. The total score is directly related to the level of psychopathology. In other words, EAT can determine individuals who can be considered "patients" at the clinical level, as well as an indicator of how susceptible they are to this disorder. Significant scores for eating disorders is the ones above 30. It has Turkish validity and reliability study [20].

Statistical Analysis

NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) program was used for statistical analysis. Descriptive statistical methods (mean, standard deviation, median, frequency, ratio, minimum, maximum) were used while evaluating the study data. The suitability of quantitative data to normal distribution was tested by Kolmogorov-Smirnov, Shapiro-Wilk test and graphical evaluations. Student T Test was used for two-group comparisons of quantitative data with normal distribution, and Mann Whitney U test was used for two-group comparisons of data that did not show normal distribution. In comparison of qualitative data, Pearson Chi-Square test, Fisher's Exact test, Fisher Freeman Halton Exact test were used. Spearman's Correlation Analysis was used to evaluate the relationships between variables. Significance was assessed at least at $p < 0.05$ level.

Results

1. The study was completed with a total of 132 participants with 13-18 years of age, of them 72 were with T1DM (T1DM-group) and 60 were healthy controls (Control group). In the T1DM-group; the average age was 14.72 years and 61.1% were girls. Groups were similar in terms of age, gender and familial characteristics of the participants. The demographic characteristics of the groups about themselves and their families are presented in Table 1.

Findings related to clinical characteristics of the participants in T1DM group showed that; 36.1% ($n = 26$) had irregular outpatient clinic follow-up, 16.7% ($n = 12$) had no diet adherence at all and 30.5% refused insulin injections at least rarely. In 27.8% ($n = 20$) of participants insulin injections were being done by only parents. The distribution of characteristics of the participants in the DM-group regarding the disease and its treatment is presented in Table 2.

The groups were compared according to scores of the scales (Table 3). In T1DM group scores of all scales (except for SCARED-PA and SCARED-SA) and rates of getting significant scores from all scales were

significantly higher compared to the control group ($p < 0.05$).

In the DM-group; examination of the relationship between sociodemographic data and the getting significant scores from scales showed that there were statistically significant relation between SCARED and family type ($p = 0.003$); between CDI and family type ($p = 0.001$) and paternal education ($p = 0.036$); between EAT and the age ($p = 0.037$), maternal education ($p = 0.011$) and paternal education ($p = 0.025$) (Table 4). In DM-group participants ratios of getting significant scores from SCARED and CDI were higher in patients who rejected insulin injections, who had irregular outpatient follow-ups, and who were hospitalized for diabetes in the previous 3 months ($p < 0.05$). In addition, the ratio of getting a significant scores from CDI was higher in those with diabetes complications compared to others ($p = 0.023$; $p < 0.05$) (Table 5 & Table 6).

In DM-group, getting significant scores from EAT was related to person who makes the insulin injections ($p = 0.017$; $p < 0.05$) and the child's diet adherence ($p = 0.001$; $p < 0.01$). Ratio of getting significant scores from EAT was lower among the participants who make their own insulin injections and higher among those who always adhere to diabetic diet (Table 5).

In the DM-group, EAT scores showed a weak statistically significant positive correlation with CDI scores ($r = 0.309$; $p = 0.008$; $p < 0.01$), but not with SCARED scores ($p > 0.05$) (Table 6).

Discussion

In this clinical study we examined emotional and eating problems in adolescents with T1DM diagnosis and found that compared to their healthy peers these adolescents had more emotional and eating problems. Refusing insulin injections and having irregular outpatient follow-up, recent hospitalization and diabetes complications, which indicated lower disease management, were associated with increased emotional problems. Besides, increasing age, low parental educational level, not to take the responsibility of insulin treatment, strict adherence to diabetic diet and depressive symptomatology were associated with increased risk for eating problems in these adolescent patients.

In literature we see that many studies examining the emotional problems in patients with T1DM have samples including both children and adolescent. Khandelwal S et al, in their case-control study, showed that the prevalence of psychosocial problems in children and adolescents (6-14 years) with T1DM was 55.95%, and this rate was almost three times higher than their healthy peers [5]. The authors reports that among patients 36.9% had depression; 32.1% had anxiety. Another cross-sectional study involving adolescents and young adults (11-25 years) similarly showed higher rates of depression (11.3%) and anxiety (21.3%) compared to healthy controls [21]. In a recent review, 14 studies on children and adolescents were examined and confirmed that T1DM is associated with high depression and anxiety symptoms [22]. It is estimated that T1DM in adolescents is associated with twice risk for depression [7]. Similar to these studies, we showed higher anxiety (52.8%) and depression (36.1%) ratios in T1DM adolescents compared to healthy controls (21.7%, 8.3%, respectively). These ratios are even higher than the ones reported in previous studies. We think that the most important reason for these higher rates are due to the fact that our study included only adolescents, not the young children. Adolescence is the last period of childhood; in which the child had weaker impulse control, more oppositional behavior and refuses the external parental control. Therefore, diabetes management becomes more difficult and deterioration in treatment adherence is more evident in adolescence period. As a matter of fact, we found that significant portion of the patients participating in

our study had no regular clinic follow-ups and in a significant portion diet adherence poor, which indicates their poor disease management.

Disease management is important for the prognosis of the disease. Any difficulty in adaptation to disease and its treatment lead deterioration in this process. In T1DM, disease management itself is reported to cause additional problems in the form of emotional and psychological difficulties [3]. Managing T1DM in the presence of anxiety is challenging. In our study, we found that emotional problems were more common in adolescents with T1DM. Moreover, those who refused insulin injections, had irregular follow-ups, diabetes complications, and recently hospitalized had higher emotional problems. In other words, we showed that those with poor diabetes management had more risk for emotional problems. This finding, which shows the relationship between emotional problems and poor disease management, supports the literature knowledge. Another important finding about the emotional state of these adolescents was that those with separate parents and low parental education had more emotional problems. It is well known that childhood adversities are the important risk factors for psychopathology. Our findings related to family characteristics drew attention to the importance of evaluation of the adolescents with his families, not alone, in their clinical follow-ups. If negative familial factors are identified, early interventions will be valuable for the psychosocial and so for the physical health of the adolescent.

Eating problems have been shown to be increased in T1DM patients [12,13]. Bernstein et al. reported that among T1DM patients 20.7% had irregular eating attitudes [21]. Scheuing et al. Demonstrated that among 52,215 diabetic patients 467 had clinical ED diagnosis [23]. In our study the eating problem was significantly higher in adolescents diagnosed with T1DM compared to their healthy peers. Almost one third of the cases had eating problems. Our finding related to the association of eating problems with some sociodemographic factors was striking. Eating problems were similar in ratio in each genders, but were increasing in frequency with age, and were associated with low parental education level. In general ED is more common in girls, especially between the ages of 13 and 14 for girls and over 16 for boys [13,24]. In T1DM, female gender and increasing age have been reported to be associated with increased risk for irregular eating behavior [25]. In the presence of T1DM there is an excessive family focus on food and weight [12]. This excessive mental focus on food and feeding and weight is among the major risk factors of eating disorders. Our finding related to parental education level is contrary to the literature. In general population EA is more common in patients with higher educational levels. In particular, poorer communication with parents and poor trust relationships were reported among girls with T1DM than those with eating disorders [10]. We thought that the relationship between low parental education and eating problem may be due to an indirect link; low parental educational level may cause negative consequences such as problems in parent-adolescent communication, conflict, and low parental involvement in the care of adolescents, which further lead eating problems in our participants.

The last important finding of this study showed that adolescents with T1DM had higher risk for eating problems compared to their healthy peers. Besides, depressive mood, strict adherence to diet and not taking the primary responsibility for insulin injections were the associated factors for this increased risk. We think that there may be various reasons why T1DM carries an extra risk in terms of eating disorders in adolescence. T1DM management requires focusing on timing and content of meals, and calori monitoring. Inappropriate approaches in this management, by health services or parents, may predispose to malfunctioning eating patterns in the patient. Beacuse in the etiopathogenesis of ED there is over focusing to body image and appearance and preoccupations with content and calori of meals are the main symptoms. It has been shown that higher levels of health and food-related anxiety may lead to ED. Similarly psychiatric disorders such as depression and anxiety are shown risk

factors for ED in T1DM diagnosed adolescents [13,24]. In particular, early recognition and treatment of emotional problems and will enable the early handling of eating disorder which makes diabetes management more difficult. The fact that eating problems are higher in those with strict diet compliance draws attention to the presence of food and diet-related concerns that these patients and their parents frequently experience.

Conclusion

Treatment in type 1 DM requires adherence to medication and diet. However, the chronic course of T1DM, including a restricted diet and frequent interventional procedures, may cause difficulties for the patient in psychosocial context. This study demonstrated that T1DM adolescents are at high risk for eating disorders and also for emotional problems. Further analysis showed that increasing age, low parental educational level, not taking the responsibility of insulin treatment, strict adherence to diabetic diet and depressive symptomatology were the associated risks for ED in T1DM. Eating disorders should given extra attention for T1DM because its treatment is diet dependent and any difficulty in the diet will worsen the patients clinic. So awareness of these factors in clinical settings is important. In the clinical follow-up of adolescents with T1DM, it is important to assess their emotional state, eating habits and attitudes apart from physical well being and laboratory findings. Besides the pediatric professionals, primary healthcare providers have the potential to provide close monitoring and support adolescents with diabetes. Early screening for psychiatric comorbidity in chronic diseases and regular follow-up from diagnosis are necessary for the clinical outcome of the disease. In T1DM adolescents, it is important to direct the cases at risk in terms of emotional and eating problems to mental health specialists as soon as possible.

What is already known on this subject?

Eating disorders are behavioral conditions characterized by persistent disturbances in eating behaviors and associated distressing thoughts and emotion. Studies about ED frequency specifically in adolescence period is limited in number and existing ones show inconsistent results in terms of the association of ED with emotional problems and treatment attitudes in T1DM.

What does the study add?

This study demonstrated that T1DM adolescents are at high risk for eating disorders and also for emotional problems. In the follow-up of T1DM adolescents, it is important to evaluate them in terms of emotional and eating problems as well as laboratory findings, and refer the cases at risk to mental health specialists as soon as possible.

Declarations

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request

Ethics Statement: The questionnaire and methodology for this study the approval number 2020-22-32 was obtained from the ethics committee of University of Health Sciences, Bakırköy Dr. Sadi Konuk Training and Research Hospital. Written and verbal consent of all participants and their parents was obtained. The authors assert that all procedures contributing to this work comply with the ethical standards in Bakırköy Dr. Sadi Konuk Training and Research Hospital and the Helsinki Declaration of 1975, as revised in 2008.

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Author Contributions:

Study concept and design: Ozlem Polat, Semra Yilmaz, Esra Papatya Cakır

Acquisition of subjects and/or data: Ozlem Polat, Semra Yilmaz, Esra Papatya Cakır

Analysis and interpretation of data: Ozlem Polat, Semra Yilmaz

Preparation of manuscript: Ozlem Polat, Semra Yilmaz, Esra Papatya Cakır

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References

1. Atkinson MA, Eisenbarth GS, Michels AW (2014). Type 1 diabetes. *Lancet*. 2014;383(9911):69-82. doi:10.1016/S0140-6736(13)60591-7
2. IDF Diabetes Atlas 9th edition Available at: <https://diabetesatlas.org/en/sections/worldwide-toll-of-diabetes.html> Accessed on:01.02.2020
3. McGrady ME, Peugh JL, Hood KK (2014). Illness representation predict adherence in adolescents and young adults with type 1 diabetes, *Psychology&Health*, 29:9, 985-998, DOI: 10.1080/08870446.2014.899361
4. Commissariat PV, Laffel LM, Gonzalez JS (2020). Identity and treatment adherence in predominantly ethnic minority teens and young adults with type 1 diabetes. *Pediatr Diabetes*. 21(1):53-60. doi: 10.1111/pedi.12932.
5. Khandelwal S, Sengar GS, Sharma M, et al (2016). Psychosocial Illness in Children with Type 1 Diabetes Mellitus: Prevalence, Pattern and Risk Factors. *J Clin Diagn Res*. 10(9):SC05-SC08. doi: 10.7860/JCDR/2016/21666.8549
6. Goad K (2015) Examining the Mental Health Issues Prevalent in Adolescent Type-1 Diabetics: An Evidence-Based Review to Improve Health. *J Diabetes Metab* 6: 599. doi:10.4172/2155-6156.1000599
7. McGrady ME, Hood KK (2010). Depressive symptoms in adolescents with type 1 diabetes: associations with longitudinal outcomes. *Diabetes Res Clin Pract*. 88(3):e35-7. doi: 10.1016/j.diabres.2010.03.025.
8. Fritsch SL, Overton MW, Robbins DR (2010). The interface of child mental health and juvenile diabetes mellitus. *Child Adolesc Psychiatr Clin N Am*. 19:335-352

9. Almeida MC, Claudino DA, Grigolon RB, et al (2018). Psychiatric disorders in adolescents with type 1 diabetes: a case-control study. *Braz J Psychiatry*;40(3):284-289. doi: 10.1590/1516-4446-2017-2259.
10. Maharaj SI, Rodin GM, Olmsted MP, et al (1998). Eating disturbances, diabetes and the family: an empirical study. *J Psychosom Res*; 44: 479-490 [PMID: 9587890]
11. Colton PA, Olmsted MP, Daneman D, et al (2013). Depression, disturbed eating behavior, and metabolic control in teenage girls with type 1 diabetes. *Pediatr Diabetes*;14(5):372-6. doi: 10.1111/pedi.12016. Epub 2013 Feb 19. PMID: 23418901
12. Pinhas-Hamiel O, Hamiel U, Levy-Shraga Y (2015). Eating disorders in adolescents with type 1 diabetes: Challenges in diagnosis and treatment. *World J Diabetes* ;6(3):517-526. doi:10.4239/wjd.v6.i3.517
13. Toni G, Berioli MG, Cerquiglini L, et al (2017). Eating Disorders and Disordered Eating Symptoms in Adolescents with Type 1 Diabetes. *Nutrients*;19 ;9(8):906. doi: 10.3390/nu9080906.
14. Commissariat PV, Laffel LM, Gonzalez JS (2020). Identity and treatment adherence in predominantly ethnic minority teens and young adults with type 1 diabetes. *Pediatr Diabetes* ;21(1):53-60. doi: 10.1111/pedi.12932.
15. Kovacs M. (1981). Rating scales to assess depression in school-aged children. *Acta Paedopsychiatr* ;46(5-6):305-15.
16. Oy B (1990). Çocukluk depresyonu; Tarihçe, sınıflandırma ve tanı ölçütleri. *Türk Psikiyatri Dergisi*; 1: 21-24.
17. Birmaher B, Brent DA, Chiappetta L, et al (1999). Psychometric properties of the Screen for Child Anxiety Related Emotional Disorders (SCARED): a replication study. *J Am Acad Child Adolesc Psychiatry* ;38(10):1230-6. doi: 10.1097/00004583-199910000-00011.
18. Cakmakci FK (2004). Çocuklarda anksiyete bozukluklarını tarama ölçeği geçerlik ve güvenirlik çalışması. *Çocuk ve Gençlik Ruh Sağlığı Dergisi*, 11(2).
19. Garner DM, Garfinkel PE (1979). The Eating Attitudes Test: an index of the symptoms of anorexia nervosa. *Psychol Med* 9:273–79.
20. Savasir I, Erol N (1989) Yeme tutum testi: anoreksiyanervoza belirtileri indeksi. *Türk Psikoloji Dergisi* 7:19–25.
21. Bernstein CM, Stockwell MS, Gallagher MP, et al (2013). Mental health issues in adolescents and young adults with type 1 diabetes: prevalence and impact on glycemic control. *Clin Pediatr (Phila)* ;52(1):10-5. doi: 10.1177/0009922812459950.
22. Buchberger B, Huppertz H, Krabbe L, et al (2016). Symptoms of depression and anxiety in youth with type 1 diabetes: A systematic review and meta-analysis. *Psychoneuroendocrinology*;70:70-84. doi: 10.1016/j.psyneuen.2016.04.019.
23. Scheuing N, Bartus B, Berger G, et al (2014). DPV Initiative; German BMBF Competence Network Diabetes Mellitus. Clinical characteristics and outcome of 467 patients with a clinically recognized eating disorder identified among 52,215 patients with type 1 diabetes: a multicenter German/Austrian study. *Diabetes Care* ;37(6):1581-9. doi: 10.2337/dc13-2156.
24. Calcaterra V, Mazzone C, Ballardini D, et al (2020). Disturbed Eating Behaviors in Youth with Type 1 Diabetes: An Exploratory Study about Challenges in Diagnosis. *Diagnostics (Basel)*.3;10(12):1044. doi:10.3390/diagnostics10121044.
25. Tokatly Latzer I, Rachmiel M, Zuckerman Levin N, et al (2018). Increased prevalence of disordered eating in the dual diagnosis of type 1 diabetes mellitus and celiac disease. *Pediatr Diabetes* ;19(4):749-755. doi: 10.1111/pedi.12653.

Tables

Table 1: Evaluation of Demographic Characteristics According to Groups

		T1DM-group (n=72)	Control group (n=60)	<i>p</i>
		n (%)	n (%)	
Age (year)	<i>Min-Max (Median)</i>	13-17 (14,5)	13-18 (14)	^a 0,808
	<i>Mean±SD</i>	14,72±1,25	14,78±1,57	
Gender	Girl	44 (61,1)	30 (50,0)	^b 0,200
	Boy	28 (38,9)	30 (50,0)	
Family Type	Nuclear	62 (86,1)	44 (73,3)	^b 0,102
	Extended	4 (5,6)	10 (16,7)	
	Parental seperation	6 (8,3)	6 (10,0)	
Monthly family income	At minimum wage	16 (22,2)	16 (26,7)	^b 0,876
	Minimum wage - 4000TL	26 (36,1)	21 (35,0)	
	4000 TL - 5000 TL	18 (25,0)	12 (20,0)	
	≥ 5000 TL	12 (16,7)	11 (18,3)	
Maternal educational level	At or below primary school	36 (50,0)	25 (41,7)	^b 0,369
	Secondary education	32 (44,4)	28 (46,7)	
	University	4 (5,6)	7 (11,7)	
Paternal educational level	At or below primary school	38 (52,8)	29 (48,3)	^b 0,867
	Secondary education	28 (38,9)	26 (43,3)	
	University	6 (8,3)	5 (8,3)	

^aStudent t Test

^bPearson Ki-Square Test

Table 2: Distribution of disease characteristics in the DM-group

Disease Characteristics (<i>n</i>=72)		n (%)
Complications	Absent	64 (88,9)
	Present	8 (11,1)
Hospitalization due to diabetes in the previous 3 months	Absent	60 (83,3)
	Present	12 (16,7)
Regular follow-up	Absent	26 (36,1)
	Present	46 (63,9)
Person who makes he insulin injections	Patient himself/herself	44 (61,1)
	Parents	20 (27,8)
	Mixed	8 (11,1)
Child's diet adherence (depending on parental report)	Never	12 (16,7)
	Sometimes	34 (47,2)
	Generally	18 (25,0)
	Always	8 (11,1)
Adolescents' rejection of the insulin injections (depending on parental report)	Never happens	50 (69,4)
	Rarely	8 (11,1)
	Sometimes	14 (19,4)

Table 3: Evaluation of Scale Scores in Groups

		T1DM-group (n=72)	Control group (n=60)	p
		n (%)	n (%)	
SCARED				
SCARED-Phobic Anxiety	Min-Max(Median)	1-23 (5)	0-20 (4)	^c 0,087
	Mean±SD	6,53±5,47	4,88±4,08	
SCARED-General Anxiety	Min-Max(Median)	0-20 (10)	0-16 (4)	^c 0,001**
	Mean±SD	9,53±5,93	5,05±3,78	
SCARED-Seperation Anxiety	Min-Max(Median)	0-14 (3)	0-11 (3)	^c 0,263
	Mean±SD	4,44±3,70	3,38±2,38	
SCARED-Social Anxiety	Min-Max(Median)	0-17 (7)	0-10 (4)	^c 0,001**
	Mean±SD	7,03±3,70	4,53±2,65	
SCARED-School Phobia	Min-Max(Median)	0-6 (1)	0-12 (1)	^c 0,009**
	Mean±SD	1,78±1,73	1,18±1,85	
SCARED-Total	Min-Max(Median)	4-66 (28)	1-50 (18,5)	^c 0,001**
	Mean±SD	29,19±15,50	19,10±10,31	
Significant score for SCARED	Present	38 (52,8)	13 (21,7)	^b 0,001**
	Absent	34 (47,2)	47 (78,3)	
CDI				
CDI	Min-Max(Median)	3-41 (14)	1-28 (7)	^c 0,001**
	Mean±SD	15,53±8,84	8,85±6,13	
Significant score for CDI	Present	26 (36,1)	5 (8,3)	^b 0,001**
	Absent	46 (63,9)	55 (91,7)	
EAT				
EAT score	Min-Max(Median)	8-72 (24,5)	3-58 (11)	^c 0,001**
	Mean±SD	25,89±12,18	13,23±8,80	
Significant score for EAT	Present	22 (30,6)	2 (3,4)	^b 0,001**
	Absent	50 (69,4)	57 (96,6)	

^aStudent t Test

^bPearson Ki-Square Test

^cMann Whitney U Test

****p<0,01**

Table 4: In DM-Group: Examination of the relationship between demographic characteristics and the status of having significant scores of CATS, CDI and EAT

		T1DM- group (n=72)					
		Significant score for SCARED		Significant score for CDI		Significant score for EAT	
		Present	Absent	Present	Absent	Present	Absent
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Age (year)	Mean±SD	14,89±1,31	14,53±1,16	15,00±1,13	14,57±1,29	15,18±1,14	14,52±1,25
	P	^a 0,217		^a 0,157		^a 0,037*	
Gender	Girl	26 (59,1)	18 (40,9)	18 (40,9)	26 (59,1)	14 (31,8)	30 (68,2)
	Boy	12 (42,9)	16 (57,1)	8 (28,6)	20 (71,4)	8 (28,6)	20 (71,4)
	P	^b 0,228		^b 0,288		^b 0,774	
Family type	Nuclear	32 (51,6)	30 (48,4)	20 (32,3)	42 (67,7)	22 (35,5)	40 (64,5)
	Extended	0 (0)	4 (100)	0 (0)	4 (100)	0 (0)	4 (100)
	Parental seperation	6 (100)	0 (0)	6 (100)	0 (0)	0 (0)	6 (100)
	P	^d 0,003**		^d 0,001**		^d 0,087	
Family income	At minimum wage	6 (37,5)	10 (62,5)	2 (12,5)	14 (87,5)	6 (37,5)	10 (62,5)
	Minimum wage - 4000TL	16 (61,5)	10 (38,5)	10 (38,5)	16 (61,5)	4 (15,4)	22 (84,6)
	4000 TL - 5000 TL	10 (55,6)	8 (44,4)	8 (44,4)	10 (55,6)	6 (33,3)	12 (66,7)
	≥ 5000 TL	6 (50,0)	6 (50,0)	6 (50,0)	6 (50,0)	6 (50,0)	6 (50,0)
	P	^b 0,495		^b 0,140		^d 0,128	
Maternal education	At or below primary education	18 (50)	18 (50,0)	12 (33,3)	24 (66,7)	16 (44,4)	20 (55,6)
	At or above secondary education	20 (55,6)	16 (44,4)	14 (38,9)	22 (61,1)	6 (16,7)	30 (83,3)
	P	^b 0,637		^b 0,624		^b 0,011*	
Maternal education	At or below primary education	22 (57,9)	16 (42,1)	18 (47,4)	20 (52,6)	16 (42,1)	22 (57,9)
	At or	16 (47,1)	18 (52,9)	8 (23,5)	26 (76,5)	6 (17,6)	28 (82,4)

	above secondary education			
	<i>p</i>	^b 0,358	^b 0,036*	^b 0,025*

^a*Student t Test* ^b*Pearson Ki-Square Test* ^d*Fisher Freeman Halton Exact Test*

p*<0,05 *p*<0,01

Table 5: In the Patient Group;Examination of the relationship between Disease Characteristics and the status of having significant scores of CATS, CDI and EAT

		DM- grubu (n=72)					
		Significant score for SCARED		Significant score for CDI		Significant score for EAT	
		Present	Absent	Present	Present	Absent	Present
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Person who makes he insulin injections	Patient himself/herself	22 (50,0)	22 (50,0)	16 (36,4)	28 (63,6)	8 (18,2)	36 (81,8)
	Parents	12 (60,0)	8 (40,0)	4 (20,0)	16 (80,0)	10 (50,0)	10 (50,0)
	Mixed	4 (50,0)	4 (50,0)	6 (75,0)	2 (25,0)	4 (50,0)	4 (50,0)
		<i>^d0,781</i>		<i>^b0,024*</i>		<i>^b0,017*</i>	
Child's diet adherence (depending on parental report)	Never	8 (66,7)	4 (33,3)	8 (66,7)	4 (33,3)	2 (16,7)	10 (83,3)
	Sometimes	16 (47,1)	18 (52,9)	10 (29,4)	24 (70,6)	6 (17,6)	28 (82,4)
	Generally	12 (66,7)	6 (33,3)	6 (33,3)	12 (66,7)	6 (33,3)	12 (66,7)
	Always	2 (25,0)	6 (75,0)	2 (25,0)	6 (75,0)	8 (100)	0 (0)
	<i>p</i>	<i>^d0,162</i>		<i>^d0,134</i>		<i>^d0,001**</i>	
Adolescents' rejection of the insulin injections (depending on parental report)	Never happens	18 (36,0)	32 (64,0)	12 (24,0)	38 (76,0)	18 (36,0)	32 (64,0)
	Rarely	8 (100)	0 (0)	6 (75,0)	2 (25,0)	0 (0)	8 (100)
	Sometimes	12 (85,7)	2 (14,3)	8 (57,1)	6 (42,9)	4 (28,6)	10 (71,4)
	<i>p</i>	<i>^b0,001**</i>		<i>^d0,004**</i>		<i>^d0,113</i>	
Regular follow-up	Absent	18 (69,2)	8 (30,8)	16 (61,5)	10 (38,5)	6 (23,1)	20 (76,9)
	Present	20 (43,5)	26 (56,5)	10 (21,7)	36 (78,3)	16 (34,8)	30 (65,2)
	<i>p</i>	<i>^b0,036*</i>		<i>^b0,001**</i>		<i>^b0,300</i>	
Copications	Absent	32 (50,0)	32 (50,0)	20 (31,3)	44 (68,8)	18 (28,1)	46 (71,9)
	Present	6 (75,0)	2 (25,0)	6 (75,0)	2 (25,0)	4 (50,0)	4 (50,0)
	<i>p</i>	<i>^e0,267</i>		<i>^e0,023*</i>		<i>^e0,237</i>	
Hospitalization due to	Absent	28	32	14	46	20	40

diabetes in the previous 3 months		(46,7)	(53,3)	(23,3)	(76,7)	(33,3)	(66,7)
	Present	10 (83,3)	2 (16,7)	12 (100)	0 (0)	2 (16,7)	10 (83,3)
	<i>p</i>	^b 0,020*		^e 0,001**		^e 0,322	

^aStudent *t* Test

^bPearson Ki-Square Test

^dFisher Freeman Halton Exact Test

^eFisher's Exact Test

**p*<0,05

***p*<0,01

Table 6: Examination of the relationship between EAT and SCARED-total and CDI scores

		T1DM-group (n=72)	Control group (n=60)
EAT- SCARED-total scores	<i>r</i>	0,169	0,175
	<i>p</i>	0,155	0,181
EAT- CDI scores	<i>r</i>	0,309	-0,038
	<i>p</i>	0,008**	0,774

r: Spearman's Korelation coefficient

***p*<0,01

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