KARYA JOURNAL OF HEALTH SCIENCE

EATING DISORDERS, SELF-MANAGEMENT, AND ANXIETY DISORDERS IN DIABETICS DURING THE COVID-19 PANDEMIC: A CROSS-SECTIONAL STUDY

PANDEMİ DÖNEMİNDE DİYABETLİLERDE GÖRÜLEN YEME BOZUKLUKLARI, ÖZ-ETKİLİLİK, ANKSİYETE BOZUKLUKLARI: KESİTSEL BİR ÇALIŞMA

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ABSTRACT

Objective: This study aimed to determine the frequency of eating disorders and symptoms, anxiety and self-care management status, and factors that have an impact on eating disorders in diabetics during the COVID-19 pandemic.

Method: This cross-sectional web-based study used a survey comprising a socio-demographic information form, the Bulimic Investigation Test of Edinburgh (BITE), Perceived Diabetes Self-Management Scale (PDSMS), and Generalized Anxiety Disorder Scale (GAD-7). Independent samples t Test, Mann Whitney U Test, Chi Square Test, Pearson correlation analysis, and Simple Regression Analysis were applied to the variables.

Results: Totally, 110 (52 Type 1, 58 Type 2) diabetics aged 18-65 participated in the study. BITE total score was determined as 20.92±7.99 (Min:8; Max:32). Eating disorder frequency was 29.1% while anxiety disorders frequency was 30.9%. Perceived Diabetes Self-Management Scale point is 24.80±3.85 (Min:8; Max:40). Married individuals and diabetics with anxiety disorder mostly had eating disorders (p<.005). There was no significant relationship between anxiety disorder, eating disorder and PDSMS scores of the participants and socio-demographics (p>.05). Anxiety was a significant predictor of eating disorders in diabetics (R=.45; R^2 =.20; F (1.108)=28.61, p<.001).

Conclusion: Eating disorder symptoms and severity of diabetics, and their coping styles with anxiety should be determined during the pandemic by diabetes care and specialist. Family eating habits and the presence of anxiety disorders should be taken into account to reduce eating disorders. People with diabetes can be emotionally and self-management empowered through online training and counseling.

Key Words: Eating disorders, Anxiety Disorders, Self-Management, COVID 19, Diabetic

ÖZ

Amaç: Bu çalışmada, COVID-19 pandemi döneminde diyabetiklerde yeme bozukluklarının ve semptomlarının görülme sıklığı, anksiyete ve öz-etkililik durumunu ve yeme bozukluklarına etkisi olan faktörlerin belirlenmesi amaçlandı.

Yöntem: Bu kesitsel web tabanlı çalışmada, Sosyo-Demografik Bilgi Formu, Edinburgh Bulimiya Araştırma Testi (BITE), Diyabette Öz-Yönetim Algısı Skalası (DÖYAS) ve Yaygın Anksiyete Bozukluğu (YAB-7) testi kullanıldı. Değişkenlere Bağımsız Örneklemler T Testi, Mann Whitney U Testi ve Ki Kare Testi, Pearson Korelasyon Analizi ve Basit Regresyon Analizi uygulandı.

Bulgular: Çalışmaya 18-65 yaşlarında toplam 110 (52 Tip 1, 58 Tip 2) diyabet hastası katıldı. BITE toplam puanı 20.92±7.99 (Min:8; Max:32) olarak belirlendi. Yeme bozukluğunun sıklığı %29,1, anksiyete bozukluklarının sıklığı %30,9'du. Diyabette Öz-Yönetim Algısı Skalası (DÖYAS) puanı 24.80±3.85'tir (Min:8; Max:40). Evli bireylerde ve anksiyete bozukluğu olan diyabet hastalarında yeme bozukluğunun daha fazla görüldüğü saptandı (p<.005). Katılımcıların anksiyete bozukluğu, yeme bozukluğu ve DÖYAS puanları ile sosyodemografik özellikleri arasında anlamlı bir ilişki bulunmadı (p>.05). Anksiyete, diyabetiklerde yeme bozukluklarının önemli bir yordayıcısıdır (R=.45; R^2 =.20; F(1.108)=28.61, p< .001).

Sonuç: Pandemi döneminde diyabet hastalarının yeme bozukluğu belirtileri ve şiddeti, anksiyete ile başa çıkma yöntemleri diyabet bakımı ile çalışan uzmanlar tarafından belirlenmelidir. Yeme bozukluklarını azaltmak için ailede yeme alışkanlıkları ve anksiyete bozukluklarının varlığı dikkate alınmalıdır. Diyabetli kişiler, çevrimiçi eğitim ve danışmanlık yoluyla duygusal ve öz yönetim açısından güçlendirilebilir.

Anahtar Kelimeler: Yeme Bozuklukları, Anksiyete Bozuklukları, Öz Yönetim, COVID 19, Diyabet

INTRODUCTION

Diabetes is associated with an increased risk of eating problems. Globally, disordered eating affects 25% and 20% of people with Type 2 and Type 1 diabetes, respectively [1]. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5) lists anorexia nervosa, bulimia nervosa, binge eating disorder, other specified feeding and eating disorders, and unspecified feeding [2]. The term 'eating problems' encompasses both 'sub-clinical' disordered eating behaviors and full-syndrome eating disorders. Among people with diabetes, the most common disordered eating behaviors are binge eating and insulin restriction/omission, although their prevalence is not well established, whereas full syndrome eating disorders are rare [1].

The COVID-19 pandemic has led to various restrictions on daily life, including social distancing, isolation, and home quarantines. Although these measures are necessary to reduce the spread of COVID-19, they may be affecting health behaviors and lifestyles at home [3]. For people with diabetes, one of the main means of controlling the condition during the pandemic is dietary regulation [4]. Thus, disruptions in food transportation during emergency situations can threaten diabetes management [5]. Among the recommendations offered by the International Diabetes Federation to individuals with diabetes during pandemics is that "You should make sure you have enough food" [6].

The quarantines and social isolation experienced during the pandemic can change the routines of diabetics in their lives [7]. Fears of infection and the deaths of family members have caused great uncertainty while isolation has increased sadness, anxiety, loneliness, and anger [8]. Thus, people with diabetes may have experienced an increase in eating disorders and self-care problems during this pandemic.

Dietary management is a key means of controlling diabetes. It requires various eating behavior changes regarding food selection, food preparation, meal planning, eating out, portion control, and finding appropriate solutions to eating problems [9]. These rules also reflect food availability, food selection, and intake, current eating habits, as well as learning mechanisms and individual beliefs and expectations, i.e., cognitive influences and meanings [9,10]. Moreover, during crises, diets become worse and diabetes management becomes more difficult [11]. As a result, people with diabetes show low compliance regarding diet as a way to manage their condition [9]. Strict adherence to diets can induce eating disorders, especially binge eating disorder. Given that diabetes generally develops before eating disorders in most patients, it may be a risk factor for developing eating disorders since diabetes requires strict dietary control. Early intervention, particularly increasing self-efficacy, can prevent these eating disorders [12]. Self-efficacy is related to an individual's belief in their abilities to change risky practices associated with eating behavior [13]. To reduce the risk of developing complications in diabetes management, it is necessary to support positive health-related behaviors, give up negative behaviors, and strengthen self-efficacy [14]. During the COVID-19 pandemic, people with diabetes have been exposed to different situations and living conditions depending on conditions in their country. Quarantines and stressful life events, psychosocial stress and uncertainty about future epidemics, and reduced access to usual treatment options may have increased eating disorder symptoms in people with diabetes [15]. However, the adverse impacts of COVID-19 on eating disorders and anxiety of the diabetic population remain unknown. Therefore, international studies are needed to examine eating disorder symptoms in diabetic patients during the pandemic and identify the risk factors that may affect them psychologically, socio demographically, and regarding self-management.

Accordingly, the present study aimed to determine the frequency of symptoms of eating disorders in diabetics, clarify what should be done regarding anxiety and self-care management, and determine the effect of the anxiety caused by the pandemic and diabetics' self-care management on eating disorders.

The study addressed the following research questions:

(i) What are the common eating disorder symptoms in diabetics during the pandemic period?
(ii) Is there a relationship between eating disorder symptoms and sociodemographic variables?
(iii) Is there a relationship between eating disorder symptoms and anxiety disorder, self-management, and clinical variables?
(iv) What are the predictors of eating disorders during the pandemic period?

METHOD

Sample and Setting

Data were collected from patients registered in the diabetes polyclinic of two hospitals in the northwest of Turkey (Karabük and Bartın). The survey was prepared as an online Google Docs Form. Since all questions were answered, there was no missing data. The sample size for t-test was calculated using G* Power version 3.14. We considered effect size .5, α .05, (1-ß) .80. The minimum sample sizes were determined to be 51 people with diabetes in both groups, the total was determined to be 102. A total of 110 diabetics, 52 of whom were with type 1 and 58 with type 2 diabetes, were included in this study. The data were collected between June 23, 2020, and July 23, 2020. The inclusion criteria for eligible participants were being 18 years or older, having a confirmed diagnosis of Type 1 or Type 2 diabetes, meeting DSM IV criteria, being able to read and understand Turkish, being able to use a mobile phone, and giving consent to participate. The exclusion criterion was being younger than 18 years old.

Measurements

The data were collected by using a survey questionnaire with a socio-demographic information form, the Bulimic Investigation Test of Edinburgh (BITE), Perceived Diabetes Self-Management Scale (PDSMS), and Generalized Anxiety Disorder Scale (GAD-7).

Questionnaire: This form was developed by the researcher in accordance with the relevant literature to gather information regarding the demographic and clinical characteristics of the participants. The socio-demographic and clinical characteristics included information about gender, age, educational level, marital status, diabetes type, diagnosis time, treatment methods, height and weight, glycolyzed hemoglobin (HbA1c).

Body Mass Index (BMI): This was calculated by dividing weight by height squared. Those with a body mass index less than 25 kg /m^2 were grouped as normal weight whereas those with a body mass index above this were grouped as overweight [16].

Hemoglobin A1c (HbA1c): The HbA1c test shows the average amount of glucose attached to hemoglobin over the past three months. HbA1c of 6.5% or higher is defined as indicating diabetes [17].

Bulimic Investigation Test of Edinburgh (BITE): BITE is a 33-item questionnaire developed by Henderson and Freeman [18] with two subscales (symptoms and severity). Participants respond based on their emotions and behaviors in the last three months. Items 1-30 measure symptoms. Items (1, 13, 21, 23, and 31) score one point for a 'No' response whereas the remaining 25 items score one point for a 'Yes' response. Items 31-33 measure severity [19]. In the severity subscale, which can be taken at most 39, 5 and above indicate the severity score. A score of five or more indicates severe bulimia. A total scale score of 25 or above is the clinically relevant cut-off point and shows presence of eating disorder. Cronbach's α was .96 for the symptom subscale and .62 for the severity subscale [18]. The scale was translated into Turkish by Guzel [19], who reported a Cronbach's α of .85 for the full scale, while in the present study it was .74.

Perceived Diabetes Self-Management Scale (PDSMS): PDSMS is an eight-item scale developed by Wallston, Rothman, and Cherrington [20], adapted from the Perceived Health Competence Scale. Participants rate the items on five-point Likert-type scale (1 = disagree, 2 = undecided, 3 =agree, 4 = strongly agree, and 5 = strongly agree).

Thus, scores can range from eight to 40, with higher scores indicating better awareness of diabetes management. Cronbach's α was .834. The scale was translated into Turkish by Bayindir Cevik [14] who reported a Cronbach's α of .77, while in the present study it was .76.

Generalized Anxiety Disorder Scale (GAD-7): GAD-7 is a seven-item scale developed by Spitzer, Kroenke, Williams, and Löwe [21] to evaluate generalized anxiety disorder based on experiences over the previous two weeks. Participants respond using a four-point Likert-type scale (0 = none, 1 = many days, 2 = more than half of the days, 3 = almost every day). Anxiety disorder is categorized as none (0-4 points), moderate (5-10 points), or severe (11-15 points). Patients with a score of 10 or more should be investigated and their condition confirmed through other GAD diagnostic methods. Patients with a score of 10 or more are considered to have an anxiety disorder. Cronbach's α was 0.92. The scale was translated into Turkish by Konkan et al. [22], who reported a Cronbach's α of .85, while it was .85 in the present study.

Data Analysis

Statistical analyses were conducted using SPSS Statistics for Windows, Version 25.0. First, normality of the data was tested to determine which tests could be used in the data analysis. The mean total scale scores assessed with the Kolmogorov Smirnov Test, skewness-kurtosis values (normality = -2.5 to 2.5) and frequency histograms [23] whereas the demographic and clinical characteristics were assessed with descriptive statistics, including frequencies, percentages, and standard deviations. The data were analyzed with Ki Kare Test, independent samples t Test, Mann Whitney U Test, and Pearson correlations. For the correlation analysis, 'very weak' was less than .26, 'weak' was .26 - .49, 'medium' was .50 - .69. 'high' was .70-.89, and 'very high' was .90 - 1.00. Simple regression analysis was applied to determine the predictors of BITE total scores in diabetics. Statistical significance was accepted as p < .05.

Ethical Considerations

The required institutional permit and permission from Bartın University Ethics Committee (Decision number: 2020-SBB-143) were obtained for conducting the study. The application permission was received from the Scientific Research Application Platform (Decision number: 2020-06-25T17-33-57). The aim of the study was also explained to the participants verbally, who then gave informed consent in order to complete the on-line survey. No identifying information was collected in the study.

RESULTS

The Sociodemographic and Parameters Associated Diabetes

Most of the participants (77.3%) were women while the mean age was 62.49 ±10.92 (Min:32; Max:85). The duration of diabetes was mostly less than 10 years (67.3%), a minority of participants were obese (15.5%), and about a third used oral antidiabetics as treatment (35.5%) (Table 1).

The Frequency of Eating Disorder Symptoms

More than half of the diabetics considered their eating habits to be abnormal (58.2%) while nearly two-thirds reported that their eating style had a serious effect on their life (61.8%). However, only a minority followed a strict diet (22.7%). Many participants reported being hungry all day (58.2%), felt a strong urge to eat (46.4%), considered themselves a binge eater (33.6%), and felt guilty when overeating (77.3%). A minority reported severe eating disorder symptoms, such as using weight loss medication (5.4%) or had eating attacks a few days a week (31.9%). The mean total BITE score was 20.92±7.99 (Min:8; Max:32) while 29.1% of the participants had eating disorders and 30.9% had anxiety disorders. The mean total PDSMS score was 24.80±3.85 (Min:8; Max:40) (Table 2).

Table 1. Demographic and clinical characteristics

Demographic Characteristics		n	%
Age (Mean+SD) 62.49±10.92 (Min:32; Max:85)			
Gender	Women	85	77.3
	Men	25	22.7
Marital Status	Married	70	63.6
	Single	40	36.3
Education Level	Primary school	13	11.8
	Middle School	8	7.3
	High school	32	29.1
	University	57	51.8
Clinical Characteristics		n	%
Diabetes Type	Type 1 DM	52	473
	Type 2 DM	58	52.7
Time since Diagnosis	≤10 years	74	67.3
	≥11 years	36	32.7
BMI	Weak (<18.5 kg/ m^2)	9	8.2
	Normal (18.5-24.9 kg/m^2)	29	26.4
	Overweight (25-29.9kg/m^2)	55	50.0
	Obese (≥30 kg/m^2)	17	15.5
Treatment Methods	Diet	21	19.1
	Oral antidiabetic	39	35.5
	Insulin	32	29.1
	Oral antidiabetic + Insulin	18	16.4
BMI (Mean+SD) 28.44±6.7 (Min:16.44; Max:45.48)			
A1C (Mean+SD) 7.86±2.45 (Min:3; Max:15)			

SD:Standard deviation, A1C: Glycolyzed hemoglobin, BMI: Body Mass Index

The Differences in Eating Disorder, Anxiety Disorder, Self-Management by Sociodemographic Variables and Disease Characteristics

Participants with eating disorders had significantly higher scores on GAD-7 Scale (X^2:5.38; p<0.05). Eating disorders were also more common among married participants (X^2:8.52; p<0.005) (Table 3).

Correlations between Eating Disorder Symptoms, Anxiety Disorder, Self-Management Scores, and Clinical Variables

There were weak but significant correlations between GAD-7 scores and BITE symptom, severity, and total scores (p<0.01) (Table 4).

Predictors of Eating Disorders

Table 5 shows that GAD-7 predicted 20% of the variance in BITE total scores (R:0.45, R^2: 0.20, p<0.001).

DISCUSSION

This study determined the frequency of eating disorder symptoms, anxiety status, perceived self-management, differences of these according to sociodemographic and disease characteristics variables, and predictors of eating disorders during the COVID-19 pandemic for people with diabetes. It also aimed to identify the need for emergency response strategies and provide recommendations regarding diabetes care during this period.

Table 2. Frequency of eating disorder symptoms

Eating Behaviour	Yes(n-%)	No(n-%)	Eating Behaviour	Never	Sometimes	A few days a week	Everyday
Presence of a regular daily meal schedule	66 (60.0)	44 (40.0)					
The ability to stop eating whenever he wants	72 (65.5)	38 (34.5)					
Leaving food on your plate at the end of the meal	51 (46.4)	59 (53.6)	If yes, how often	44 (44.0)	49 (44.5)	11 (10.0)	6 (5.5)
Determining the amount of hunger eating	83 (75.5)	27 (24.5)					
Who find their eating habits normal	46 (41.8)	64 (58.2)					
Following a strict diet	25 (22.7)	85 (77.3)					
Feeling frustrated when diet is broken	73 (66.4)	37 (33.6)					
Don't think about the calories of meals when you're off the diet	42 (38.2)	68 (61.8)	Drugs Used and Their Frequency	93 (84.5)	8 (7.3)	6 (5.4)	3 (1.8)
Eating style seriously affecting life	68 (61.8)	42 (38.2)					
Food dominates life	58 (52.7)	52 (47.3)					
Eating until you feel unwell	39 (35.5)	71 (64.5)					
Don't always think about food	50 (45.5)	60 (54.5)					
Eating more mindfully in front of others	51 (46.4)	59 (53.6)	Slimming drugs	88 (80.0)	15 (13.6)	3 (2.7)	4 (3.6)
Feeling a strong urge to eat constantly	51 (46.4)	59 (53.6)					
Wanting to overeat in anxious moments	63 (57.3)	47 (42.7)					
Terrifying obesity	84 (76.4)	26 (23.6)					
Eating large amounts of food quickly	74 (67.3)	36 (32.7)					
Food habit embarrassment	37 (33.6)	73 (66.4)	Diuretics	89 (80.9)	16 (14.5)	4 (3.6)	1 (0.9)
Inability to control the amount eaten	78 (70.9)	32 (29.1)					
Eating to relax	50 (45.5)	60 (54.5)					
Don't lie about the amount eaten	76 (69.1)	34 (30.9)					
If you have frequent eating attacks	62 (56.4)	48 (43.6)					
If it does, it creates psychological discomfort	61 (55.5)	49 (44.5)	Laxatives	100(90.9)	7 (5.9)	1 (0.09)	3 (2.7)
Having binge eating episodes alone	49 (44.5)	61 (55.5)					
Excessive food intake during a eating attack	60 (54.5)	50(45.5)					
Feeling guilty when overeating	85 (77.3)	25 (22.7)					
Secret eating situation	37 (33.6)	73 (66.4)					
Seeing yourself as overeating	37 (33.6)	73 (66.4)	Willful vomiting	-	75 (78.1)	35 (31.9)	-
More than 2.5 kg weight gain per week	16 (14.5)	94 (85.5)					
Hungry all day	64 (58.2)	46 (41.8)					

BITE= 20.92±7.99 (Min:8; Max:32)

BITE (Symptom Score)- BITE (Severity Score)= 15.61 ± 4.49 (Min:7; Max: 25)- 5.30 ± 5.12 (Min:1; Max: 35)

Eating disorder (+/-)= 32 (29.1) / 78 (70.9)

GAD-7= 6.98±4.75 (Min:0; Max: 21)

Anxiety disorder (+/-)=34 (30.9)/ 76 (69.1)

PDSMS=24.80±3.85 (Min:8; Max:40)

BITE:Bulimic Investigation Test of Edinburgh, PDSMS:Perceived Diabetes Self-Management Scale, GAD-7:Generalized Anxiety Disorder

Table 3. Relationship between eating disorder, anxiety disorder, self-management, sociodemographic and disease characteristics

		Eating disorder				Anxiety				PDSMS			
		(+)	(-)			(+)	(-)						
		n (%)	n (%)	χ2	p	n (%)	n (%)	χ2	p	MR	SR	U	p
		32 (29.1)	78 (70.9)			34 (30.9)	76 (69.1)						
Gender	Men	4 (12.5)	21 (26.9)	2.68	0.134	27 (79.4)	58 (76.3)	0.128	0.720	55.44	1386.00	1061.00	0.991
	Women	28 (87.5)	57 (73.1)			7 (20.6)	18 (23.7)			55.52	4719.00		
Age	≤50	5 (15.6)	7 (9.1)	0.985	0.321	5 (14.7)	7 (9.3)	0.689	0.406	61.96	743.50	498.50	0.416
	≥ 50	27 (84.4)	70 (90.9)			29 (85.3)	68 (90.7)			54.14	5251.50		
Diagnosis Time	≤10 year	27 (84.4)	47 (60.3)	5.995	0.014	24 (70.6)	50 (65.8)	0.246	0.620	52.31	3871.00	1096.00	0.130
	≥11 year	5 (15.6)	31 (39.7)			10 (29.4)	26 (72.2)			62.06	2234.00		
Marital Status	Married	17 (53.1)	19 (24.4)	8.52	0.003*	19 (55.9)	51 (67.1)	1.279	0.258	52.34	3871.00	1488.50	0.906
	Single	15 (46.9)	59 (75.6)			15 (37.5)	25 (32.9)			62.06	2234.00		
Diabetes Type	Type 1 DM	16 (50.0)	36 (46.2)	0.135	0.714	18 (52.9)	34 (44.7)	0.634	0.426	55.13	2866.50	1488.50	0.906
	Type 2 DM	16 (50.0)	42 (53.8)			16 (47.1)	42 (55.3)			55.84	3238.50		
BMI	Not overweight	10 (31.3)	28 (35.9)	0.217	0.642	14 (41.2)	24 (31.6)	0.957	0.328	18.94	170.50	125.50	0.863
	Overweight	22 (30.6)	50 (69.4)			20 (58.8)	52 (68.4)			19.67	570.70		
Anxiety	+	15 (46.9)	19 (24.4)	5.387	0.020*		-				-		
	-	17 (53.1)	59 (75.6)										

PDSMS: Perceived Diabetes Self-Management Scale; χ2: Ki kare; U: Mann Whitney U Test, MR:Mean Rank,SR:Sum of Rank

Table 4. Correlations between eating disorder symptoms, anxiety disorder, self-management scores, and clinical variables

	PDSMS	GAD-7	BITE	BITE Symptom	BITE Severity	A1C	BMI
PDSMS	1						
GAD-7	0. 051	1					
BITE	- 0.050	0.414*	1				
BITE Symptom	- 0.082	0.363*	0.919*	1			
BITE Severity	- 0.085	0.352*	0.729*	0.507*	1		
A1C	0.306	0.098	0.115	0.105	0.026	1	
BMI	0.125	-0.046	0.063	0.157	0.095	0.388	1

*r=Pearson Correlation Test, *p<0.05. BITE:Bulimic Investigation Test of Edinburgh, PDSMS:Perceived Diabetes Self-Management Scale, GAD-7:Generalized Anxiety Disorder, A1C:Glycolyzed hemoglobin, BMI:Body Mass Index*

Table 5. Predictors of eating disorders

	B	SE	β	t	p
GAD-7	0.76	0.14	0.45	5.34	0.000
Constant	15.56	1.21	-	12.83	0.000

*$R = .45; R^2 = .20; F (1.108) = 28.61; p =0 .000$, *Simple Regression Analysis, GAD-7: Generalized Anxiety Disorder*

Given that eating disorders are common in people with diabetes [24], the success of diabetes management primarily depends on nutrition and glucose management – i.e., healthy eating behaviors. Therefore, controlling the eating disorders of people with diabetes is very important in ensuring diabetes management, commonly by following a strict diet and continuously calculated calorie intake. However, our findings show that more than half of the participants reported uncontrolled eating habits during the pandemic.

In addition, a significant proportion of the participants reported eating disorder symptoms, such as feeling hungry, sometimes all day, experiencing eating attacks a few days a week, and then feeling guilty.

Eating disorders make diabetes and weight control difficult for both Type 1 and Type 2 diabetics [25-27]. Although eating disorders may affect FPG and HbA1c, this has not been proven [24,27,28]. Similarly, in our study, HbA1c, and BMI, were not associated with eating disorders. Nevertheless, the levels of these two parameters indicated that the participants were not successful in managing their blood glucose and body weight during the pandemic. However, the relationship between binge eating severity and diabetic control is not explained by being overweight. This finding is also supported by the participants' frustration when their diet was disrupted. Overeating has been associated with compensatory behaviors to lose weight and improve physical appearance, such as using laxatives, diuretics, and weight-loss drugs, fast and heavy exercise, and a strict diet [29]. In contrast, in a study with over 15 years of follow-up study found that diabetics had a significantly low rate of using laxatives, diuretics, diet pills, and compensatory exercise, although there was a significant increase in binge-eating and purging severity [30]. Similarly, not many participants in our study reported using weight-loss drugs, diuretics, and laxatives, or vomiting to lose weight, although about one third

experienced eating attacks several days a week. Thus, the severity of eating disorder symptoms was in line with the literature, with high rates of eating attacks rather than diet pill use. Previous studies showed that the frequency of binge eating disorders in individuals with Type 2 diabetes varies between 2.5% and 25.6% [3,30] while the frequencies of clinical eating disorders and subclinical disordered eating are higher in young women than men with Type 1 diabetes [27].

Most studies confirm that women diabetics are more susceptible [3,28]. In our study, the frequency of eating disorders was slightly higher than in previous studies [27,30,31], but not associated with gender, although binge eating disorders were more common among women participants. The high frequency of binge eating symptoms in women can be explained by sociocultural variables, especially due to the discrepancy in western cultures between women's ideal and average or normative weights. This discrepancy leads to body dissatisfaction, over-concern about weight, dieting, depression, and increased eating disorders in women [26].

As in previous studies [2,30], gender, education, diabetes type, and time since diagnosis did not differ in terms of eating disorders whereas married participants (53.1%) were more likely to report eating disorders in our study. Torrance et al. [24] also reported that married couples with diabetes may negatively affect each other's eating habits.

The psychological causes of eating can include low self-esteem, feelings of inadequacy, stress, anxiety, and depression [26,28]. High anxiety levels are significantly associated with Type 1 diabetes, female gender, age, long time since diagnosis, and receiving oral antidiabetic treatment [32,33]. Our study found that eating disorders of diabetics were less common (29.1%) in hospital-based studies (61%) but higher than in community-based studies (22%) conducted before the pandemic [32,34,35]. This higher rate of anxiety compared to population-based studies can be attributed to increased anxiety during the pandemic. The incidence of eating disorders and anxiety was also lower than in hospital-based studies, which may be because the diabetics who participated in our study did so in a home environment instead of a hospital. Another risk factor for anxiety in patients with diabetes is female gender [32,35]. Although anxiety was not significantly related to gender in our study, female participants reported anxiety symptoms more frequently. However, age, time since diabetes diagnosis, type of diabetes, and BMI were not related with anxiety levels. Thus, our findings confirm that eating disorders behaviors are associated with emotional problems [36-38].

Binge eating is correlated with a range of psychological disturbances, including low self-esteem and anxiety disorders [39]. However, sociodemographic characteristics, such as level of education, marital status, gender, diabetes type, and occupation, should not be considered as barriers to diabetes self-management [33,40]. Similarly, we found that the self-management perceptions of diabetics during the pandemic did not depend on their socio-demographic characteristics, anxiety, or eating disorder behaviors. Gender, BMI, HbA1c level did not predict eating disorders, self-management, or experienced anxiety. However, as anxiety disorders increased, the symptoms and severity of the eating disorders increased. Moreover, anxiety disorders were significant predictors of BITE score (symptom, severity, and total score) whereas there were no significant differences in PDSM Scale, CFBG, and HbA1c levels between participants with/without eating disorders.

Limitations

This study has some limitations. First, the data were not collected face to face. For example, the participants' metabolic status was based on their latest HbA1c values measured at the hospital in the pandemic period. Second, all measurements were made during the pandemic, they are self-reported. On the other hand, the data were collected in the natural home environment of the diabetics and community based. It is important to reveal the eating problems experienced by diabetics under restrictions during the COVID-19 pandemic. This demonstrates the validity and strength of the study.

Implications for Diabetes Care and Education Specialists

Based on the findings, the following recommendations can be made. For successful diabetes management during an extended pandemic, eating disorder behaviors and experienced anxiety should be evaluated using reliable measurement tools by diabetes professionals.

An individual online training and counseling system can be created to reduce eating disorder behaviors identified by diabetes care and specialist. Since the family's eating behaviors influence eating disorders, the family can be included as a support system in the treatment plan by evaluating the eating behaviors of other family members for married individuals. In addition, people with diabetes should be informed about methods to reduce anxiety during pandemics

CONCLUSION

This study examined the eating disorders, anxiety, and self-management of people with diabetes during the COVID-19 pandemic and made recommendations for improving care of diabetics. The findings demonstrate that eating disorders symptoms are higher during the pandemic while anxiety and being married are associated with higher levels of eating disorders. Anxiety is an important predictor of eating disorders in diabetics. Although perceived self-management is neither a cause nor a result of eating disorder-related behaviors, it is important for diabetes management.

Determining the symptoms and severity of eating disorders in diabetics and reducing their anxiety will greatly contribute to diabetes management during pandemics. To explain the eating disorders of diabetics during the COVID-19 pandemic more clearly, qualitative longitudinal hospital-based studies and online interviews with larger samples should be conducted in the future.

REFERENCES

1. Diabetes UK. Chapter 8. Eating Problems. Retrieved from: https://www.diabetes.org.uk/ March 14,2021.
2. American Psychiatric Association (APA).2013. The Diagnostic and Statistical Manual of Mental Disorders: DSM-5(5th ed.). Washington DC: American Psychiatric Association; 2013.
3. Ammar A, Brach M, Trabelsi K, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: results of the ECLB-COVID19 international online survey. Nutr. 2020;12(6):1583-1596.
4. Wang A, Zhao W, Xu Z, Gu J. Timely blood glucose management for the outbreak of 2019 novel coronavirus disease (COVID-19) is urgently needed. Diabetes Res Clin Pract. 2020;162:108118.
5. Hartmann-Boyce J, Kamal RM. Supporting people with long-term conditions (LTCs) during national emergencies. The Cent Evid Based Med. 2020.
6. International Diabetes Federation. Coronavirus COVID-19. 2020. Retrieved from:https://www.idf.org/e-library/welcome.html.
7. Brooks SK, Webster RK, Smith LE, Woodland S, Greenberg N, Rubin GJ. The psychological impact of quarantine and how to reduce it: Rapid review of evidence. Lancet. 2020;395:912-920.
8. Touyz S, Huber TL, Phillipa H. Eating disorders in the time of COVID-19. J Eat Disord. 2020;20(8):1-3.
9. Dening J, Shariful Islam SM, George E, Maddison R. Web-based interventions for dietary behavior in adults with type 2 diabetes: systematic review of randomized controlled trials. J Med Int Res. 2020;22(8):e16437.
10. Khan P, Qayyum N, Malik F, Khan T, Khan M, Tahir A. Incidence of anxiety and depression among patients with type 2 diabetes and the predicting factors. Cureus. 2019;11(3):e4254.

11. Dumont E, Jansen A, Kroes D, de Haan E, Mulkens S. A new cognitive behavior therapy for adolescents with avoidant/restrictive food intake disorders in a day treatment setting: A clinical case series. Int J Eat Disord. 2019; 52(4):447-458.

12. Oldham-Cooper R, Semple C. Prevention and early help for eating disorders in young people with type 1 diabetes. Clin Child Psychol Psychiatry. 2021;18:1-13.

13. Linardon J. The relationship between dietary restraint and binge eating: Examining eating-related self-efficacy as a moderator. Appetite. 2018;127:126-129.

14. Bayındır Çevik A. Relations between health belief and self-efficacy and cardiovascular risk factors in people with Type 2 diabetes. Istanbul University, Health Science Institute, Medical Nursing Department. Doctorate Dissertation. İstanbul; 2010.

15. Hartmann-Boyce J, Morris E, Goyder C, et al. Diabetes and COVID-19: risks, management, and learnings from other national disasters. Diab Care. 2020;43(8):1695-1703.

16. World Health Organization (WHO). 2020. Retrieved from: https://www.euro.who.int/en/health-topics/disease-prevention/nutrition/a-healthy lifestyle/body-mass-index-bmi. June 05, 2020.

17. American Diabetes Association (ADA). 6. Glycemic targets: Standards of medical care in Diabetes-2020. Diabetes Care. 2020;43(Suppl 1):66-76.

18. Henderson M, Freeman CP. A self-rating scale for bulimia. The 'BITE'. Br J Psychiatry. 1987;150:18-24.

19. Güzel S. Determining the eating and eating habits and quality of life levels of individuals with type 2 diabetes. Başkent University Institute of Health Sciences, Nutrition and Dietetics Department. Master Thesis. Ankara; 2014.

20. Wallston KA, Rothman RL, Cherrington A. Psychometric properties of the perceived diabetes self-management scale (PDSMS). J Behav Med. 2007; 30(5):395-401.

21. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Int Med. 2006; 166:1092-1097.

22. Konkan R, Şenormancı O, Güçlü O, Aydın E, Sungur MZ. Validity and reliability study for the Turkish adaptation of the generalized anxiety disorder-7(GAD-7) scale. Arch Neuropsychiatry. 2013;50:53-58.

23. Blanca MJ, Arnau J, Lopez-Montiel D. Skewness and kurtosis in real data samples. Methodology. 2013;9:78-84.

24. Torrance A, Chlanese A, Zanfardino A, et al. Disordered eating behaviors among Italian adolescents with type 1 diabetes: Exploring relationships with parents' eating disorder symptoms, externalizing and internalizing behaviors, and body image problems. J Clin Psychol Med Settings. 2020;27(4):727-745.

25. Araia E, Hendrieckx C, Skinner T, Pouwer F, Speight J, King RM. Gender differences in disordered eating behaviors and body dissatisfaction among adolescents with Type 1 diabetes: Results from diabetes MILES youth-Australia. Int J Eat Disord. 2017;50(10):118-193.

26. Broadley MM, Zaremba N, Andrew B, et al. 25 years of psychological research investigating disordered eating in people with diabetes: what have we learnt? Diabet Med. 2020;37(3):401-408.

27. Clery P, Stahl D, Ismail K, Treasure J, Kan C. Systematic review and meta-analysis of the efficacy of interventions for people with Type 1 diabetes mellitus and disordered eating. Diabet Med. 2017;34(12):1667-1675.

28. Nezami L, Abiri F, Kheirjoo E. Bulimia in diabetic patients: A review on diabulimia. Iranian J Diabetes Obes. 2018;10(2):102-105.

29. Leal GV. da S, Philippi ST, Alvarenga M dos S. Unhealthy weight control behaviors, disordered eating, and body image dissatisfaction in adolescents from São Paulo, Brazil. Braz J Psychiatry. 2020;42(3):264-270.

30. Romano KA, Heron KE, Amerson R, Howard LM, MacIntyre RI, Mason TB. Changes in disordered eating behaviors over 10 or more years: A meta-analysis. Int J Eat Disord. 2020;53:1034-1055.

31. Nip AS, Reboussin BA, Dabelea D, et al. Disordered eating behaviors in youth and young adults with type 1 or type 2 diabetes receiving insulin therapy: The SEARCH for diabetes in youth study. Diabetes Care. 2019;42(5):859-866.

32. Khan P, Qayyum N, Malik F, Khan T, Khan M, Tahir A. Incidence of anxiety and depression among patients with type 2 diabetes and the predicting factors. Cureus. 2019;11(3):e4254.

33. Rose M, Streisand R, Tully C, et al. Risk of disordered eating behaviors in adolescents with type 1 diabetes. J Pediatr Psycho. 2020;45(5):583-591.

34. Iwajomo T, Bondy S, De Oliveira C, Colton P, Trottier K, Kurdyak P. Excess mortality associated with eating disorders: Population-based cohort study. Br J Psychiatry. 2020;29:1-7.

35. Wisting L, Skrivarhaug T, Dahl-Jørgensen K, Rø Ø. Prevalence of disturbed eating behavior and associated symptoms of anxiety and depression among adult males and females with type 1 diabetes. J Eat Disord. 2018;11(6):28-37.

36. Castellano-Guerrero AM, Guerrero R, Relimpio F, et al. Prevalence and predictors of depression and anxiety in adult patients with type 1 diabetes in tertiary care setting. Acta Diabetol. 2018;55(9):943-953.

37. Rescorla LA, Ewing G, Ivanova MY, et al. Parent-adolescent cross-informant agreement in clinically referred samples: Findings from seven societies. J Clin Child Adolesc Psychol. 2017;46(1):74-87.

38. Monteleone AM, Ruzzi V, Patriciello G, et al. Emotional reactivity and eating disorder-related attitudes in response to the trier social stress test: An experimental study in people with anorexia nervosa and with bulimia nervosa. J Affect Disord. 2020;274:23-30.

39. Pace CS, Muzi S. Binge-Eating Symptoms, Emotional-Behavioral Problems and Gender Differences among Adolescents: A Brief Report. Mediterr J Clin Psychol. 2019;7(2):1-9.

40. Petroni ML, Barbanti FA, Bonadonna R, et al. Dysfunctional eating in type 2 diabetes mellitus: A multicenter Italian study of socio-demographic and clinical associations. Nutr Metab Cardiovasc Dis. 2019;29(9):983-990.