nutrición clínica y Dietética Hospitalaria

Artículo Original

Nutr Clín Diet Hosp. 2025; 45(1):69-75
DOI: 10.12873/451kacar

Relationships between psychological, clinical aspects and eating behavior in individuals with diabetes: cross-sectional study

Mihrican KACAR, Filiz YANGILAR, Sevil Karahan YILMAZ, Nazife YILMAZ

Department of Nutrition and Dietetics, Erzincan Binali Yildirim University, Erzincan, Türkiye.

Recibido: 1/octubre/2024. Aceptado: 7/diciembre/2024.

ABSTRACT

Introduction: Eating disorders are closely related to mental status, and individuals with diabetes have a significantly increased risk of developing an eating disorder.

Objective: This study aims to evaluate the possible association of cognitive restriction, uncontrolled eating, emotional eating factors, and eating disorders with depression in individuals with diabetes.

Methods: A cross-sectional study was carried out on 132 patients who were diagnosed with diabetes between 2022 and 2024 in the Internal Medicine outpatient clinic of a university hospital in Türkiye. The Beck Depression Inventory (BDI) was used to assess the depression status of individuals, the Three-Factor Eating Questionnaire (TFEQ-R18) to measure eating habits, and the Night Eating Questionnaire (NEQ) to obtain information about night eating behavior. All anthropometric measurements were taken by the researcher.

Results: It was determined that there was a 'mild depression' state in both the Type 1 diabetes patient group (14.10±8.26) and the Type 2 diabetes patient group (14.74±7.64). A linear, moderate, and significant correlation was found between BDI scores and NEQ scores in individuals with type 1 diabetes ($r=0.547$, $p<0.001$). In individuals with type 2 diabetes, an inverse, moderate, and significant correlation was found between BDI scores and cognitive restriction scores ($r=-0.406$, $p=0.029$). For the individuals in the two groups, statistically significant differences were found in the scores obtained from the BDI, NEQ, and TFEQ-R18 in terms of the history of mental illness and obesity, diabetic diet, and hypoglycemia ($p<0.05$).

Conclusions: In this study, it has been shown that the effect of mental illness and obesity history on current eating behavior may be on night eating behavior, cognitive restriction, and uncontrolled eating. It is likely that compliance with the diabetic diet and prevention of hypoglycemia will be reflected in eating behavior and anthropometric measurements.

KEYWORDS

Depression; Diabetes Mellitus; Eating Behavior; Mental Health, Night Eating Syndrome.

INTRODUCTION

Eating disorders include a wide range of unhealthy and dangerous eating attitudes and behaviors (rigid attitudes and irrational beliefs about foods such as good and bad)[1]. The risk of developing eating disorders is high, especially in chronic diseases (like diabetes) in which nutrient intake (limitations) is important in their medical treatment and management[2]. Due to the nature of diabetes, factors such as diet lists that must be followed to keep blood sugar under control, the presence of prohibited foods, and being a chronic disease lead to psychiatric disorders in patients and cause mental preoccupations to focus on food and weight control. For all these reasons, deterioration in the eating attitudes and behaviors of patients is observed[3].

There is a bidirectional relationship between diabetes and some mental disorders such as depression, anxiety disorders, eating disorders, and cognitive deficits, and these diseases are more common in the diabetic population[4]. Psychological status may affect the risk of eating disorders in individuals with diabetes. In a study conducted with 194 adults with type 2 diabetes, it was found that 7% met the criteria for Night Eating

Correspondencia:
Mihrican Kacar
mihrican.kacar@erzincan.edu.tr

Syndrome (NES) and that increased night eating symptoms were associated with increased levels of clinical depressive symptoms[5]. In another study investigating night eating behavior in individuals with type 2 diabetes, higher emotional eating behavior (Cohen's d=0.52, p=0.04) was found in those who ate at night compared to diabetic patients who did not eat at night. However, no differences were observed between individuals in terms of depressive symptoms[6].

OBJECTIVE

This study aims to evaluate the causes of cognitive restriction, uncontrolled eating, emotional eating factors and eating disorders in individuals with diabetes and the possible relationship of these eating patterns with depression.

METHODS

This study was conducted with adult individuals between the ages of 19-65 who were diagnosed with diabetes and applied to the Internal Medicine outpatient clinics of a university hospital in Türkiye between 2022-2024. A total of 132 volunteers, 62 of whom were diagnosed with type 1 diabetes and 70 with type 2 diabetes, were reached. Exclusion criteria include pregnancy, breastfeeding, being diagnosis with depression, amputation, and diabetic complications. The study was approved by the Erzincan Binali Yildirim University Human Research Ethics Committee and written informed consent was obtained from all participants in accordance with the provisions of the Declaration of Helsinki in 2013 (as revised in Finland 2024)[7]. A questionnaire form was applied by researchers to the individuals participating in the study by using face-to-face interview technique.

Assessment of anthropometric measurements

All measurements were taken by the researcher. Participants' body weights (kg) were measured using the Tanita MC 780 Digital Scales; heights (cm) were measured on the Frankfort plane, while standing, with the help of a stadiometer. BMI values were calculated by dividing the body weight of the individuals by the square meter of their height (kg/m^2).

Assessment of depression status

Beck Depression Inventory was used to evaluate the depression status of individuals. The highest score that can be obtained from the scale is 63, and a high total score indicates a high level of depression. According to the total depression score, 0-9 indicates 'minimal depression', 10-16 'mild depression', 17-29 'moderate depression', and 30-63 'severe depression'[8,9].

Three Factor Eating Questionnaire (TFEQ-R18)

The Three Factor Eating Questionnaire (TFEQ-R18) was used to measure the nutritional habits of individuals. With this questionnaire, the degree of restriction of people's conscious eating, the level of uncontrolled eating, and the degree of eating when they are emotional can be measured. TFEQ-R18 assesses current eating habits and measures three different aspects of eating behavior: cognitive restriction, uncontrolled eating, and emotional eating. High scores are an indication of more cognitive eating, uncontrolled eating, or emotional eating[10]. The reliability of the TFEQ-R18 in Türkiye was calculated with the Cronbach alpha value in 2015 and the Cronbach alpha value was found to be 0.721[11].

Night Eating Questionnaire (NEQ)

The Night Eating Questionnaire (NEQ) was applied to get information about food intake during the day, control over night eating behavior, cravings, frequency of waking up at night, awareness of night eating and mood. Those who score 30 and above on the Night Eating Questionnaire are in the risk group[12,13].

Statistical analysis

The data obtained from the study were evaluated with the SPSS 22.0 statistical package program. While frequency was calculated in qualitative data, mean and standard deviation were calculated in quantitative data. Mann Whitney U test was used to compare the numerical variables of the independent data groups that were not normally distributed. Pearson Chi-square test and Fisher's Exact Chi-square test were used in the evaluation of qualitative variables. The relationship between two non-normally distributed numerical variables was tested with Spearman Correlation analysis. In all analyses, $p<0.05$ was considered statistically significant.

RESULTS

The sociodemographic characteristics, disease states of individuals are shown in Table 1. The mean age was 40.9±13.7 years in the patient group with type 1 diabetes (Type 1 DM-PG) and 50.7±9.8 years in the group of patients with type 2 diabetes (Type 2 DM-PG) ($p<0.05$). The number of female and male individuals in both the Type 1 DM-PG and the Type 2 DM-PG is similar (51.6% women and 48.4% men in the Type 1 DM-PG; 50.0% women and 50.0% men in the Type 2 DM-PG).

Considering the diet application status, it was determined that 54.8% of the individuals in the Type 1 DM-PG and 25.7% of the individuals in the Type 2 DM-PG followed a diabetic diet ($p<0.05$). It was determined that the majority of individuals in both groups experienced hypoglycemia (91.9% in the Type 1 DM-PG, 71.4% in the Type 2 DM-PG) ($p<0.05$).

The mean and standard deviation values of the scores obtained from the BDI, NEQ, and TFEQ-R18 scales are given in Table 2. According to the total depression score average, it was determined that there was a 'mild depression' state in

Table 1. Demographic characteristics, disease states, and scale scores of individuals

	Type 1 DM-PG (n:62)		**Type 2 DM-PG** (n:70)		**Total** (n:132)		**p-value**
	n	**%**	**n**	**%**	**n**	**%**	
Age (years) (X±SD)	40.9±13.7		50.7±9.8		47.8±12.0		**0.002**[a*]
Sex							
Female	32	51.6	35	50.0	67	50.8	0.810[b]
Male	30	48.4	35	50.0	65	49.2	
BMI (kg/m^2) (X±SD)	26.23±3.96		29.39±3.96		28.15±4.10		**0.001**[c*]
Disease duration (X±SD)	14.27±10.95		4.48±4.88		7.44±8.50		**<0.001**[a*]
Medical Treatment Applied **							
Oral antidiabetic drug	7	11.3	69	98.6	76	57.6	**<0.001**[b*]
Insulin	57	91.9	7	10	64	48.5	
Insulin pump	2	3.2	-	-	2	1.5	
Diabetic diet application status							
Yes	34	54.8	18	25.7	52	39.4	**0.005**[b*]
No	28	45.2	52	74.3	80	60.6	
The state of experiencing hypoglycemia							
Yes	57	91.9	50	71.4	107	81.1	**0.012**[b*]
No	5	8.1	20	28.6	25	18.9	
Frequency of hypoglycemia							
Every day	-	-	1	2.0	1	0.9	0.419[d]
1-2 times a week	26	45.6	17	34.0	43	40.2	
3-4 times a week	12	21.1	5	10.0	17	15.9	
1 time in 15 days	15	26.3	15	30.0	30	28.0	
1 time per month	4	7.0	9	18.0	13	12.2	
Less often	-	-	3	6.0	3	2.8	
Increased food consumption during hypoglycemia treatment							
Never	-	-	1	2.0	1	0.9	0.351[d]
Sometimes	11	19.3	17	34.0	28	26.2	
Generally	39	68.4	25	50.0	64	59.8	
Always	7	12.3	7	14.0	14	13.1	

*p<0.05, [a] Mann Whitney U test, [b] Chi-square test, [c] Independent Samples t test, [d] Fisher test, BMI: Body Mass Index, ** More than one option has been ticked.

Table 2. TFEQ-R18, NEQ, and BDI scores of individuals

	Type 1 DM-PG (n:62)	Type 2 DM-PG (n:70)	p-value
	$\bar{X}$ ±SD	$\bar{X}$ ±SD	
TFEQ-R18			
Total	40.97 ± 3.74	43.18 ± 6.29	**0.030***
Cognitive restraint	16.71 ± 2.43	15.25 ± 3.13	**0.036***
Uncontrolled eating	10.99 ± 2.22	12.55 ± 3.48	**0.017***
Emotional eating	5.01 ± 2.21	5.86 ± 2.52	0.141
NEQ	17.93 ± 8.91	15.35 ± 8.19	0.150
BDI	14.10 ± 8.26	14.74 ± 7.64	0.504

*p<0.05, Mann Whitney U test, TFEQ-R18: Three Factor Eating Questionnaire, NEQ: Night Eating Questionnaire, BDI: Beck Depression Inventory.

both the Type 1 diabetes patient group (14.10±8.26) and the Type 2 diabetes patient group (14.74±7.64).

The relationship between the depression levels of individuals and their eating behaviors is examined in Table 3. For individuals in the Type 1 DM-PG, a linear, moderate, significant relationship was found between BDI scores and NEQ scores (r=0.547, p<0.001). For individuals in the Type 2 DM-PG, a moderate, inverse, significant relationship was found between BDI scores and cognitive restriction scores (r=-0.406, p=0.029).

Table 3. The relationship between individuals' depression levels and eating behaviors

	BDI			
	Type 1 DM-PG (n:62)		Type 2 DM-PG (n:70)	
	r	p-value	r	p-value
TFEQ-R18				
Total	0.058	0.647	-0.152	0.431
Cognitive restraint	-0.080	0.504	-0.406	**0.029***
Uncontrolled eating	0.041	0.721	0.072	0.712
Emotional eating	0.060	0.618	-0.168	0.385
NEQ	0.547	**<0.001***	0.332	0.073

*p<0.05, Spearman Correlation Analysis, BDI: Beck Depression Inventory, TFEQ-R18: Three Factor Eating Questionnaire, NEQ: Night Eating Questionnaire.

Some factors affecting individuals' eating behaviors are shown in Table 4. The scores obtained from BDI in individuals in both groups were found to be statistically significantly higher in those with a history of mental illness than in those without a history of mental illness (p<0.05). The NEQ scores were found to be higher in the presence of a history of mental illness in the Type 2 DM-PG compared to the absence of it (p<0.05). The total TFEQ-R18 score in both the Type 1 DM-PG and the Type 2 DM-PG was found to be statistically significantly higher in those with a history of obesity than in those without a history of obesity (p<0.05). A statistically significant difference was found in the individuals in the Type 2 DM-PG in terms of cognitive restriction and uncontrolled eating score, presence of obesity history, diabetic diet, and hypoglycemia (p<0.05).

DISCUSSION

The prevalence of depression in individuals with diabetes may vary according to gender, type of diabetes, medical condition, and current conditions[14]. In this study, in which the depression level and its effect on the eating behavior of adults diagnosed with diabetes were evaluated, the average of the scores obtained from the BDI in both the Type 1 DM-PG (14.10±8.26) and the Type 2 DM-PG (14.74±7.64) shows the mild depression level. In addition, moderate and severe depression was detected in 35% of individuals. In a study completed with 171 participants investigating the prevalence of depression symptoms in diabetes in Türkiye, it was determined that 29.2% of the patients had moderate and severe depression symptoms, similar to the results of this study[14].

Diabetic patients with depression are more prone to poor glycemic control[14]. Fluctuations in blood sugar levels are closely related to changes in mood and energy and are affected by what we eat[15]. In this case, fluctuations in HbA1c and fasting blood glucose levels are likely to be reflected in eating behavior and anthropometric measurements. After the diagnosis of diabetes, the increasing need for control over body weight and eating can be exacerbated by depression, and as a result, deterioration in eating attitudes and behaviors of patients can be observed. According to the results of this study, depression was found to be associated with NEQ and cognitive restriction behavior in individuals with diabetes, and this relationship was mediated by adherence to diet, medical treatment (using insulin), blood sugar regulation, maintaining body composition, obesity, and a history of mental illness.

In this study, a linear, moderate, and significant correlation (r=0.547, p<0.001) was found between BDI scores and NEQ scores for individuals in the Type 1 DM-PG. In addition, the higher scores obtained from the NEQ scale support this find-

Table 4. Factors affecting the eating behaviors of individuals

	BDI		NEQ		TFEQ-R18 Cognitive restraint		TFEQ-R18 Uncontrolled eating		TFEQ-R18 Emotional eating	
	Type 1 DM-PG	Type 2 DM-PG	Type 1 DM-PG	Type 2 DM-PG	Type 1 DM-PG	Type 2 DM-PG	Type 1 DM-PG	Type 2 DM-PG	Type 1 DM-PG	Type 2 DM-PG
	X̄±SD	X̄±SD	X̄±SD	X̄±SD	X̄±SD	X̄±SD	X̄±SD	X̄±SD	X̄±SD	X̄±SD
Sex										
Female	11.18±6.24	14.34±7.66	17.01±7.77	14.60±7.61	17.15±2.55	15.77±2.74	10.12±2.11	11.46±2.39	4.74±1.98	5.20±1.98
Male	17.41±9.57	15.14±7.70	19.29±9.01	16.11±8.78	16.22±2.30	14.74±3.45	11.32±2.17	13.66±4.05	5.00±2.30	6.51±2.84
p-value	**0.048***	0.642	0.441	0.564	0.610	0.176	0.219	**0.002***	0.710	0.063
Diabetic diet										
Yes	13.10±8.15	15.67±8.83	19.89±8.95	13.33±7.40	16.50±2.64	17.61±2.25	11.48±2.25	11.33±3.83	4.75±2.18	5.72±2.72
No	15.73±8.51	14.42±7.25	15.75±6.55	16.06±8.40	16.80±2.17	14.44±3.00	11.08±2.23	12.98±3.28	5.01±2.04	5.90±2.47
p-value	0.344	0.726	0.340	0.185	0.510	**<0.001***	0.812	**0.049***	0.715	0.688
Hypoglycemia										
Yes	14.75±8.25	15.54±8.06	16.91±8.10	16.10±8.13	16.51±2.46	14.74±2.90	10.61±2.17	13.28±3.31	4.75±1.99	5.86±2.59
No	8.20±5.81	12.75±6.20	14.15±8.02	13.50±8.26	18.52±0.70	16.55±3.41	10.05±2.70	10.75±3.32	5.98±4.23	5.85±2.39
p-value	0.299	0.211	0.210	0.084	0.165	**0.020***	0.620	**0.003***	0.720	0.921
History of obesity										
Yes	15.58±8.85	14.80±7.87	17.88±8.90	15.81±8.29	17.10±2.15	14.95±3.04	11.39±1.83	12.91±3.31	4.55±1.64	5.92±2.54
No	11.09±6.74	13.25±4.03	17.41±9.35	10.00±3.37	16.19±2.90	19.25±1.26	10.21±2.76	7.5±2.38	5.52±2.75	4.25±1.89
p-value	0.098	0.969	0.810	0.120	0.666	**0.005***	0.174	**0.004***	0.421	0.176
History of mental illnes										
Yes	25.71±10.24	21.93±8.03	24.03±11.99	20.50±8.62	16.74±2.97	14.87±4.03	10.21±0.95	12.81±5.22	4.21±1.50	6.44±3.08
No	12.14±6.43	12.61±6.12	15.06±7.11	13.83±7.48	16.73±2.40	15.37±2.86	10.85±2.32	12.48±2.84	4.85±2.18	5.68±2.34
p-value	**0.009***	**<0.001***	0.151	**0.004***	0.995	0.854	0.769	0.916	0.735	0.475

*p<0.05, Mann Whitney U test, BDI: Beck Depression Inventory, NEQ: Night Eating Questionnaire, TFEQ-R18: Three Factor Eating Questionnaire.

ing in the presence of a history of mental illness at any time in the Type 2 DM-PG. A study of 714 individuals with type 1 and 2 diabetes found that, compared to patients without night eating symptoms, those with night eating symptoms were significantly more likely to experience major depression and to eat in response to emotions (anger, sadness, loneliness, worry, and beingupset)[16].

In a study conducted on adults with type 2 diabetes, a linear, moderate and significant relationship (r=0.53, p<0.001) was found between the NES score and depressive symptoms, similar to this study[5]. In another study investigating night eating behavior in individuals with type 2 diabetes, no difference was observed in terms of depressive symptoms between those who ate at night and those who did not[6]. Low mood (especially in the evening) itself is a symptom of NES, but evening hyperphagia as well as night eating also have an effect on depressive syndromes. NES is therefore a complex syndrome that includes symptoms related to malnutrition,

sleep, and mood regulation. Since night eating increases the preference of high-carbohydrate and high-fat foods, it may cause weakening of glycemic control in individuals with diabetes mellitus, which may be reflected in eating behavior[17,18].

The interaction between mood and eating behavior is quite complex. In general, mood regulates mood by changing food selection and amount[19]. Eating behavior is key to understanding people's food choices and is associated with a variety of health outcomes. The Three Factor Eating Questionnaire (TFEQ-R18) questions individuals' cognitive restriction, uncontrolled eating, and emotional eating behaviors. Uncontrolled eating is defined as the tendency to eat more than normal due to loss of control over food consumption, and high scores are associated with overeating and obesity. Emotional eating behavior is a type of psychological eating that usually causes eating more than normal during emotional changes such as loneliness, depression, and anxiety[20,21]. Cognitive restriction behavior is defined as the tendency to consciously reduce food intake to control body weight. The main reason for cognitive restriction behavior is individuals' efforts to control their body weight[22].

When the cognitive restriction behavior is examined, it is seen that the cognitive restriction average score of the individuals in the Type 1 DM-PG (16.71±2.43) is higher than the individuals in the Type 2 DM-PG (15.25±3.13) ($p<0.05$). In a sample of adult patients with type 1 and type 2 diabetes, contrary to the findings of this study, patients with type 2 diabetes reported significantly more restrained when eating compared to patients with type 1 diabetes. It has been suggested that this condition may be the cause or consequence of their high BMI[23]. In this study it is thought that the behaviors of individuals with type 1–diabetes to consciously control their eating habits may result from the use of insulin or insulin pumps in their medical treatment and insulin restriction[24]. As a matter of fact, in a study conducted to evaluate the relationship between mood and eating behaviors and demographic and physical characteristics, treatment, biochemical profiles, and chronic comorbidities in individuals with type 2 diabetes, it was determined that insulin therapy had a positive effect on cognitive restriction[25]. In this study, an inverse, moderate, and significant correlation was found between BDI scores and cognitive restriction scores in individuals in the Type 2 DM-PG ($r=-0.406$, $p=0.029$). In a cross-sectional study examining the links between depression and eating habits, women with higher depression scores had lower cognitive restriction scores ($r=-0.141$, $p=0.022$)[26]. Cognitive restriction behavior is effective in reducing hypoglycemia in individuals with type 2 diabetes. As a matter of fact, the mean score of cognitive restriction was found to be higher in the Type 2 DM-PG who did not experience hypoglycemia (16.55±3.41) than those with hypoglycemia (14.74±2.90) ($p<0.05$). It was observed that cognitive restriction scores of individuals in the same group who did not have a history of obesity in any period of life (19.25±1.26) were higher than those with a history of obesity (14.95±3.04) ($p<0.05$). In addition, it was determined that individuals with type 2 diabetes who had higher cognitive restriction scores had higher diabetic diet adherence. On the other hand, since unsuccessful dieting can show high cognitive restriction and overeating tendencies, cognitive restriction behavior can have the opposite effect and lead to body weight gain[27]. All these findings support that optimal cognitive restriction behavior provides health benefits in preventing hypoglycemia, achieving a healthy body composition, and compliance with diet in conditions where mental health is optimal and the risk of developing depression is low in individuals with type 2 diabetes.

In this study, the mean uncontrolled eating score of the individuals in the Type 2 DM-PG (12.55±3.48) was found to be higher than the individuals in the Type 1 DM-PG (10.99±2.22) ($p<0.05$). In a study conducted on individuals with diabetes, it was found that the diet disinhibition scores of individuals with type 2 diabetes, which means decreased or lost control over eating, were higher than those with type 1 diabetes, but the difference was not statistically significant ($p=0.18$)[23]. In this study, no significant relationship was found between BDI scores and uncontrolled eating scores for individuals in both the Type 1 diabetes patient group and the Type 2 diabetes patient group ($p>0.05$). Similar to the finding in this study, no correlation was found between depression scores and uncontrolled eating behavior in a cross-sectional study ($n=400$)[26]. In this study, 74.3% of the individuals in the Type 2 DM-PG did not follow a diabetic diet, and it was found that the uncontrolled eating scores of those who do not follow a diabetic diet (12.98±3.28) were found to be higher than those who follow a diabetic diet (11.33±3.83) ($p<0.05$). In addition, uncontrolled eating scores of individuals in the Type 2 DM-PG who experienced hypoglycemia (13.28±3.31) were found to be higher than those who did not experience hypoglycemia (10.75±3.32) ($p<0.05$). These findings supports the importance of diet in the regulation of blood sugar in individuals with type 2 diabetes. The fact that individuals with type 2 diabetes with a history of obesity have higher uncontrolled eating scores than those without a history of obesity is an indicator of the high risk of obesity and the possibility of recurrence in these individuals[28,29].

CONCLUSIONS

In this study, it was tried to determine the factors that may cause eating disorders, including diabetes history and management in individuals diagnosed with diabetes. It has been determined that the effect of mental illness and obesity history on current eating behavior in diabetic patients may be on night eating behavior, cognitive restriction, and uncontrolled eating. In addition, it was found that there was a linear relationship between the degree of depression and night eating behavior, and an inverse relationship between the degree of depression and cognitive restriction. It is likely that compliance with the diabetic diet and prevention of hypoglycemia will be reflected in eating behavior and anthropometric measurements.

REFERENCES

1. Haddad C, Khoury C, Salameh P, Sacre H, Hallit R, Kheir N, et al. Validation of the Arabic version of the Eating Attitude Test in Lebanon: a population study. Public Health Nutr. 2021;24(13): 4132–4143.
2. Quick VM, Byrd-Bredbenner C, Neumark-Sztainer D. Chronic illness and disordered eating: a discussion of the literature. Adv Nutr. 2013 May;4(3):277–86.
3. Priesterroth L, Grammes J, Strohm EA, Kubiak T. Disordered eating behaviours and eating disorders in adults with type 1 diabetes (DEBBI): rational and design of an observational longitudinal online study. BMJ Open. 2022;12(9).
4. Young-Hyman D, De Groot M, Hill-Briggs F, Gonzalez JS, Hood K, Peyrot M. Psychosocial care for people with diabetes: a position statement of the American Diabetes Association. Diabetes Care. 2016;39(12):2126–40.
5. Hood MM, Reutrakul S, Crowley SJ. Night eating in patients with type 2 diabetes. Associations with glycemic control, eating patterns, sleep, and mood. Appetite. 2014 Aug;79:91–6.
6. Bermúdez-Millán A, Pérez-Escamilla R, Lampert R, Feinn R, Damio G, Segura Pérez S, et al. Night eating among Latinos with diabetes: Exploring associations with heart rate variability, eating patterns, and sleep. J Nutr Educ Behav. 2022;54(5):449–54.
7. World Medical Association. WMA Declaration of Helsinki-Ethical principles for medical research involving human participants. Cited: 19 November 2024. Available from: https://www.wma.net/policies-post/wma-declaration-of-helsinki/
8. Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Arch Gen Psychiatry. 1961;4(6): 561-571.
9. Hisli N. Beck Depresyon Envanterinin üniversite öğrencileri için geçerlilik ve güvenilirliği. Tu̇rk Psikol Derg. 1989;7(23):3–13.
10. Karlsson, J., Persson, L. O., Sjöström, L., Sullivan, M. Psychometric properties and factor structure of the Three-Factor Eating Questionnaire (TFEQ) in obese men and women. Results from the Swedish Obese Subjects (SOS) study. Int J Obes. 2000;24(12): 1715-25.
11. Kirac D, Altunok E, Avcılar T, Cakir O, Ulucan K, Kurtel H, et al. A new method for investigating eating behaviours related with obesity ''Three-Factor Eating Questionnaire ''. J Marmara Univ Inst Heal Sci. 2015;1.
12. Allison KC, Lundgren JD, O'Reardon JP, Martino NS, Sarwer DB, Wadden TA, et al. The Night Eating Questionnaire (NEQ): Psychometric properties of a measure of severiy of the Night Eating Syndrome. Eat Behav. 2008;9:62-72.
13. Atasoy N, Saraçli Ö, Konuk N, Ankarali H, Güriz SO, Akdemir A, et al. Gece yeme anketi-Türkçe formunun psikiyatrik ayaktan hasta popülasyonunda geçerlilik ve güvenilirlik çalışması. Anadolu Psikiyatri Dergisi. 2014;15:238-247
14. Eker S. Prevalence of depression symptoms in diabetes mellitus. Open access Maced J Med Sci. 2018 Feb;6(2):340–3.
15. Rawlinson S, Andrews ZB. Hypothalamic insulin signalling as a nexus regulating mood and metabolism. J Neuroendocrinol. 2021;33(4):e12939.
16. Morse SA, Ciechanowski PS, Katon WJ, Hirsch IB. Isn't this just bedtime snacking? The potential adverse effects of night-eating symptoms on treatment adherence and outcomes in patients with diabetes. Diabetes Care. 2006 Aug;29(8):1800–4.
17. McCuen-Wurst C, Ruggieri M, Allison KC. Disordered eating and obesity: associations between binge-eating disorder, night-eating syndrome, and weight-related comorbidities. Ann N Y Acad Sci. 2018 Jan;1411(1):96–105.
18. Meule A, Allison KC, Brähler E, de Zwaan M. The association between night eating and body mass depends on age. Eat Behav. 2014 Dec;15(4):683–5.
19. Pe K. Good mood foods. J Nutr Heal Food Eng. 2017;7.
20. Malkki-Keinänen K, Lankinen M, Karhunen L, Schwab U. Psychometric evaluation of three-factor eating questionnaire -R18 in aging Finnish men with increased risk for type 2 diabetes. Nutr Health. 2022 Jul;2601060221112178.
21. Konttinen H, van Strien T, Männistö S, Jousilahti P, Haukkala A. Depression, emotional eating and long-term weight changes: a population-based prospective study. Int J Behav Nutr Phys Act. 2019;16(1):28.
22. de Lauzon B, Romon M, Deschamps V, Lafay L, Borys J-M, Karlsson J, et al. The Three-Factor Eating Questionnaire-R18 is able to distinguish among different eating patterns in a general population. J Nutr. 2004 Sep;134(9):2372–80.
23. Ryan M, Gallanagh J, Livingstone MB, Gaillard C, Ritz P. The prevalence of abnormal eating behaviour in a representative sample of the French diabetic population. Diabetes Metab. 2008; 34(6):581–6.
24. Paoli T De, Rogers PJ. Disordered eating and insulin restriction in type 1 diabetes: A systematic review and testable model. Eat Disord. 2018;26(4):343–60.
25. González-Cantú A, Mireles-Zavala L, Rodríguez-Romo A, Olavide-Aguilar E, De la Garza-Hernández NE, Romero-Ibarguengoitia ME. Eating behaviors and emotional distress are predicted by treatment and adverse outcome in patients with type 2 diabetes. Psychol Health Med. 2018 Mar;23(3):325–36.
26. Aoun C, Nassar L, Soumi S, El Osta N, Papazian T, Rabbaa Khabbaz L. The cognitive, behavioral, and emotional aspects of eating habits and association with impulsivity, chronotype, anxiety, and depression: A cross-sectional study. Front Behav Neurosci. 2019;13:204.
27. Kowalkowska J, Poínhos R. Eating behaviour among university students: relationships with age, socioeconomic status, physical activity, body mass index, waist-to-height ratio and social desirability. Nutrients. 2021 Oct;13(10).
28. Malone JI, Hansen BC. Does obesity cause type 2 diabetes mellitus (T2DM)? Or is it the opposite? Pediatr Diabetes. 2019 Feb;20(1):5–9.
29. De Lorenzo A, Romano L, Di Renzo L, Di Lorenzo N, Cenname G, Gualtieri P. Obesity: A preventable, treatable, but relapsing disease. Nutrition. 2020 Mar;71:110615.