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Night Eating Syndrome and Food Addiction in Turkish Population

Türk nüfusunda gece yeme sendromu ve yeme bağımlılığı

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Abstract
Objectives: The aim of this study was to determine the prevalence of food addiction (FA) and night eating syndrome (NES) and to investigate any correlation between them in Turkish population.
Materials and Methods: Subjects registered with family medicine centers were randomly invited to participate in the study (415 volunteers). Participants were evaluated with a socio-demographic data form, the Yale Food Addiction Scale (YFAS) and the Night Eating Questionnaire (NEQ).
Results: A total of 295 subjects, including 160 females and 135 males, were evaluated in our study. The mean age of the participants was 33.78±10.72 and the mean BMI was 25.11±4.63. 7.8% of the subjects had FA according to the YFAS, and 13.2% had NES according to the NEQ. The prevalence of a coexistence of NES and FA was 2%. Using Pearson correlation analysis, a positive correlation was established between BMI and NEQ (r=0.14, p<0.01) and a positive correlation was found between total scores from the NEQ and the YFAS (r=0.14, p<0.01). With multiple linear regression analysis, it was demonstrated that 18.4% of total NEQ scores could be explained by eight YFAS symptom scores (p<0.001).
Conclusion: It should be kept in mind that normal-weight, overweight or obese individuals may have NES or FA or both. Therefore, it could be useful to assess these problematic eating behaviors in individuals presented to family medicine outpatient clinics and to refer those with these problematic eating behaviors to relevant treatment centers.
Keywords: Night eating syndrome, food addiction, prevalence, problematic eating behaviors

Öz
Amaç: Bu çalışmanın amacı, Türk nüfusunda, yeme bağımlılığı (YB) ve gece yeme sendromu (GYS) prevalansını belirlemek ve aralarındaki muhtemel ilişkiyi araştırmaktır.
Materyal ve Metot: Aile hekimliği merkezlerine kayıtlı kişiler rastgele çalışmaya davet edildi (415 gönüllü). Katılımcılar sosyodemografik veri formu, Yale Gıda Bağımlılığı Ölçeği (YGBÖ) ve Gece Yeme Anketi (GYÖ) ile değerlendirildi.
Bulgular: Çalışmamızda 160 kadın, 135 erkek olmak üzere toplam 295 gönüllü değerlendirildi. Katılımcıların yaş ortalaması 33,78 ± 10,72 ve BKİ ortalaması 25,11 ± 4,63 idi. Deneklerin % 7,8'i YGBÖ'e göre YB, % 13,2'si GYÖ'ye göre GYS'e sahipti. GYS ve YB birlikteliğinin prevalansı % 2 idi. Pearson korelasyon analizi kullanılarak BMI ve YBÖ arasında pozitif bir korelasyon saptandı (r = 0,14, p <0,01) ve YBÖ ve YGBÖ toplam puanları arasında pozitif bir korelasyon bulundu (r = 0,14, p <0,01). Çoklu doğrusal regresyon analizi ile, toplam YBÖ puanlarının %18,4'ünün sekiz YGBÖ semptom skoruyla açıklanabileceği gösterilmiştir (p <0,001).
Sonuç: Normal kilolu, aşırı kilolu veya obez bireylerin GYS veya YB veya her ikisine sahip olabileceği akılda tutulmalıdır. Bu nedenle, aile hekimliği polikliniğine başvuran bireylerde bu problemli yeme davranışlarını değerlendirmek ve bu problemli yeme davranışları olanları ilgili tedavi merkezlerine yönlendirmek faydalı olabilir.
Anahtar kelimeler: Gece yeme sendromu, yeme bağımlılığı, prevalans, problemli yeme davranışı

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Introduction

Eating disorders are classified under eight topics in the DSM-5 (Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, Pica, Rumination Disorder, Avoidant/Restrictive Food Intake Disorder, Other Specified Feeding or Eating Disorder, and Unspecified Feeding or Eating Disorder).[1] Different from these eating disorders, another actual problematic eating behavior that is not described in the DSM-5 but is frequently investigated in the literature in recent years is food addiction (FA). Gearhardt et al. (2009) described FA using DSM-IV substance addiction criteria and developed a scale in order to be able to assess FA. With the development of this scale, the FA concept, has led to several discussions on whether it is an addiction or not, was merged with substance abuse and dependence in DSM-5, thus causing new discussions.[2] Furthermore, in the newly published ICD-11, the section describing eating disorders (Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, and Avoidant/Restrictive Food Intake Disorder) does not include FA.[3]

A Canadian study conducted on the general population reported that the prevalence of FA was 6.7% among women and 3% among men.[4] In a study conducted on the general population in Germany, the prevalence of FA was found to be 8.8%.[5] In a study conducted with low-income women aged 18-40 years in the USA, the prevalence of FA was estimated at 2.8%.[6] In a meta-analysis that reviewed studies utilizing the Yale Food Addiction Scale (YFAS), it was identified that the prevalence of FA increases proportionally to body weight and that the calculated prevalence of FA for normal-weight individuals according to the mean of 5 studies was 11.1% .[7] In a study performed with Turkish University students, the prevalence of FA was 10.4%.[8] According to these studies, the prevalence of FA can be said to differ by country, gender, age, BMI and economic conditions. Considering that FA is a new and current psychiatric manifestation, determination of the prevalence of FA in various populations can be considered to be important for mental and physical health. However, so far there have been no studies assessing the prevalence of FA in the Turkish general population.

Night Eating Syndrome (NES) has been described in the DSM-5 section of "Other Specified Feeding or Eating Disorder". NES is an eating disorder characterized by a delayed circadian pattern of food intake.[9] Allison et al. (2010) showed using a validated measurement tool that NES is associated with evening hyperphagia, poor appetite in the morning, and mood and sleep problems. It is indicated that NES can be clinically important due to its relation to obesity, and its prevalence can increase with weight.[10] It is demonstrated that obese individuals with NES present with more depressive symptoms compared to other obese individuals, and they have lower self-esteem.[11]

In a study conducted in the general population in the USA, NES prevalence was found to be around 1.5%.[12] Another study conducted on only young adult women reported a NES frequency of 1.6%.[13] Research studies on NES conducted in Turkey focused on individuals with psychiatric disorders and the reported values for the prevalence of NES were 15.7% and 22.4%.[14-16] The only study that investigated the prevalence of NES in a population without psychiatric disorders in Turkey was conducted on university students and reported 9.5% for the prevalence of NES among students.[17] There has been no NES study conducted on the general population in Turkey.

It has been observed that NES and FA can be seen more frequently in obese patients compared to non-obese patients and at the same time these problematic eating behaviors can be associated with several mental diseases.[11,18,19] Therefore the principal aim of this study was to determine the prevalence and co-existence of NES and FA in the Turkish population. Its secondary aim was to investigate the association of NES and FA symptoms in individuals with NES.

Materials and Methods

Procedure

Five of family medicine centers in Bursa city in Turkey were selected randomly and participants registered to these centers were randomly called by phone and invited into the study. Study exclusion criteria were mental retardation, neurological problems, pregnancy and not being at least a primary school graduate (a minimum schooling period of 5 years). Before the study, family physicians again assessed whether the subjects were suitable for the study and asked researchers to complete a socio-demographic data form. The subjects were then assessed by paper and pencil tests used in the study. Approval of the ethics committee was obtained and the study was conducted in line with the Helsinki Declaration. Informed consent was obtained from all participants. In addition, the study was authorized by the ethical board of the hospital.

Participants

Four hundred and fifteen people randomly selected for the study came to family medicine centers in order to participate in the study. Eighteen patients whose educational level was less than 5 years were excluded from the study. 57 individuals with chronic diseases (diabetes, hypertension, etc.) were excluded from the study. 36 patients who had been receiving psychiatric treatment (depression, anxiety, alcohol and substance abuse, etc.) in the last one year were also excluded. Six patients who reported that they were pregnant were excluded from the study in advance. Any person with mental retardation or any neurological health issues were excluded from the study. Mental retardation and the presence of a neurological disease were evaluated by the family physician by clinical interviews. In these interviews, it was questioned whether the person understood his / her reading, whether there was a mental disability report or not and received treatment for a serious neurological disease. In addition, three people whose measurements were incomplete or incorrect were excluded from the study. For these reasons, 295 adults in the age range of 18 to 65, who were highly capable of representing the society, were assessed in the study.

Measures

The socio-demographic data form consisted of 20 questions related to socio-demographic characteristics, including age, gender, education, income and immigration history, as well as personal characteristics, including Body Mass Index (BMI).

The Yale Food Addiction Scale (YFAS) consists of 25 items that assess FA based on substance dependence criteria.[2] By using these 25 items, 8 food addiction symptoms representing DSM-IV substance addiction diagnostic criteria are obtained (1-Consumed more than planned, 2-Unable to cut down or stop, 3-Great deal of time

spent, 4-Important activities given up, 5-Use despite consequences, 6-Tolerance, 7-Withdrawal, 8-Impairment or distress). By adding the scale scores of the 8 food addiction symptoms, the YFAS total score varying between 0 and 7 is obtained. In addition to this, an individual who receives at least 1 point from the 8th symptom and3 points from at least three of the other 7 criteria is assessed as having eating addiction according to the YFAS scale. Obtaining a high score on the scale shows that eating addiction is increased in an individual. The validity of the scale in Turkey was established by Bayraktar et al. (2012) and it has been shown that the scale is a valid and reliable measuring tool.[20] In addition to this, in the study performed by Şanlier et al. (2016) it was demonstrated that the validity and reliability data of the scale were sufficient for a young Turkish population.[8]

The Night Eating Questionnaire is a 16-item measurement tool for screening NES symptoms associated with night eating, evening hyperphagia, poor appetite in the morning, and mood and sleep problems.[21] The first nine questions in the questionnaire were completed by all participants. There was an instruction for the participants who do not wake up at night or who do not eat at night to not continue with the subsequent questions. Total score on the scale varies between 0-52 and a score of 25 and over means that the individual has NES. The cut-off point of the scale was determined as 18 in the validity study made for the Turkish psychiatric population.[15] At the same time, it was shown in this study that the scale is a valid and reliable measuring tool. Obtaining a high score on the scale demonstrates that symptoms of night eating syndrome are increased in the individual and obtaining a score of more than 18 demonstrates the presence of NES in the individual.

Statistics

Chi-square test was used to compare the groups with and without FA and the groups with or without NES by socio-demographic characteristics. Pearson correlation analysis was utilized to assess the relationship between NEQ and YFAS. Independent Sample T test was used to compare FA symptoms between the subjects with NES and those without NES. Multiple linear regression analysis was used to demonstrate how NEQ explains 8 food addiction symptoms. The normality assumption was met for Pearson Correlation analysis, Independent Samples T-Test and multiple linear regression analysis. Significance level for all analyses was set as $p < 0.05$. IBM Statistic 22.0 software package was used to analyze the data.

Results

295 subjects, including 160 females and 135 males, were evaluated in our study. The mean age of the participants was 33.78±10.72 and the mean BMI was 25.11±4.63. 4.4% of the subjects were underweight, 49.8% were of normal weight, 32.2% were overweight and 13.6% were obese. 7.8% of the subjects had FA according to the YFAS, and 13.2% had NES according to the NEQ. The prevalence of a coexistence of NES and FA was 2%. We found that underweight subjects did not have FA and that the percentages of FA in normal-weight subjects, overweight subjects and obese subjects were 10.9%, 4.2% and 7.5%, respectively. Additionally, we found that underweight subjects had no NES, normal-weight subjects 10.9%, overweight subjects 14.7% and obese subjects 22.5%. According to the NEQ scale it was determined that only economic conditions ($X^2=24.23$, $p<0.001$) and lifestyle ($X^2=5.26$, $p=0.022$) varied significantly among the

individuals with and without NES. Other socio-demographic features are shown in Table 1. When the cut-off point of the NEQ scale was 25, NES prevalence of the general population was 5.8%. When the cut-off point was 25, NES prevalence in normal, over-weight and obese individuals was 5.4%, 5.3% and 10.0%, respectively.

Table 1. Comparison of sociodemographic characteristics between participants with and without night eating syndrome according to the Night Eating Questionnaire

Participants		With night eating syndrome N=39		Without night eating syndrome N=256		X^2	p
		n	%	n	%		
Gender	Female	24	61.5	136	53.1	0.965	0.326
	Male	15	38.5	120	46.9		
Education status	Primary school	6	15.4	41	16.0	0.250	0.699
	Secondary school	3	7.7	20	7.8		
	High School	10	25.6	74	28.9		
	University	20	51.3	121	47.3		
Income status	Low	28	71.8	96	37.5	24.232	<0.001
	Moderate	0	0.0	96	37.5		
	High	11	14.7	64	25.0		
Marital status	Married	26	66.7	172	67.2	3.439	0.179
	Single	10	25.6	78	30.5		
	Divorced	3	7.7	6	2.3		
Employment status	Employed	27	69.2	187	73.0	0.247	0.619
	Unemployed	12	45.6	69	27.0		
Living alone	Yes	8	20.5	22	8.6	5.263	0.022
	No	31	79.5	234	91.4		
History of Immigration	Yes	9	23.1	65	25.4	0.096	0.756
	No	30	76.9	191	74.6		
History of psychiatric treatment	Yes	4	10.3	13	5.1	1.671	0.196
	No	35	89.7	243	94.9		
Smoking	Yes	9	23.1	78	30.5	0.889	0.346
	No	30	76.9	178	69.5		
BMI	Underweight <18.5	0	0.0	13	5.1	5.872	0.118
	Normal 18.5-24.9	16	41.0	131	51.2		
	Overweight 25.0-29.9	14	35.9	81	31.6		
	Obese ≥30.0	9	23.1	31	12.1		
Food addiction	Yes	6	15.4	17	6.6	3.600	0.058
	No	33	84.6	239	93.4		

A positive correlation was established between BMI and NEQ ($r=0.13$, $p<0.05$). No correlation was found between BMI and total YFAS score. Despite this, a positive

correlation was identified between BMI and first (r=0.21, p<0.001), third (r=0.21, p<0.001) and fourth (r=0.15, p<0.01) food addiction symptoms. In addition, a negative correlation was established between BMI and the fifth (r=-0.12, p<0.05) food addiction symptom. A positive correlation was found between the total scores from NEQ and YFAS (r=0.13, p<0.05), and a positive correlation was identified between NEQ and the first (r=0.26, p<0.001), third (r=0.24, p<0.001), fourth (r=0.39, p<0.001), seventh (r=0.11, p<0.05) and eighth (r=0.20, p<0.001) food addiction symptoms. A negative correlation was established between NEQ and the fifth (r=-0.12, p<0.05) and sixth (r=-0.18, p<0.01) food addiction symptoms (Table 2).

Table 2. Correlations between the Night Eating Questionnaire (NEQ), the Yale Food Addiction Scale (YFAS) and symptoms and BMI.

	BMI	NEQ	YFAS	1	2	3	4	5	6	7
NEQ	0.13*									
YFAS	-0.02	0.14*								
1-Consumed more than planned	0.19**	0.26***	0.45***							
2-Unable to cut down or stop	-0.01	-0.00	0.30***	0.12*						
3-Great deal of time spent	0.18**	0.24***	0.51***	0.52***	0.15**					
4-Important activities given up	0.12*	0.39***	0.51***	0.36	0.14*	0.36**				
5-Use despite consequences	-0.12*	-0.12*	0.48***	0.11*	0.00	0.04	0.08			
6-Tolerance	-0.09	-0.18**	0.28***	0.20***	0.02	0.15**	0.12*	0.43***		
7-Withdrawal	0.04	0.11*	0.50***	0.42	0.12*	0.37***	0.42***	0.05	0.13*	
8-Impairment or distress	0.09	0.20***	0.30***	0.23	0.12*	0.22***	0.50***	0.09	0.21***	0.34***

*p<0.05, **p<0.01, ***p<0.001

It was found that BMI averages of the subjects with NES were higher than those without NES (p=0.031). In addition, it was seen that score averages of four of the YFAS symptoms (1, 3, 4, 8) were higher in the group with NES than the group without NES. Despite this, the score average of the sixth symptom of YFAS (p=0.008) was lower in the group with NES than the group without NES. Total score for the symptoms of the YFAS second, fifth and seventh food addiction symptoms did not differ between the subjects with NES and without NES (Table 3).

The variable predicted by multiple linear regression analysis is NEQ score. Predictor variables are the scores of the 8 symptoms of YFAS. It was demonstrated that 18.4% of total NEQ scores were accounted for by the eight food addiction symptom scores (P<0.001). However, the factors that were effective in that analysis were the YFAS first, fourth and seventh food addiction symptom scores (Table 4).

Table 3. Comparison of mean scores from the Yale Food Addiction Scale and symptoms between the groups with and without night eating syndrome

	With night eating syndrome N=39	Without night eating syndrome N=256	p	LL	UL
1-Consumed more than planned	0.48±0.99	0.17±0.55	0.004	0.02	0.62
2-Unable to cut down or stop	1.10±0.71	1.03±0.56	0.481	-0.16	0.30
3-Great deal of time spent	0.35±0.77	0.13±0.45	0.010	-0.01	0.48
4-Important activities given up	0.76±1.13	0.17±0.55	<0.001	0.23	0.96
5-Use despite consequences	0.56±0.50	0.70±0.45	0.073	-0.30	0.02
6-Tolerance	1.17±0.79	1.50±0.68	0.008	-0.58	-0.07
7-Withdrawal	0.20±0.61	0.12±0.46	0.317	-0.09	0.31
8-Impairment or distress	0.30±0.65	0.11±0.38	0.011	-0.01	0.40
YFAS	3.15±1.66	2.87±1.04	0.153	-0.25	0.77
BMI	26.60±4.83	24.88±4.57	0.031	0.05	3.35

Table 4. Multiple linear regression analysis related to total scores from the Night Eating Questionnaire

YFAS symptoms	O.R.	Std. Error	*Beta*	t	p	95% Confidence Interval for O.R.	
(Constant)	13.45	0.98		13.64	<0.001	11.74	15.18
1-Consumed more than planned	1.27	0.62	0.13	2.05	0.041	0.22	2.19
2-Unable to cut down or stop	-0.75	0.55	-0.07	-1.35	0.176	-1.59	0.43
3-Great deal of time spent	0.96	0.75	0.08	1.27	0.202	-0.35	2.34
4-Important activities given up	3.17	0.58	0.36	5.43	<0.001	1.40	3.28
5-Use despite consequences	-0.42	0.76	-0.03	-0.55	0.581	-1.21	1.58
6-Tolerance	-0.88	0.52	-0.10	-1.69	0.091	-2.03	-0.20
7-Withdrawal	-1.68	0.78	-0.13	-2.16	0.032	-2.74	-0.34
8-Impairment or distress	0.10	0.87	0.00	0.11	0.905	-0.90	1.90

Dependent variable = Night Eating Questionnaire, Independent variables= Eight food addiction symptom scores, R2=0.206, Adjusted R2=0.184, R2 Change=0.20, df=5.47, F=9.27, p<0.001.

Discussion

The results of this study showed that the eating addiction prevalence in the general Turkish population was 7.2%, NES prevalence was 13.2% and the prevalence of comorbidity of these two problematic eating behaviors was 2%. There was a positive relation between NES, FA and BMI in the general Turkish population. In addition, we found that YFAS food addiction symptoms scores explained 18.4% of NEQ scores.

A study with the YFAS conducted on the general population reported a FA prevalence of 5.4%.[4] In a meta-analysis that reviewed previous studies on YFAS, the prevalence of FA among normal-weight individuals was 11.1% according to the mean value of five studies.[7] In our study, FA prevalence among normal weight, overweight and obese individuals was 10.9%, 4.2% and 7.5%, respectively. The eating culture in Turkey is different in certain aspects from that of countries in Europe and America. Despite this, the existence of FA at different rates in normal weight, overweight and obese individuals can indicate that this problematic eating behavior is a general health problem that is not associated only with obesity.

In this study, when the cut-off point of the NEQ scale was set at 18, the NES prevalence was found to be 13.2%.Given the research studies conducted on the general population, the percentage obtained in our study can be said to be high compared to the others.[12,22] At this point, it should be noted that various assessment tools and methods will lead to various rates obtained for different populations. The cut-off value was 25 in the study on which the scale we used in our study was based.[21] In the validity study of the YFAS in Turkey conducted with psychiatric patients, the cut-off was set at 18.[15] If we took the cut-off score as 25 in our study, the prevalence of NES would decrease to 5.8%according to the NEQ. However, in the current study, we found that the percentage of NES increased with increasing body weight and that the percentages of NES were 10.9%, 14.7% and 22.5% in normal-weight, overweight and obese subjects, respectively. When the cut-off point is 25, NES prevalence in normal, overweight and obese individuals was, respectively, 5.4%, 5.3% and 10.0%. Previous studies reported that the prevalence of NES may vary in the range of 6 to 25% in obese individuals.[11,23,24] In addition, the prevalence of NES is rather high in people with other eating disorders (anorexia, bulimia, binge eating) or those with sleep disorders compared to the normal population.[25] The high prevalence of NES in the current study may be ascribed to the fact that subjects with the aforementioned characteristics were not excluded from the study.

Nolan and Geliebte (2016), indicate in their study that there is a positive relation between YFAS tolerance symptoms and NEQ in the general population and that this relation can be explained by increased negative emotional nutrition due to NES.[18] At the same time, in this study it is discussed that the food consumed during nocturnal awakening when depressive symptoms are higher, do not provide the same effect and this situation can increase YFAS tolerance symptoms. In this study, YFAS tolerance sub-criteria were higher in the group without NES, which can be considered to be unexpected. An unexpected result emerged of a low negative correlation between YFAS tolerance symptoms and NEQ. These findings may be due to the fact that individuals with NES have a higher amount of food consumption compared to those without NES. It has been demonstrated in other studies that NES prevalence increases proportionally with BMI. In other words, it can be assumed that individuals with NES try to restrict themselves less in food consumption and for this reason they more easily

tolerate mental problems that tolerance symptoms may cause. At the same time, a statistically significant high level of tolerance score averages of the individuals without NES compared to those with NES in this study support this view. More studies may be necessary to elucidate the relation between NES and YFAS tolerance symptoms.

In this study, the consuming more than planned symptom average was significantly higher in individuals with NES compared to those without NES. In studies of NES it has been shown that impulsive behaviors are more likely to occur in people with NES and as a result of impulsive features NES symptoms can increase. When it is considered that one of the effective factors for explaining NEQ is item one in multiple regression analysis, it can be assumed that individuals with NES have more difficulty in controlling eating behavior. High score averages of the third and fourth criteria of FA in individuals with NES compared to those without NES can be associated with NES symptoms, since in the YFAS symptoms used in calculation of the third and fourth symptom scores are assessed (sustained food consumption throughout the day, surplus of search for food and abandonment of important activities for nutrition reasons). At this point, it can be assumed that due to NES, individuals can spend more time getting food, the behavior of searching for food is much greater in individuals with NES and thus these individuals avoid social environments where they cannot obtain food at night. At the same time, the fact that the YFAS 4th criteria is an effective factor in explaining NEQ score in regression analysis supports this opinion.

According to the YFAS scale, in order to determine the existence of FA in individuals, they must have at least one point from the eighth criteria. The 8th symptom score on the YFAS scale is composed of the scores of two symptoms that evaluate the disturbance of the individual by the behaviors associated with eating and degradation of functionality due to eating. When it is considered that the prevalence of sleeping disorders, psychiatric disease, obesity and other metabolic diseases are much greater in individuals with NES compared to those without NES, the functionality of these people can be affected more negatively. The possibility of NES causing weight increase in individuals and at the same time difficulty of weight control in individuals with NES due to sleep and irregular eating habits could cause an increase of the YFAS 8th symptom score in these individuals. Because these individuals with NES have difficulty controlling their eating behaviors and have irregular eating habits, they may think while completing this scale that their life is affected more negatively compared to those without NES and that they feel more uncomfortable due to this situation.

We found that another important factor in explaining 18.5% of NEQ scores in multiple regression analysis was the YFAS 7th symptom. This symptom measures the increase of food amount in case of quitting certain foods and the increase of food consumption as a result of coping with problems occurring due to deprivation symptoms. In the studies performed on individuals with NES, it was assessed that these individuals tend to consume more food at night in order to cope with anxiety, depression or stressful feelings. Especially because of negative emotions following nocturnal awakening, individuals tend to consume more food. Because of the symptoms seen in individuals with NES, the subjects may have received higher scores than those without NES for the 7thsymptom of FA when assessing problematic eating behaviors. For this reason it could be useful to perform additional studies in order to understand how eating

behaviors emerge that are seen in individuals with NES and the similarity to FA regression symptoms.

In our study, the prevalence of a coexistence of NES and FA was 2%. Correlations between NES and FA, increased FA symptoms in subjects with NES and the fact that FA accounted for NEQ scores indicate that these two nutritional problems interact with each other. It should be kept in mind that normal-weight, overweight or obese individuals may have NES or FA or both. Therefore, it could be useful to assess these eating disorders in individuals presenting to family medicine outpatient clinics and refer those with these eating disorders to relevant treatment centers.

The limitations of our study include the fact that NES and FA were assessed using self-report questionnaires rather than clinical diagnosis. In addition to this, another important limitation of the study is that individuals with other eating disorders that could cause a confusing effect in definitive diagnosis of NES and FA were not excluded from the study.

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Compliance with ethical standards

Conflict of interest: On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval: The study was conducted in 2016 with Institutional Review Board approval (2011-KAEK-25 2016/14-06).

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