

# Nutritional status of university students with binge eating disorder

*Tıkınırcasına yeme bozukluğu olan üniversite öğrencilerinin beslenme durumları*

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**Aim:** To determine the binge-eating disorder (BED) and relationships with body mass index (BMI) and nutritional status in 281 university students.

**Materials and Methods:** BED was assessed by Bulimic Investigatory Test, Edinburgh (BITE) proposed by Henderson and Freeman.

**Results:** Sixty-five students (14.2 % male, 8.9 % female; totally 23.1 %) met the criteria for BED (BED+) with a mean age of 20.9±1.7 years and BMI of 23.7±3.9 kg/m<sup>2</sup>. Nearly fifteen percent (15.4 %) of the BED+ group was classified as at risk of overweight (>95<sup>th</sup> to <95<sup>th</sup> percentiles) and 1.5 % of them were classified as overweight (>95<sup>th</sup> percentile). Significant differences were observed in daily total energy intake between BED+ (2381±1096kcal/day) and BED- (1700±747 kcal/day) (p<0.05). There were significant differences in consuming of breads/cereals, dairy products (p<0.01), vegetables, meat servings (p<0.05), between groups.

**Conclusion:** These findings suggest that BED should be a significant health problem associated with medical problems among university students

Keywords: *Binge eating disorder (BED), dietary intake, university students, obesity*

**Amaç:** Üniversite öğrencilerindeki tıkınırcasına yeme bozukluğunun (TYB) sıklığını ve beden kitle indeksi (BKİ) ile beslenme durumları arasındaki ilişkiyi belirlemek.

**Gereç ve yöntem:** Çalışmaya 281 gönüllü öğrenci katılmıştır. TYB'in varlığı Henderson ve Freeman tarafından geliştirilen BITE (Bulimic Investigatory Test, Edinburgh) anketi ile araştırılmıştır.

**Bulgular:** Altmış beş öğrencinin (%23.1; %14.2 erkek, %8.9 kız) TYB kriterlerini sağladığı (TYB+), yaş ortalamalarının 20.9±1.7 yıl, BKİ ortalamalarının da 23.7±3.9 kg/m<sup>2</sup> olduğu saptanmıştır. Öğrencilerin %15.4'ünün şişmanlık riski taşıdığı (85-95.persentil), %1.5'inin de şişman (>95.persentil) olduğu belirlenmiştir. Günlük enerji alımları açısından gruplar arasında önemli farklılıkların (TYB+ grubu 2381±1096 kkal/gün; TYB- grubu 1700±747 kkal/gün; p<0.05) olduğu saptanmıştır; diyetle günlük alınan besinlerin miktarları açısından da özellikle ekmek ve tahıllar, süt ve ürünleri (p<0.01), sebze ve et tüketimi (p<0.05) açısından farklılıklar belirlenmiştir.

**Sonuç:** Bu bulgular doğrultusunda, tıkınırcasına yeme davranış bozukluğunun üniversite gençliği arasında yaygın ve önemli bir sağlık problemi olduğu söylenebilir.

Anahtar sözcükler: *Tıkınırcasına yeme bozukluğu (TYB), besin alımı, üniversite öğrencileri, şişmanlık*

Eating disorders are generally characterized by abnormal eating patterns and cognitive distortions related to food and weight, which in turn result in adverse effects on nutrition status, medical complications and impaired health status and function. Binge eating disorder (BED) is a new proposed eating disorder in the 4<sup>th</sup> ed. of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV). BED is not a formal diagnosis within the DSM-IV, but in day-to-day clinical practice the diagnosis seems to be generally accepted. The binge eating episodes are associated with three or more of the following: eating much more rapidly than normal, eating until feeling uncomfortably full, eating large amounts of food when not feeling physically hungry, eating alone because of being embarrassed by how much one is eating, feeling disgusted with oneself, depressed or very guilty after overeating (1).

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People with the BED have binge eating as do subjects with bulimia nervosa, but unlike the latter they do not engage in compensatory behaviors. Although the diagnosis BED was created with the obese in mind, obesity is not a criterion. Overweight subjects with BED consider themselves more overweight and fatter than non-binge subjects with a comparable weight (2). Subjects with BED and obesity had a higher energy intake than subjects with obesity alone. Also, subjects with BED consumed more dessert and more snack foods (more fat and less fruit) than did obese control subjects. Unhealthful eating behaviors remain predominant among late adolescents, especially those in college (3). The purpose of this study was to examine the difference in nutritional status of university students who met the criteria for BED and who did not.

## Material and methods

The study population was consisting of 18-24 years old university students from 3 public and 2 private universities in Ankara, Turkey. A total of 139 male (49.5%) and 142 (50.5%) female students participate in this study. The universities were chosen from a list of all public and private universities in Ankara using a proportional-size probability formula. In each university, 60 students were selected randomly. A total of 300 students were invited to participate but 11 students refused to participate. Of the 289 distributed surveys, 8 were not returned therefore we used 281 surveys for present analyses (response rate 93.6%). Measurement and data collection were conducted during 1 semester (4 months) period between March and June 2004.

### *Determination of BED*

BED, assessed by the Bulimic Investigatory Test, Edinburgh (BITE) proposed by Henderson and Freeman (4). The BITE is a 33-item self-report measure, designed to identify subjects with symptoms of bulimia or binge eating. The BITE consists of two subscales: Symptom Scale, which measures the degree of symptoms present, and the Severity Scale which provides an index of the severity of bingeing and purging behaviors as defined by their frequency. The maximum possible score is 30 for Symptom Scale. A symptom score of 20 or more indicates a highly disordered eating pattern and the presence of binge eating; the medium range (10-19) suggests an unusual eating pattern; the low range (0-10) falls within normal limits.

### *Dietary intake and nutrient analysis*

Three dietitians collected the dietary data using an open ended, interview-administered dietary history. All participants completed detailed three-day food records. Participants were required to maintain the food records for two weekdays, and one weekend day. Prior to completing

the food records, all participants were required to attend a one-hour class of verbal instructions on maintaining the food records. The average energy, total fat, saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), polyunsaturated fatty acids (PUFA) and cholesterol content for each individual's diet were analyzed using food composition tables (5). The energy and nutrient intakes of these participants were compared to the Recommendation Dietary Allowances (RDA) (6) and American Heart Association (AHA) recommendations (7).

### *Anthropometrical measurements*

Height was measured to the nearest 0.1 cm, and weight to nearest 0.5 kg in light clothing and without shoes. BMI was calculated as weight (kg) / (height (m<sup>2</sup>)). Trained staff using standardized methods and apparatus of the same took all anthropometrical measurements precision. Since reference data on BMI for the Turkish population are not available, the National Health and Nutrition Examination Survey (NHANES) reference data were used for estimating obesity in Turkish adolescents. The adolescents were grouped into four categories, underweight, normal-weight, at risk of overweight and overweight in accordance with the cut-off points of <5th, 5th to <85th, 85th to <95th and ≥ 95th percentiles of the NHANES III standard respectively (8).

### *Other assessments*

Questionnaire interview were conducted to gather information such as demographic information, nutritional habits and health status of the students by a self-administered questionnaire.

### *Statistical analysis*

Data normality was checked by using One-Sample Kolmogorov-Smirnov Test. The differences between bingers and non-bingers mean values were determined by parametric (Independent Sample t-Test) and non-parametric (Mann-Whitney U Test) tests. The Chi-Squared Test (employing Fisher's exact test when indicated) was used to compare the percentage of the general characteristics. All data analysis was performed by using SPSS statistical package (version 10.0) and the level of statistical significance for analysis was set at  $p < 0.05$  unless otherwise stated.

## Results

The study population consisted of 281 university students, with 139 males and 142 females. BITE was carried out to all students and 65 students (totally 23.1 %; 14.2 % male, 8.9 % female) met the criteria for BED (BED+). BED+ group had a mean age of  $20.9 \pm 1.7$  years and BMI of  $23.7 \pm 3.9$  kg/m<sup>2</sup>. Most of them (55.4 %) were studying at public universities and 26.2 % of them were studying

in biological sciences. From the data, 15.4 % of the BED+ group was classified as at risk of overweight and 1.5% of them were classified as overweight. The mean binge frequency of bingers was approximately 3.2 days per week. Compared to BED- group, BED+ group had skipped main meals especially breakfast and lunch ( $p<0.05$ ). In addition, they also had more unusual eating patterns such as night eating than BED- group (84.6% and 65.7 %, respectively). More than half of (50.8%) the BED+ group felt themselves to be very overweight, 49.2% of them felt as overweight and determined their health status as "bad" (12.3%)(Table 1).

**Table 1.** The percentage of BMI, nutritional habits and health status of students

	BED + group (n=65)	BED - group (n=216)	$\chi^2$	p value
<b>BMI<sup>1</sup></b>				
Underweight (<5th)	3.1	8.8		
Normal (5th - <85th)	80.0	85.2		
Risk of overweight (85th-<95th)	15.4	5.1	9.604	0.022*
Overweight ( $\geq 95$ th)	1.5	0.9		
<b>Nutritional Habits</b>				
<b>Skipped meal</b>	53.8	45.3		
Breakfast	40.0	33.8	2.321	0.313
Lunch	10.8	11.5		
Dinner				
Snacks	96.9	96.3	1.079	0.299
Night eating	84.6	65.7	8.934	0.011*
<b>Health status</b>	12.3	6.9		
Bad	41.5	43.5	1.884	0.390
Moderate	46.2	49.6		
Good				

\*Significantly different ( $p<0.05$ ) between groups

<sup>1</sup>BMI body mass index

Table 2 represents the mean daily energy and nutrient intake of groups. Total energy (TE) intake was higher in BED+ group (2381±1096kcal/day) than BED- group (1700±747 kcal/day) and the mean differences were statistically significant ( $p<0.01$ ). According to the AHA recommendations both groups had high intake of total fat, SFA and MUFA. The mean percentage of energy from fat was 33.3±7.7 % TE for BED+ group and 31.8±8.5 % TE for BED- ( $p>0.05$ ). Also compared to each group BED+ group had higher intake of SFA, MUFA, PUFA ( $p>0.05$ ) and cholesterol ( $p<0.01$ ) than BED- group. In the other hand, BED+ group had lower intake of protein and carbohydrates than BED- group ( $p>0.05$ ).

**Table 2.** Nutrient intake differences between groups (values are means±SD)

Nutrients	BED + group (n=65)	BED - group (n=216)	t
Energy kcal/d	2381±1096	1700±747	-5.73*
Protein %kcal	15.4±4.3	16.4±4.9	ns
Carbohydrate %kcal	49.2±8.1	51.0±8.7	ns
Total fat %kcal	33.3±7.7	31.8±8.5	ns
SFA, %kcal	12.0±3.4	11.5±3.6	ns
MUFA, %kcal	10.6±3.1	10.5±7.7	ns
PUFA, %kcal	8.3±4.1	7.7±4.2	ns
P/S ratio	0.7±0.4	0.7±0.5	ns
Cholesterol (mg/d)	237±242	164±116	-3.36*

\*Significantly different ( $p<0.05$ ) between groups

<sup>1</sup>SFA saturated fatty acid, MUFA monounsaturated fatty acid, PUFA polyunsaturated fatty acid, P/S ratio polyunsaturated/saturated ratio

Table 3 indicated that the mean number of servings along with the recommended number of servings, for each food group in the Food Guide Pyramid. There were significant differences in amount of breads/cereals, dairy products ( $p<0.01$ ), vegetables, meat servings ( $p<0.05$ ), between groups. In BED+ group, especially high fat content foods, such as meats and dairy products consumed more than BED- group. Both in two groups, vegetables, fruits and dairy servings were lower than the recommendations in Food Guide Pyramid. Mean daily servings for sweets and fats were higher but there was no significant difference among groups ( $p>0.05$ ).

**Table 3.** Mean numbers of servings per day by food guide pyramid categories (values are means±SD)

Pyramid Food Group	Recommended (servings/day)	BED + group (n=65)	BED - group (n=216)	p value
Breads/cereals	6-11	10.5±7.3	8.1±5.3	0.005*
Vegetables	3-5	1.7±1.2	1.2±0.9	0.020**
Fruits	2-4	1.2±2.2	1.3±2.1	0.711
Meats	2-3	2.9±1.1	2.3±1.6	0.029**
Dairy	2-3	1.4±1.3	0.9±0.8	0.000*
Sweets	minimal	5.7±8.2	5.0±6.7	0.495
Fat	minimal	9.8±6.4	7.9±8.9	0.132

Significantly different (\*  $p<0.01$ ; \*\* $p<0.05$ ) between groups

## Discussion

Binge eating is proposed as a new diagnostic category within the new spectrum of eating disorders. The disorder falls into the category "eating disorders not otherwise specified"(EDNOS) (1).

More than 5 million Americans suffer from eating disorders. According to ADA (American Dietetic Association) report, five percent of females and 1% of males have anorexia nervosa, bulimia nervosa or binge eating disorder. It is estimated that 85% of eating disorders have their onset during the adolescent age period (9). In the other hand, the onset of binge eating disorder typically occurs in late adolescence or in the early twenties. Also, unhealthy eating behaviors remain predominant among young adults, especially those in college. For example, the occurrence of bulimia has been estimated to be as high as 20% in college populations (10) and symptoms of binge eating have been detected in up to 90% of college women (11). Previous study in Turkey, disturbed eating behavior (EAT-26 score of 20 or above) was found in 11.5 % of the university students (12).

In our study, after carried out BITE, 23.1% (14.2% male, 8.9% female) of the university students met the criteria for BED. According to common idea, binge eating disorder affects men and women, although it is slightly more in women, with about three women being affected for every two men (13). On the contrary, in our study, males (14.2%) affected more than females (8.9%). In the other study it is reported that, not only do males binge less than females (28-49 % and 34-79 %, respectively), binge on different types of foods than females (e.g., pizza, hamburgers and snack foods), and at mealtimes, but they are also more likely to do so in public and feel no loss of control or dysphoria during or after (14). In fact, in another research it was found that many males reported feeling happy after having binged and the most males were not identifying their eating as a binge (15). In a recent review, Marcus (16) found that binges typically occur 3 to 5 times a week. In our study, the mean binging frequency of the students was  $4.4 \pm 2.1$  days/week for the students with a BMI greater than 95<sup>th</sup> percentile,  $3.1 \pm 2.3$  days/week for the students with a BMI between 85<sup>th</sup> - <95<sup>th</sup> percentile. Empirical data indicated that as weight increases, so does the prevalence and frequency of binge eating. Özbey, et al (17), determined the prevalence of binge-eating disorder in obese women in Turkey and 23 % subjects met the criteria for BED with a mean of  $34.3 \pm 5.63$  kg/m<sup>2</sup> BMI.

In this study, most of the BED+ group (55.4 %) were studying at public universities and mostly (54 %) lived in dormitory. Many authors have noted that eating disorders are detectable in all social classes, suggesting that higher socioeconomic status is not a major factor in the prevalence of eating disorders (9).

Body mass index cut-off points are very useful clinically if they are based on national data. Therefore, each country even different regions should produce their own

BMI percentiles. Unfortunately, there is no data on BMI for the Turkish population. Therefore the NHANES reference data were used for estimating obesity in Turkish adolescents and late adolescents. According to this reference data, 15.4 % (12.0% of female, 17.5 % male) of the BED+ group was classified as at risk of overweight and 1.5% (no female, 2.0% male) of them were classified as overweight. By the NHANES III survey in 1988-1994, 11% of youth were overweight (based on body mass index in the 95<sup>th</sup> percentile) and 22% were at risk for overweight (based on the 85<sup>th</sup> percentile of BMI) (18). The data showing that obesity is not necessarily a criterion for BED because BED occurs not only in obese individuals but also in persons of normal weight and overweight.

More than fifty percent (50.8%) of the BED+ group felt themselves to be very overweight, 49.2% of them felt as overweight and determined their health status as "bad" (12.3%). Moreover, BED+ group skipped meals especially breakfast and lunch also; night eating attitudes were more than BED- group (84.6% and 65.7%, respectively). It is reported that, the BED group ate significantly more in the evening than its control group counterparts (19). Guss et al. (20) showed that mean energy intake differed significantly among the subjects with BED than subjects without BED. Also, BED groups consumed a significantly greater percentage of their total energy from fat (38.5 %) than did normal weight controls (30.8%). In our study, total energy intake was higher in bingers than non-bingers ( $p < 0.01$ ). Besides, the mean percentage of energy from fat was high in both groups ( $33.3 \pm 7.7\%$  of TE for BED+ and  $31.8 \pm 8.5\%$  of TE for BED- groups). Likewise, in a study, BED group consumed a significantly greater percentage of their total energy from fat (38.5 %) than did normal weight controls (30.8 %) (41). According to the recommendations of AHA; a diet that provides < 30 % of total calories from fat, <10% of calories from saturated fatty acids, up to 10% from polyunsaturated fatty acids, and as much as 15% from mono unsaturated fatty acids is recommended (21).

In this study, both groups had high intake of saturated fatty acids (respectively,  $12.0 \pm 3.4\%$  of TE,  $11.5 \pm 3.6\%$  of TE;  $p < 0.01$ ). Besides, in both groups polyunsaturated fatty acids intake was lower than recommendations, so that Turkish late adolescences are under risk of arteriosclerosis.

Yanovski et al (22) also reported that bingers had greater percentage of kcal from fat and lesser percentage of kcal from protein than obese control. Although dietary intake of protein percentage met the recommendations of RDA, BED+ group had less protein than BED- group (respectively,  $15.4 \pm 4.3\%$  of TE,  $16.4 \pm 4.9\%$  of TE;  $p > 0.05$ ). Also,

BED+ group's carbohydrate intake was less than BED-group (respectively, 49.2±8.1 % of TE, 51.0±8.7% of TE;  $p>0.05$ ) and under the recommendations of RDA.

Findings from initial laboratory studies, suggest that when people binge eat, a greater percentage of foods eaten high in fat and low in protein and high-fat foods are preferred more than carbohydrate-rich foods (16). In current study, in both groups the mean daily servings of bread/cereals (10.5±7.3 servings, 8.1±5.3 servings;  $p<0.01$ ) and meats (2.9±2.1 servings, 2.3±1.6 servings;  $p<0.01$ ) were met the recommendations of Food Guide Pyramid. In the study by Cooke et al (23), BED subjects consumed significantly more meat than subjects without BED. Besides, the mean number of servings/day of fruits (1.2±2.2 servings/day) and vegetables (1.7±1.2 servings/days) were under the recommendations of Food Guide Pyramid. The Munoz (24) study reported fat and sugar intake by kilocalories and indicated that fat and sugars were extremely high, providing around 40% of the daily calories across all groups (age, gender, and poverty status). In our study, the combined sweets and fats category (top of the Pyramid) was very high at 13.2±8.2 servings per day.

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## Conclusions

As a conclusion, although eating disorders are primarily disorders of the mind, nutrition-related problems are the dominating consequences of this disease. Results suggest that BED is a significant health problem associated with physical and mental illnesses as well as impaired quality of life and social functioning. Although obesity is not necessarily a criterion for BED, mostly people diagnosed with BED are overweight and suffer the same medical problems faced by the non-binging obese population such as diabetes, high blood pressure, high blood cholesterol levels, gall-bladder disease, heart disease and certain types of cancer. Obesity among children and adolescents is increasing and binge eating is a prevalent problem among obese children and adolescents seeking help for their obesity. Although our sample size was small, the findings may help direct health efforts in the late adolescence by improving diet adequacy, educating the students about meal planning because it is still unclear whether adolescents have a full understanding of their eating behaviors.

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