Journal of Health Sciences Arel University, *9(2), 1-9*
Arel Üniversitesi Sağlık Bilimleri Dergisi, 9(2), 1-9

JOURNAL OF HEALTH SCIENCES AREL UNIVERSITY

AREL ÜNİVERSİTESİ SAĞLIK BİLİMLERİ DERGİSİ

Home page (Web sayfası): https://dergipark.org.tr/en/pub/arsagbil

DOI: 10.71230/arsagbil.1572117 *Research Article*

Evaluation of the Relationship Between Eating Disorder Risk and Anthropometric Measurements: A Cross-Sectional Study with Faculty of Health Sciences Students

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Abstract
This study aimed to evaluate the relationship between the REZZY eating disorders scale and anthropometric measurements in health sciences university students. 149 health sciences university students were evaluated. In the study, anthropometric measurements were evaluated. REZZY eating disorders scale was used for eating disorder screening. The data were evaluated with SPSS 27.0 program. Variables affecting REZZY eating disorders were determined by binary logistic regression analysis. Risk of eating disorder was detected in 51% of the students. Female students had a significantly higher risk of eating disorders ($p<0.05$). Body weight, waist circumference and muscle mass were found to be significantly lower in those at risk for eating disorders ($p<0.05$). It was observed that overweight and obese students and the students who were at risk according to waist/height ratio classification and required treatment had a significantly lower risk of eating disorder ($p<0.05$). Risk of eating disorder in women was found to be 2.919 times higher ($p<0.05$). Risk of eating disorder was found to be 4.182 times higher for individuals who were underweight and normal according to their body mass index ($p<0.05$). It is thought that eating disorders may differ in these individuals and comprehensive studies on this population should be increased.

Keywords: Anthropometric measurements, Eating disorder, REZZY, University students

Yeme Bozukluğu Riski ile Antropometrik Ölçümler Arasındaki İlişkinin Değerlendirilmesi: Sağlık Bilimleri Fakültesi Öğrencileri ile Kesitsel Bir Çalışma

Özet
Bu çalışmada sağlık bilimleri alanında öğrenim gören üniversite öğrencilerinde REZZY yeme bozukluğu ölçeği ile antropometrik ölçümler arasındaki ilişkinin değerlendirilmesi amaçlanmıştır. Kesitsel olarak planlanan bu araştırmanın örneklemini 18-25 yaş aralığındaki 149 sağlık bilimleri alanında öğrenim görmekte olan üniversite öğrencisi oluşturmakta olup antropometrik ölçümleri değerlendirilmiştir. Yeme bozukluğu taraması için REZZY yeme bozukluğu ölçeği kullanılmıştır. Veriler SPSS 27.0 programı ile değerlendirilmiştir. REZZY yeme bozukluğu üzerine etki eden değişkenler binary lojistik regresyon analiziyle belirlenmiştir. Öğrencilerin %51'inde yeme bozukluğu riski saptanmıştır. Kız öğrencilerin anlamlı düzeyde daha fazla yeme bozukluğu riskine sahip olduğu belirlenmiştir ($p<0,05$). Yeme bozukluğu açısından riskli gruptakilerde vücut ağırlığı, bel çevresi ve kas kütlesinin anlamlı düzeyde düşük olduğu

Başvuru: 22 Ekim 2024 **Kabul:** 3 Mart 2025
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Journal Abbrevations: J. H. Sci. Arel U. Arel Ü. S. Bil. Derg.

saptanmıştır (p<0,05). Fazla kilolu ve obez öğrenciler ile bel/boy oranı sınıflamasına göre riskli ve tedavi gerektiren öğrencilerin daha düşük yeme bozukluğu riskine sahip olduğu görülmüştür (p<0,05). Kadınlarda erkeklere göre yeme bozukluğu riski 2,919 kat daha fazla bulunmuştur (p<0,05). Beden kütle indeksine göre zayıf ve normal olan bireylerin fazla kilolu ve obezlere göre yeme bozukluğu riski 4,182 kat daha fazla olarak saptanmıştır (p<0,05). Obezite prevelansının son zamanlarda artışıyla birlikte odak noktası değişmekte ve obez bireyler yeme bozukluğu riski açısından daha ön planda olabilmektedir. Dolayısıyla yeme bozuklukları açısından normal ağırlıkta ve zayıf bireyler göz ardı edilebilmektedir. Bu bireylerde yeme bozukluğu değişkenlik gösterebilmekte ve bu kitleye yönelik kapsamlı çalışmaların arttırılması gerektiği düşünülmektedir.

Anahtar kelimeler: Antropometrik ölçüm, REZZY, Üniversite öğrencileri, Yeme bozukluğu

1. INTRODUCTION

As a part of weight management, detecting the risk of eating disorders is very important [1]. Eating disorder development is affected by many biological, psychological, developmental and sociocultural factors as well as eating disorder behavior. Many eating disorders begin in adolescence or early adulthood, and these individuals can be quite vulnerable to the effects of the environment, especially in today's conditions [2]. The majority of people with eating disorders are under the age of 25, and individuals at this age can experience both the difficulties of adolescence and the experiences of stressful life such as leaving home to go to university. Trying to adapt to a new environment can cause stress and feelings of loneliness in these individuals, and this can lead to emotional problems. It is known that emotions can cause changes in eating habits and behaviors, and it is stated that stress and negative emotions cause physiological reactions similar to satiety, which in turn leads to a decrease in appetite and energy intake. In addition, the difficulties these individuals face in their changing social environments can increase their stress and anxiety levels, causing their existing eating disorder to worsen [3]. Research on students' eating habits shows that options such as simple food preparation methods, affordable foods and delicious meals are frequently preferred by these individuals. Having a fast and affordable option may encourage students to consume fast food frequently. Frequent consumption of fast food and ready-made foods can make the nutritional status of students more unhealthy [4]. In recent years, the perception of beauty has been changing with the influence of social media, and unhealthy nutrition and living conditions can cause undesirable changes in physical appearance. In this context, it should not be forgotten that the group that mostly suffers from this situation is adolescents and young adults. The concept of eating attitude has been encountered frequently recently. Eating attitude refers to all nutritional practices, food preferences, nutrition programs and eating patterns of a person. Nutrition is much more than a need and urge created by physiological hunger and is a phenomenon with psychological, socioeconomic and environmental interactions [5]. An individual's eating attitude can be affected by many factors such as genetic factors, age, gender and social environment [6]. For example, one study conducted a systematic review of 25 studies and found that the most consistent predictor of eating disorder risk was body dissatisfaction, followed by depression and low self-esteem. In addition, female gender has also been identified as an important factor in eating disorders and has been found to have a strong relationship with body dissatisfaction [7].

Different types of scales are available to assess eating disorders [8]. One of these scales is the REZZY eating disorders scale, which was developed to screen for eating disorders. This scale can screen for eating disorders with a small number of question items and provide warnings for further research. The scale consists of a total of five items, and the letters selected from the items constitute the name of the scale. Its name was determined as SCOFF, based on the letters chosen in the original form of the scale. The Turkish validity and reliability structures of the scale are called the REZZY eating disorders scale [9]. This study aimed to evaluate the relationships between eating

disorder risk and anthropometric measurements by providing comparisons among health sciences university students, who are a sensitive population in terms of eating disorders.

2. MATERIALS AND METHODS

2.1. Place, Time and Sample Selection of Research

The sample of this cross-sectional research includes Ankara University Faculty of Health Sciences students between the ages of 18-25 in May 2022-July 2022. The departments from which the data were taken were selected among the departments with the highest number of students in the faculty. The size of the universe was 980 and in determining the sample size to be included in the study, the effect size was used as 0.5 (medium effect), the significance level (α) was 0.05, and the power (1-β) was 0.90. According to this result, 149 students were included in the study. Students under the age of 18 and over the age of 25, those with any psychiatric illness, those diagnosed with an eating disorder or using any pharmacological agent that affects appetite, and also international students were not included in the study. Research data was obtained using a survey form and face-to-face interview technique. The survey form applied to the participants consists of sociodemographic characteristics, anthropometric measurements and the REZZY eating disorders scale. Participants were informed before the study, and the study was conducted with those who volunteered to participate in the study and a consent form was signed. Ethics Committee Approval numbered 08/80 dated 25.04.2022 was received from Ankara University Clinical Research Ethics Committee.

2.2. Evaluation of Anthropometric Measurements

In the study, students' body weight (kg), height (cm), waist circumference (cm), hip circumference (cm), neck circumference (cm) measurements were taken and these measurement values were combined with body mass index (BMI), waist height ratio, waist circumference (cm). hip ratio, body composition (body fat percentage, lean body mass, etc.) were measured. Among anthropometric measurements, waist circumference was measured with a non-flexible tape measure, height was measured with a Seca brand stadiometer , and weight and body component analyzes were measured by the researchers with TANITA-BC-545-N. Neck circumference measurement is an anthropometric measurement that is easy to apply, cheap, highly repeatable and it does not show any changes since it is not affected by different situations during the day, which can be useful in the follow-up of the preliminary diagnosis and treatment process. It is seen as a practical method that can be used in determining nutritional status. In recent years, it is important to evaluate NC, which has been found to be highly related to chronic diseases and biochemical findings of diseases, for all age groups and determine the cut-off points [10]. Neck circumference was measured horizontally with a rigid tape measure at the upper edge of the laryngeal prominence, with the head upright and the eyes facing forward [11]. Neck circumference is a parameter that can be used to evaluate upper body fat accumulation, and the limit value for obesity is >34 cm in women; It is accepted as >37 cm in men [12]. Waist circumference was measured from the midpoint of the lowest rib and the iliac bone [13]. For hip circumference, the largest circumference between the waist and knees was measured [14]. BMI was calculated by dividing body weight by the square of height (kg/m^2). Measurement results <18.5 is underweight; 18.5-24.9 kg/m^2 are normal; 25.00-29.9 kg/m^2 overweight; 30.0-39.9 kg/m^2 is classified as obese [15]. Waist height ratio is the ratio of waist circumference to height, and measurement results of 0.4-0.5 are normal; 0.5-0.6 risky; >0.6 was evaluated as requiring treatment [16]. Waist-hip ratio is the ratio of waist circumference to hip circumference, and ≥85 is considered risky in women and ≥0.90 is considered risky in men [13].

2.3. REZZY Eating Disorders Scale

The REZZY eating disorders scale was developed by Hill et al. in 2010 under the name SCOFF and helps determine the risk of eating disorders [17]. Turkish validity and reliability study was conducted by Aydemir et al. [9] the scale consists of five questions, and each item is given 1 point. A person who scores 2 or more points is considered to be at risk for an eating disorder . This scale is also used to detect mixed eating behaviors in epidemiological studies [18].

2.4 Statistical Evaluation of Data

The data obtained from the study were analyzed using Spss 27.0 program. Descriptive data are given as number (n), percentage (%), arithmetic mean ($\bar{x}$) and standard deviation (SD). The suitability of the variables to normal distribution was examined with the Kolmogorov-Smirnov test. Pearson Chi-square test was used to compare categorical data, and Student t-test was used to compare quantitative data between groups. Variables affecting the participants' eating disorder were determined by binary logistic regression analysis. A value of $p \leq 0.05$ was accepted as statistical in the analyses.

3. RESULTS

Demographic characteristics of the students according to eating disorder risk status are shown in Table 1. According to the data obtained, it was determined that 71.1% of the students were female students, 16.1% had a chronic disease, 17.4% smoking, 22.1% consuming alcohol, and 40.9% were nutrition and dietetics students. It was determined that female students had a significantly higher risk of eating disorders compared to male students, it was determined that the incidence of eating disorders was higher in individuals with chronic diseases ($p < 0.05$). In general, the risk of eating disorder was detected in 51% of the students.

Table 1. Demographic characteristics of students

Variables	REZZY (+) (n:76)	REZZY (-) (n:73)	Total (n:149)	x^2	P
	n (%)	n (%)	n (%)		
Gender					
Male	14 (32.6)	29 (67.4)	43 (28.9)	8.232	**0.004***
Female	62 (58.5)	44 (41.5)	106 (71.1)		
Chronic Disease					
Yes	17 (70.8)	7 (29.2)	24 (16.1)	4.500	**0.034***
No	59 (47.2)	66 (52.8)	125 (83.9)		
Smoking Status					
Yes	15 (57.7)	11 (43.3)	26 (17.4)	0.622	0.733*
No	54 (50.0)	54 (50.0)	108 (72.5)		
Quit	7 (46.7)	8 (53.3)	15 (10.1)		
Use of Alcohol					
Yes	19 (57.6)	14 (42.4)	33 (22.1)	0.732	0.392*
No	57 (49.1)	59 (50.9)	116 (77.9)		
Department					
Nutrition and dietetics	34 (55.7)	27 (44.3)	61 (40.9)	5.546	0.136*
Orthosis and prosthesis	16 (59.3)	11 (40.7)	27 (18.1)		
healthcare Management	8 (30.8)	18 (69.2)	26 (17.4)		
social service	18 (51.4)	17 (48.6)	35 (23.5)		

Age (Years) (X±SS)	21.9±2.9	22.1±4.2	22.0±3.6	0.772†

**Pearson's Chi-square test, †Student's t-test. Chronic Disease: Cardiovascular disease, Cancer, Diabetes, Asthma/COPD, REZZY (+): Eating disorder, REZZY (-): No eating disorder*

Anthropometric measurements of the students according to eating disorder risk status are shown in Table 2. Body weight, waist circumference and lean body mass were found to be significantly lower in the group at risk of eating disorders ($p<0.05$).

Table 2. Anthropometric measurements of students

Variables	REZZY (+) (n:76)	REZZY (-) (n:73)	Total (n:149)	t	p
Body weight (kg)	65.4±14.6	72.1±18.9	68.7±17.1	2.424	**0.017**†
Waist circumference	75.7±11.1	81.1±16.3	78.3±14.1	2.376	**0.019**†
Hip circumference	98.7±8.9	100.7±10.5	99.7±9.7	1.298	0.196†
Neck circumference	32.8±3.0	32.5±2.2	32.6±2.6	0.681	0.497†
Body fat percentage (%)	25.9±7.7	24.8±8.3	25.4±8.0	-0.817	0.415†
Lean body mass (kg)	46.6±10.5	52.6±13.6	49.5±12.5	3.057	**0.003**†
Body water percentage (%)	54.1±8.0	54.4±6.3	54.3±7.2	0.215	0.830†

†Student's t-test. REZZY (+): Eating disorder, REZZY (-): No eating disorder

The markers associated with the anthropometric measurements of the students according to eating disorder risk status are shown in Table 3. It was determined that overweight and obese students and students at risk and requiring treatment according to waist/height ratio classification had a significantly lower risk of eating disorders ($p<0.05$).

Table 3. Indicators associated with students' anthropometric measurements

Variables	REZZY (+) (n=76)	REZZY (-) (n=73)	x^2	p
BMI (kg/m^2)				
Underweight and normal	54 (66.7)	27 (33.3)	17.417	**<0.001***
Overweight and obese	22 (32.4)	46 (67.6)		
Waist/hip ratio				
Low risk of metabolic complications	66 (52.8)	59 (47.2)	0.999	0.318*
High risk of metabolic complications	10 (41.7)	14 (58.3)		
Waist/height ratio				
<0.5 (no risk)	61 (58.1)	44 (41.9)		
0.5-0.6 (risk)	13 (35.1)	24 (64.9)	7.251	**0.027***
>0.6 (requires treatment)	2 (28.6)	5 (71.4)		
Neck Circumference				
Risk	6 (40.0)	9 (60.0)	0.809	0.369*
No risk	70 (52.2)	64 (47.8)		

* Pearson's Chi-square test, BMI: Body Mass Index, *REZZY (+): Eating disorder, REZZY (-): No eating disorder*

The distribution of students who answered yes to the REZZY eating disorders scale questions according to BMI classification is shown in Table 4. From the REZZY eating disorders scale questions of underweight and normal weight students, "Do you worry about losing control over how much you eat?" and “Did you believe you were fat even though others said you were too skinny?” It was determined that significantly more people answered yes to the questions ($p<0.05$).

Table 4. Distribution of students who answered yes to the REZZY eating disorders scale questions according to BMI classification

Variables	Underweight-Normal (n:81)	Overweight-Obese (n:68)	x^2	p
1. Make yourself sick (vomit)	2 (2.5)	-	1.702	0.192*
2. Lost control how much you eat	49 (60.5)	25 (36.8)	8.326	**0.004***
3. Recently lost more than six kg	13 (16.0)	11 (16.2)	<0.001	0.983*
4. Believe yourself to be fat	41 (50.6)	15 (22.1)	12.852	**<0.001***
5. Food dominates your life	33 (40.7)	20 (29.4)	2.070	0.150*

** Pearson's Chi-square test*

Factors affecting individuals' REZZY eating disorder risk classification are shown in Table 5. The risk of eating disorders in women was found to be 2.919 times higher than in men ($p<0.05$). The risk of eating disorders in individuals with underweight and normal BMI was determined to be 4.182 times higher than overweight and obese individuals ($p<0.05$).

Table 5. Factors affecting students' REZZY eating disorder risk classification

Variables	β	SH	OR 95% CI	p
Gender	1.071	0.380	2.919 (1.385-6-153)	**0.005**
BMI	1.431	0.350	4.182 (2.104-8.310)	**<0.001**
Waist/hip ratio	0.449	0.451	1.566 (0647-3.792)	0.320
Waist/height ratio	1.243	0.860	3.466 (0.643-18.690)	0.148
Neck circumference	0.495	0.555	1.641 (0.553-4.866)	0.372

BMI: Body Mass Index

4. DISCUSSION

Eating disorders affect more than 30 million people worldwide and cause significant morbidity and mortality [19]. Although eating disorders have become common among university students recently, the rapid change in the lifestyle and eating habits of university students is an important factor in the increase in the risk of eating disorders [20].

According to the results of this study, it was seen that the majority of university students (51%) were at risk of eating disorders. Similar studies that screened for eating disorders using the REZZY eating disorders scale also reported that high rates of eating disorders were detected in university students. The reason for this high rate may be due to the stress experienced by university students [21,22]. Data from this study showed that the likelihood of eating disorders was significantly higher in female students. While these data are consistent with existing literature, numerous reports worldwide indicate a higher prevalence of eating disorders in women [23, 24, 25, 26, 27]. The

study data was conducted at the faculty of health sciences and it is known that the students receiving education are generally female students. A long and difficult training process in the field of health may be among the reasons for the increased incidence of eating disorders. In addition, this study supports the possibility that female students are trying to look thinner due to the changing perception of beauty brought about by social media and the modern world, and that these individuals are in the risk group for eating disorders.

When the relationship between eating disorder risk and BMI was evaluated, it was determined in this study that the risk of eating disorders was higher in underweight and normal weight individuals. There are different results in the literature regarding this relationship. In a study, it was stated that as a result of evaluation with the REZZY eating disorders scale, the risk of eating disorders was observed in individuals with normal BMI range [21]. In a similar study, it was determined that the risk of eating disorders was higher in individuals of normal weight [23]. In a study conducted with a similar method in Vietnam, 48.8% of the participants were determined to be at risk for eating disorders, and it was determined that the participants answered yes to questions two and three of the REZZY eating disorders scale at a high rate. In addition, a positive and significant relationship was found between the risk of eating disorders and underweight status according to BMI classification and body dissatisfaction [28]. There are also different results in the literature, and in a study involving 48% of obese participants, it was determined that approximately 42% of obese participants showed a positive correlation with the risk of eating disorders [29]. In a similar study, the REZZY eating disorders scale was used and it was determined that there was a positive relationship between eating disorder and body fat percentage, BMI and body fat mass [30]. Other studies conducted with similar methods have also determined that the risk of eating disorders is higher in overweight and obese individuals compared to thin individuals [24]. In this study, body weight, waist circumference and lean body mass were found to be significantly lower in those at risk of eating disorders. In a study evaluating anthropometric measurements and the risk of eating disorders, results contrary to this study were obtained [30]. The results obtained in this study show differences and similarities with the literature. In this context, it is possible to say that eating disorders are common in all categories of the BMI classification. Although the risk of eating disorders has increased recently in overweight and obese individuals, normal weight and underweight individuals can be ignored in terms of eating disorders. Efforts of underweight and normal weight individuals to keep their weight control constant and stable, and the efforts to achieve this through diet, physical activity, etc. initiatives should also be taken into consideration. In addition, eating disorders may vary in these individuals and it is thought that comprehensive studies on this subject should be increased for this population. It should not be forgotten that the results obtained in the studies may differ due to the changing perceptions of beauty and body due to the cultural structure of the societies.

As a result, the prevalence of eating disorders has recently increased in our country, and most individuals are unaware that they suffer from eating disorders. The REZZY eating disorders scale is only one of the tools available to screen for eating disorders. Detections can be made using similar tools to screen for eating disorders in university students, and with the right guidance, these individuals can be assisted and directed to consult a health consultant. It should not be forgotten that early diagnosis of eating disorders can help provide early treatment.

Since the study is cross-sectional, the study sample is small and reflects a certain segment of the society, and the generalizability of the results may be limited. In addition, the eating disorders of the participants were determined with the help of a scale based on personal declaration, and it is thought that it would be useful to include clinical data in future studies.

Conflict of Interest

The author declare that they have no conflict of interest.

Author's Contributions
The author designed, conducted, and analyzed data for this study. The author also contributed to the writing and editing of the entire manuscript and contributed to the writing of the introduction, results, and discussion sections, and designing tables.

Ethics Committee Declaration
Ethics committee approval (No. 08/80, date 25.04.2022) was received from Ankara University Clinical Research Ethics Committee. After being informed about the study, participants who agreed to participate voluntarily signed the "Informed Consent Form".

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