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Investigation of the relationship between orthorexic tendencies and some anthropometric measurements and variables in university students

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Abstract

Orthorexia nervosa (ON) is a type of eating disorder marked by an excessive preoccupation with eating healthily to preserve and promote health, which surpasses normal levels of concern. This study aims to investigate the correlation between orthorexic tendencies, anthropometric measurements, and several other characteristics among university students. A cross-sectional study was done with a sample size of 307 university students from various departments, consisting of 228 females and 79 males. The data-gathering process consisted of administering a demographic information form and the ORTO-11 questionnaire. Anthropometric measurements, such as weight, height, waist circumference, hip circumference, and chest circumference, were measured. In addition, Body Mass Index (BMI) was calculated. The TANITA BC-418 equipment was used to measure the weight of the participants, while a flexible tape measure was used to measure their height, waist circumference, hip circumference, and chest circumference. The BMI was calculated by the individual's weight (in kilograms) by the square of their height (in meters). The data analysis encompassed the utilization of descriptive statistics, t-tests, variance analysis, and Pearson correlation analysis. A score of 25 or lower on the ORTO-11 scale was categorized as orthorexic, whereas a score higher than 25 was deemed normal. The average age and orthorexia scores of the subjects were 20.81 ± 1.86 and 27.76 ± 4.42 for females, and 21.38 ± 4.14 and 28.11 ± 4.37 for males, respectively. It was determined that 29.3% of the participants were found to display orthorexic tendencies, while the remaining 70.7% did not. There were no statistically significant variations in age, hip circumference, and orthorexia scores across genders ($p > 0.05$). No statistically significant relationship was found between the total orthorexia scores and BMIs of the individuals ($r = -.051$, $p > 0.05$). ON is associated with psychological and social complications, which in turn contribute to the development of disordered eating patterns. The results of this study indicate that determining the frequency of orthorexic tendencies among university students may contribute to the development of strategies for its prevention.

Keywords: Orthorexia nervosa, orthorexic tendency, body mass index, orthorexia scale, university students

Introduction

Orthorexia nervosa (ON) is defined as an excessive mental preoccupation with healthy eating and the consumption of healthy foods. Excessive and time-consuming preoccupation with healthy eating characterizes the term orectic, referring to the obsession with healthy eating [1]. There are no universally accepted definitions and diagnostic criteria, and there is no specific tool to assess the tendency for ON. Among the psychometric tools used

in studies on ON, the Bratman Orthorexia Test (BOT) is used [1] and ORTO-15 scale [2].

Hormones are biomolecules involved in many anxiety and mood disorders [3,4]. A decrease in norepinephrine and serotonin hormones is reported to occur in the etiology of eating disorders. Studies link this to depression and feelings of emotional and physical inadequacy. A feeling of hunger occurs when the serotonin level decreases in the blood, and a feeling of satiety

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occurs when it is high. Reduced serotonin levels can lead to symptoms like anxiety, pessimism, irritability, and obsessive-compulsive tendencies. A diet rich in carbohydrates increases serotonin levels. Thus, psychological factors that regulate an individual's appetite and emotional states link to changes in the levels of nervous system chemicals [5-7].

When the preoccupation with healthy eating and dieting becomes excessive, some psychological and social difficulties arise. Over time, these difficulties become pathological and have a negative impact on the person's life. Healthy eating habits are normally not pathological. However, when it turns into an obsession, causes negative situations that reduce the quality of life in daily life, and continues for a long time, it can be considered a behavioral disorder [8]. Orthorexic individuals examine the packaging of the products for a very long time during the purchase to determine whether there are carcinogenic substances, hormones, dyes, or additives in the product. They attach importance to food being extremely pure and unadulterated, with obsessive meticulousness. Therefore, they prefer to consume many foods raw. Orthorectics tend to restrict their diets gradually, and malnutrition may develop in these people. People with eating disorders may have disturbed eating habits, thoughts about body weight and physical appearance, and eating behaviors [8]. For orthorectics, dietary programs are very important. Some dietary approaches restrict the intake of one or more foods or food groups. Individuals adhering to this dietary approach may turn their diet into an obsession. Such diet programs, due to their easy accessibility, may lead an individual to develop an obsession, incorporating them into their life without questioning their suitability and making them a habit. Orthorectic risk groups include students receiving health and sports education, dietitians, and individuals who frequent fitness centers, including trainers and those undergoing training. According to reports, the prevalence of ON ranges from 6.9% to 57.8% and tends to rise among athletes [9,10]. Research suggests that individuals who receive education on healthy nutrition place a high value on it, not only for themselves but also for the groups they serve, potentially leading to an obsession with nutrition. The importance of healthy nutrition compels them to spend most of the day contemplating the preparation or passing of food [11,12]. According to literature research, although the orthorexia tendencies of the groups studying in the fields of health and sports sciences are reported to be high, they remain at a limited level. This study aims to investigate the correlation between orthorexic tendencies, anthropometric measurements, and various variables among university students enrolled in health and sports sciences faculties.

Material and Methods

Ethical Approval

Ethics committee approval (29.03.2023/Decision no: 91) and institutional permission were obtained before the study. The participants were informed about the study in accordance with the Declaration of Helsinki and their consent was obtained for the

Informed Consent Form. Volunteer participants were included in the study.

Study Design and Participant

This study's population consisted of 307 healthy male and female students studying at the Faculty of Health and Sports Sciences. The study was started with a study group of 350 people who voluntarily agreed to participate in the study from this population, and since 43 people did not complete the study, a study group of 307 people was taken into consideration. The convenience sampling method was used as the sampling method. In this sampling method, it is aimed at reaching the closest and most easily accessible sample to the researcher [13]. The study excluded students with psychological and chronic disorders, those who use medication for any purpose, including sedatives, herbal mixtures, or supplements, those with allergies or health issues related to smell, and those with communication disabilities. Table 1 presents information about the demographic characteristics of the individuals in the study group.

Table 1. Sociodemographic data and orthorexia status of the participants

	S	%
Gender		
Female	228	74.3
Male	79	25.7
Faculty of study		
Faculty of Health Sciences	271	88.3
Faculty of Sport Sciences	36	11.7
Education status		
First education	199	64.8
Secondary education	108	35.2
Department of study		
Nutrition and dietetics	215	70.0
Coaching education	8	2.6
Physical education and sports teaching	29	9.4
Nursing	53	17.3
Health management	2	0.7
Grade		
1st	66	21.5
2nd	127	41.4
3rd	92	30.0
4th	22	7.2
Orthorexia condition		
Orthorectic tendency	90	29.3
No orthorectic tendency	217	70.7

Measurement of Anthropometric Parameters

On the day of questionnaire data collection, weight and body composition measurements (fat/muscle ratio and mass) were

measured by Tanita BC-418, Tokyo, Japan, and height, body mass index (BMI), waist circumference, hip circumference, and chest circumference were measured with a flexible tape measure.

Data Collection

In this study, the orthorexia scale (ORTO-11) was used to determine the orthorexia levels of the participants, and a demographic information form was used to collect personal data about the participants. In this study, the data were obtained by face-to-face interviews with 307 Bayburt University students studying in different departments of the Faculty of Health and Sports Sciences. Before starting the study, consent was obtained from the participants with the Volunteer Information Form. A questionnaire questioning sociodemographic data and basic nutritional information and the Orthorexia-11 Scale (ORTO-11), whose Turkish validity and reliability were performed by Arusoğlu et al. (2008), consisting of 11 questions to obtain information about eating attitudes and behaviors, were used [14].

ORTO-11 scale

The ORTO-11 scale was used to determine the participants' obsessions about healthy eating. Donini et al. revised the 10-item scale originally developed by Bratman et al. to become the ORTO-15 scale (3, 15). The Turkish validity and reliability of the scale were performed by Arusoğlu et al. and adapted as ORTO-11 (Arusoğlu, 2008) [14]. Items 1, 2, 3, 4, 5, 7, 8, 9, 10, and 11 of the scale are graded between 1 and 4 points (1-never, 2-sometimes, 3-often, and 4-always). The scale reverses the scoring of question 6. Higher scores indicate that participants are less at risk of developing ON. The cut-off point method was used in the evaluation of the scale. The study determined the cut-off point to be 25 points at the 25% percentile and defined 25 points and below as orthorectic tendencies.

Statistical Analysis

The data obtained as a result of the research were evaluated with the SPSS (Statistic Package for Social Sciences) 20.0 statistical package program in a Windows environment. Qualitative variables were given as numbers (n) and percentages (%). Continuous variables (quantitative variables) obtained by measurement are given as mean, median, and standard deviation values. For the presentation of categorical variables (qualitative variables), number and percentage values were used. The data

were analyzed using the chi-square test. In order to determine the appropriate statistical test, the normality distribution was performed by the Shapiro-Wilk test. The correlation analysis for the data for which a normal distribution could not be obtained was carried out with the Spearman correlation test. In the interpretation of the r value obtained as a result of the correlation analysis, it was interpreted that there was a very weak relationship between 0-0.19, a weak relationship between 0.19-0.39, a moderate relationship between 0.40-.59, a strong relationship between 0.60-0.79, and a very strong relationship between 0.80-1.00.

Results

Sociodemographic data related to gender and educational status of the participants and their orthorexia status according to ORTO-11 scale scores are given in Table 1. 74.3% of the participants were female and 25.7% were male. The majority of the participants (88.3%) were studying at the Faculty of Health Sciences, while 11.7% were studying at the Faculty of Sport Sciences (Table 1). Seventy percent of the participants reported that they were studying in the Department of Nutrition and Dietetics, 17.3% in the Department of Nursing, and 9.4% in the Department of Physical Education and Sports Teaching. 21.5% of the students were studying in the 1st grade, almost half (41.4%) in the 2nd grade, 30.0% in the 3rd grade, and 7.2% in the 4th grade. Using the ORTO-11 scale scores to examine the participants' orthorectic tendencies, we found that 29.3% had an orthorectic tendency and 70.7% did not. The anthropometric measurements of the participants, such as age, height, weight, waist circumference, hip circumference, chest circumference, and orthorexia scores, are given in Table 2. The mean age of the individuals who participated in the study (total 307) was found to be 20.95±2.64. When the anthropometric measurements of the participants were examined, the mean height was 167.31±8.45 cm, the mean weight was 61.69±12.41 kg, the mean waist circumference was 67.45±10.23 cm, the mean hip circumference was 93.34±13.50 cm, and the mean chest circumference was 87.36±10.75 cm. The participants' mean orthorexia scale score was 27.85±4.40, and the first quartile of orthorexia scores was 25 points. The first quartile in this study indicates that individuals exhibit orthorectic tendency if their mean orthorexia score is 25 or below, while a score above 25 indicates no orthorectic tendency.

Table 2. Participants' age, anthropometric measurements and mean orthorexia scores

	Age	Height (cm)	Weight (kg)	Waist circumference (cm)	Hip circumference (cm)	Chest circumference (cm)	Orthorexia score
Number	307	307	307	307	307	307	307
Average	20.95	167.31	61.69	67.45	93.34	87.36	27.85
Standard deviation	2.648	8.459	12.410	10.232	13.501	10.757	4.406
Median	21.00	166.00	59.00	67.00	94.00	87.00	28.00
25. Persentil							25.00

The relationships between age, anthropometric measurements, orthorexia scores, and orthorexia status of the individuals participating in the study according to gender are shown in Table 3. The mean values of height, weight, waist circumference, and chest circumference in females were 163.56±5.13, 57.82±10.13, 66.36±9.51, and 85.48±9.50, respectively, and in males, these values were 178.14±6.64, 72.86±11.62, 70.61±11.56, and 92.80±12.27, respectively. These differences between the mean values of height, weight, waist circumference, and chest circumference were found to be statistically significant (p<0.05). The age and orthorexia scale mean scores were 20.81±1.86 and 27.7632±4.42 in women and 21.38±4.14 and 28.1139±4.37 in men, respectively. The differences between the age, hip circumference, and orthorexia scores of the participants according to gender were not statistically significant (p>0.05). Upon analyzing orthorexia status by gender, we found that 70 (30.7%) women and only 20 (25.3%) men exhibited orthorexic tendencies. These data show that women are slightly more likely than men to have orthorectic tendencies, but this difference is not statistically significant (p>0.05).

Table 3. Relationships between age, anthropometric measurements, orthorexia scores and orthorexia status of individuals according to gender

	Gender	S	Mean	Standard deviation	t	df	p
Age	Female	228	20.81	1.860	-1.662	305	0.098
	Male	79	21.38	4.146	-1.187	89.113	0.238
Height (cm)	Female	228	163.56	5.132	-20.086	305	0.000**
	Male	79	178.14	6.648	-17.744	111.893	0.000**
Weight (kg)	Female	228	57.82	10.136	-10.935	305	0.000**
	Male	79	72.86	11.622	-10.233	121.625	0.000**
Waist circumference (cm)	Female	228	66.36	9.512	-3.232	305	0.001**
	Male	79	70.61	11.567	-2.941	116.631	0.004**
Hip circumference (cm)	Female	228	92.59	12.801	-1.668	305	0.096
	Male	79	95.52	15.223	-1.534	118.457	0.128
Chest circumference (cm)	Female	228	85.48	9.506	-5.447	305	0.000**
	Male	79	92.80	12.278	-4.819	112.100	0.000**
Orthorexia scores	Female	228	27.7632	4.42222	-.609	305	0.543
	Male	79	28.1139	4.37647	-.612	137.056	0.541
Orthorexia states	Female		Male		χ^2	p	
	S	%	S	%			
Orthorectic tendency		70	30.7	20	25.3	0.821	0.365
No orthorectic tendency		158	69.3	59	74.7		
*p<0.05, p<0.01							

The Spearman correlation analysis results show a very weak, negative, and statistically significant relationship between the individuals' body mass index and the emotion sub-factor of Factor 1, which examines the emotional domain within the orthorexia scale. (r=-0,119, p<0.05) (Table 4). Therefore, it can be said that as the body mass index of individuals decreases, their concerns and feelings about healthy eating increase. It was discovered that the 1st Factor Emotion sub-factor, which looks at the emotional part of the orthorexia scale, had a statistically significant positive relationship with the 2nd Factor Behavior and 3rd Factor Cognition sub-factors (r=0.263, r=0.327, p<0.01). It appears that there is a statistically weak and positive relationship between the 2nd factor behavior sub-factor and the 3rd factor cognition sub-factor (r=0,263, p<0.01). Therefore, it can be said that an increase in one of the factors of individuals' concerns and feelings about healthy eating, their behaviors related to food selection, and their cognitions about nutrition leads to an increase in the other factor. The total scores of the orthorexia scale show no statistically significant relationship with the BMI of individuals (r=-.051, p>0.05). It is seen that there is a very strong (r=0.862), moderate (r=0.557), strong (r=0.691), and positive statistically significant relationship between orthorexia total scores and orthorexia scale factors 1 emotion, factor 2 behavior, and factor 3 (p<0.01). The relationship between the scale scores and sub-factors suggests that the individuals correctly filled out the scale by understanding it.

Table 4. The relationships between body mass index (BMI), orthorexia scale sub-factors (Emotion, Behaviour, Cognition) and orthorexia scale total scores of individuals

	1	2	3	4
1 Body mass index				
2 Factor 1- emotion	-.119*			
3 Factor 2- behaviour	.051	.263**		
4 Factor 3- cognition	.032	.327**	.263**	
5 Orthorexia Scale total scores	-.051	.862**	.557**	.691**

*p<0.05; **p<0.01

Discussion

ON is a disorder characterized by obsession with healthy eating and restrictive eating behaviors, which can significantly affect the psychological and physical health of the individual [15,16]. Adolescence and young adulthood, which have a high prevalence, have seen an increase in recent years. In their 2020 study, Evcimen and Ayyıldız looked at the link between university students' tendency toward orthorexia nervosa and obsession [17]. They discovered that the students' total ORTO-11 score was 28.34±5.48, and 21.8% of the students who took part in the study had an orthorectic tendency. In the same way, they reported that females showed higher orthorectic tendencies and obsessive behaviors than males (p<0.05), and students studying in the health department had more orthorectic tendencies than social sciences students (p<0.001). Bağcı Bosi et al. (2016) reported the mean ORTO-15 score of the participants as 39.87±0.22 [18], and Duran et al. (2016) reported the mean orthorectic symptom score of the students of the School of Health as 26.95±5.11 [19]. In this study, in which the ORTO-11 scale was used to evaluate the orthorectic tendencies of individuals, the rate of individuals with orthorectic tendencies was found to be 29.3%, and this rate was found to be 26.4% in another previous study using the ORTO-11 scale in Türkiye [20], similar to other studies, and in another study, rates similar to the rate reported in this study were obtained [21]. In our current study, the rate of orthorectic tendency is similar to the orthorectic tendency in studies conducted with students with similar characteristics [19-21], while it differs from some studies (Bağcı Bosi et al., 2019). We think that this is due to the fact that the students who make up the sample in our study pay more attention to their physical appearance during adolescence, receive different vocational education, and the scale used is different.

BMI is one of the parameters that contribute to the evaluation and diagnosis of eating disorders. When the literature was reviewed, body mass index and orthorexia symptoms were found to be associated with each other in one study [22]. In another study, it was found that orthorexia scores were lower in individuals with a low body mass index [23]. A study using the ORTO-11 scale found a statistically significant relationship between the orthorectic

tendency of individuals and BMI increases, with orthorexia scores decreasing as the body mass index increased (Fidan et al., 2010). Another study used the ORTO-11 scale and found a negative and statistically insignificant relationship between the orthorexia score and the BMI values of the participants, with the orthorectic tendencies decreasing as the BMI values increased [24]. In this study, it is seen that there is a very weak, negative, and statistically significant relationship between the body mass index of the individuals and the 1st factor emotion sub-factor of the orthorexia scale (r=-0.119, p<0.05). Therefore, it can be said that as the body mass index of individuals decreases, their concerns and feelings about healthy eating increase. Simultaneously, this study, like other studies in the literature, shows no statistically significant relationship between the total scores of the orthorexia scale and the BMI of individuals [25-27]. We think that this may be due to reasons such as sample size and differences in the scale used in our study.

Gender refers to the biological, physiological, and genetic dimensions of an individual's being male or female. Reports in recent years suggest that the spread of a healthy eating culture has led to a widespread ON phenomenon. However, there are controversial results in the literature regarding the incidence of ON tendencies in men and women. Evcimen and Ayyıldız İzcan (2020) examined the relationship between ON tendencies of university students and obsession and found that 21.8% of the students participating in the study showed orthorectic tendency, and women showed higher orthorectic tendency and obsessive behaviors than men (p<0.05). Oğur and Aksoy (2015) determined that 49.8% (n=126) of female students and 32.2% (n=71) of male students had scores ≥4 in their research to determine the ON tendency in university students [28]. He reported that the difference between gender and the possibility of being prone to orthorexia nervosa was found to be significant (p<0.05). Arusolu (2018) reported that the determination of orthorexia nervosa tendency in male students of the nutrition and dietetics department revealed a high rate of orthorectic tendencies among male students [29]. In our current study, the rate of orthorectic tendency according to gender was found in 70 of 228 female university students (30.7%) and in 20 of 79 male university students (25.3%). Despite the observation that women were

slightly more likely than men to have an orthorectic tendency, the relationship between orthorectic tendency and gender was not statistically significant ($p>0.05$). The results of our current study are consistent with the research results [21] and differ with some research results [17,30]. The reason for this is thought to be due to the difference in the sample size included in the study.

Limitations of the Study

The study found no effectiveness in gender due to the small number of male students participating. Furthermore, the study at the Faculty of Sports Sciences included fewer students than expected, which hindered a thorough discussion of the findings in the discussion section. In addition, it is thought that ON among university students will make an important contribution to the literature due to its relationship with many diseases and health problems, especially eating behavior disorders.

Conclusion

In conclusion, the relationship between the orthorectic tendency of university students and some anthropometric measurements and some variables was revealed. ON is associated with highly restrictive and unhealthy food intake, as well as maladaptive eating behavior disorders that lead to various psychiatric, physiological, and health complications such as depression, anxiety, and personality disorders. Therefore, it is thought that the examination of the prevalence of ON may contribute to the elucidation of the physiological mechanisms of the disease as well as the prevention of diseases and health problems such as eating disorders and ON with high orthorectic tendency.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

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Ethical Approval

Ethics committee approval (29.03.2023 /Decision no: 91) and institutional permission were obtained by the Bayburt University Ethics Committee before the study.

Patient Informed Consent

The participants were informed about the study in accordance with the Declaration of Helsinki and their consent was obtained for the Informed Consent Form. Volunteer participants were included in the study.

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