Consideration of Healthy Eating Obsession (Orthorexia Nervosa) for Students Educated in Nutrition and Dietetics Department

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Abstract: Objective: It was conducted to evaluate the susceptibility to ON (orthorexia nervosa) in the students of the nutrition and dietetics department according to the variables of gender, age and BMI (body mass ındex). Subjects and Methods: The research covers the students of Marmara University Faculty of Health Sciences, Department of Nutrition and Dietetics in September-October 2017-2018 academic year. The data were collected by survey method. Socio-demographic characteristics and anthropometric measurements of the participants were questioned. EAT-40 (Eating Attitude Test), ORTO-15 test and MOCI (Maudsley Obsessive Compulsive Inventory) were used in the study. It was evaluated with SPSS (The Statistical Package for The Social Sciences) 21.0 program. Results: 205 people participated in the study. EAT-40 scores were found to be ≤ 20 in 94% of the women and 95.2% of the men in the study. The EAT-40 score is ≥ 21 in 6% of women and 4.8% of men in the study ($p = 0.646 > 0.05$). The ORTO-15 score of 72.3% of women and 71.4% of men is ≤ 40 ($p = 0.934 > 0.05$). EAT-40 average is 10.25 ± 1.10 in underweight. It was found to be 9.21 ± 0.42 in normals and 8.23 ± 0.76 in slightly obese subjects ($p = 0.758 > 0.05$). ORTO-15 average of those with BMI ≤ 18.49 kg/m^2 is 39.59 ± 0.54; Those with 18.50-24.99 kg/m^2 were found to be 38.30 ± 0.25 and those with 25.00-29.99 kg/m^2 were found to be 39.54 ± 0.75 ($p = 0.098 > 0.05$). As the EAT-40 score increased, the ORTO-15 score decreased. It shows a negative, statistically significant difference between EAT-40 and ORTO-15 scores ($p = 0.00 < 0.05$). Conclusion: It was concluded that orthorexic tendency is common (72.2%) in nutrition dietetic students, and ON is associated with BMI and EAT-40 scores. In terms of ON, it would be beneficial to conduct comprehensive international studies and determine DSM (Diagnostic and Statistical Manual of Mental Disorders) diagnostic criteria.

Key words: ON, ORTO-15 test, EAT-40.

1. Introduction

Psychiatric disorders in food consumption behavior of individuals are called ED (eating disorders) [1]. Many studies have shown the existence of ED in different forms since the beginning of humanity. ED is used in determining the diseases caused by attitudes towards eating behavior, as well as covering all forms of eating behavior under a single title. ED is one of the most important diseases of our age, which has been mentioned frequently, especially in recent years, due

to inadequate or excessive nutrient intake, which causes physical and mental consequences [2]. Although the causes of ED are not fully understood, it is thought that heredity is caused by the effects of social and cultural factors and spiritual factors [3].

The APA (American Psychiatric Association) inspects the establishment of criteria for defining psychological conditions and periodically updates the DSM (Diagnostic and Statistical Manual of Mental Disorders) [4]. In the last published DSM-5 classification, Nutrition and ED are divided into 7 subtitles [5]:

(1) Pica;

(2) Back Extraction (Ruminating) Disorders;

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(3) Avoidant/Restricted Food Intake Disorder;

(4) Anorexia Nervosa;

(5) Bulimiya Nervosa;

(6) Binge ED;

(7) It is another defined Nutrition and ED.

Although ON (orthorexia nervosa) is not included in the education classification system such as anorexia and bulimia nervosa, it is expected that the news about ON will increase as the study increases [4].

The word orthorexia consists of the words "orthos", which means "true", "appropriate" and "orexia", which means appetite. It was first described by Steven Bratman. According to Bratman, ON is the pathology related to the consumption of suitable, healthy food [6].

Bratman calls himself orthorexia in the healing process. According to Bratman, the purpose of ON is not to have a low body weight because they do not feel overweight. According to him, there is a mental preoccupation with the perfection of the diet in cases. Individuals with orthorexia neurosis really or exaggerate aim to be healthy or balanced [6].

ON is one's obsession with consuming a "pure" diet. In order to be able to talk about ON, the patient must become obsessive [6, 7]. Orthorexic individuals want what they eat in their food consumption to be natural and beneficial for health [8].

Orthorectic individuals control every food they eat at an exaggerated level, examine the packaging of the products they will buy during shopping for a long time and examine the content (additive, carcinogenic substance, hormone, etc.). They care about the healthy and additive-free foods they will use at an extremely obsessive level. They are also concerned about the methods and materials used during food preparation, and they refuse the consumption of different foods according to their composition or preparation [9]. For this reason, most of what they will consume is raw. These orthorexic cases stop consuming many foods due to psychological reasons and lose weight like in anorexia nervosa [10].

Orthorectic individuals, who tend to restrict their diets due to their efforts to achieve perfection, decrease the variety of food in consumption and consequently may develop malnutrition [8, 11]. In addition to malnutrition, osteoporosis, disruption of the menstrual cycle and heart problems related to excessive drop in blood pressure may occur [8].

Although ON is not included in DSM-V criteria, its incidence is gradually increasing. It is found at higher levels especially in certain occupational groups. When evaluated in terms of ON, women, children in adolescence, individuals doing sports, medical faculty students, health sector employees, dietitians are more risky than other groups [12].

This study, which was conducted with students of Marmara University Faculty of Health Sciences, Department of Nutrition and Dietetics, who are considered to be in the risk group, was carried out to evaluate the students' healthy eating obsessions, eating attitudes and behaviors according to various sociodemographic data.

2. Methods

2.1 Study Place, Time and Sample Selection

The study is a cross-sectional study conducted in September-October 2017-2018 academic year to determine the obsession with healthy nutrition in students who continue their education in the Department of Nutrition and Dietetics at Marmara University Faculty of Health Sciences. Based on volunteering, a total of 205 people, 184 women and 21 men, participated in the study.

2.2 Data Collection and Evaluation

The thesis was approved by the Okan University Ethics Committee, and the necessary permissions were obtained from Marmara University Faculty of Health Sciences in order to apply the questionnaire. The consent form was filled out by the participants. The data in the study were obtained by questionnaire form and anthropometric measurement techniques.

The questionnaire forms were filled in with the participants using face to face interview method.

In demographic information, gender, class, monthly expenditure level, age and place of residence were questioned. In the anthropometric measurements, body weight and height were asked and the statements of the people who participated in the questionnaire were taken as basis. The body weight suitable for the height was evaluated with the BMI (body mass index) formula. It has been interpreted according to the WHO (World Health Organization) classification [13].

The EAT-40 (Eating Attitude Test) was developed by Garner and Garfinkel in order to evaluate the attitudes and behaviors of individuals with ED regarding the consumption of foods, as well as the symptoms of eating behavior disorders in normal individuals [12, 14]. The test consists of 40 questions in the form of a self-assessment scale. It provides more detailed information in clinical evaluation and determines the changes that occur as a result of treatment [14]. A maximum of 120 points can be obtained from the test. The evaluation of the EAT-40 results is made as follows: For question number 1, 18, 19, 23, 27, 39, "sometimes" 1, "rarely" 2 and "never" 3, other options score 0, while the answers in the remaining questions "Always" is 3, "very often" is 1 and other options are considered 0 points. The answer scores given to all questions in the scale are added together and the scale score is evaluated. Those scoring less than 21 in total are included in the "low risk" group, those between 21-30 are included in the "medium risk" group, and those scored more than 30 are included in the "high risk" group [15].

Rachman and Hodgson developed the MOCI (Maudsley Obsessive Compulsive Inventory). It is a 30-item inventory of true-false type used in the evaluation of obsessive compulsive symptoms [16]. Its Turkish version was made by Erol and Savaşir. By adding 7 items related to obsessive thinking to the adaptation, an inventory of 37 items in total was created. One point is given for each correct answer marked in the evaluation. Only item 11 is scored in reverse. The highest values in the collected scores are 37 for the total obsession score. In a study conducted in Turkey, no cut-off score is calculated. It is recommended to use the cut-off score in comparative studies [17].

ORTO-15 scale was used to evaluate the orthorexic tendencies of individuals. This scale is a 15-item self-rating scale. According to the ORTO-15 test, the answers accepted as distinctive in ON are "1"; Answers about normal eating behavior are "4" points. The answer given for questions 1 and 13 is 2 points if "always", 4 points if "often", 3 points if "sometimes", 1 point if "never" is given to questions 2, 5, 8, 9. Four points for "always", 3 points for "often", 2 points for "sometimes", 1 point for "never". The answer given to the questions 3, 4, 6, 7, 10, 11, 12, 14, 15 are evaluated with 1 point if "always", 2 points if "often", 3 points if "sometimes", and 4 points if "never". Individuals will be able to get a minimum of 15 and a maximum of 60 points with this scale.

With the items in the inventory, individuals' obsession with food selection, purchase, preparation, and consumption of foods that they consider healthy for themselves are evaluated, and the participants are investigated emotionally and rationally [18].

Those who score 40 and below in the test are defined as "Orthorexic" (eating behavior is extremely sensitive). It is understood that the eating behavior tends to approach normality with the increase in the test score [18].

2.3 Statistical Analysis

The data obtained from the questionnaire form were evaluated using the SPSS (The Statistical Package for The Social Sciences) 21.0 program. Variable distributions were examined by Kolmogrov-Smirnov and Shapiro-Wilks tests. Mean and standard error were used in the evaluated data, and the number of observations and relative frequencies were used in the

classified data. Non-parametric Mann-Whitney U test was used for those who did not show normal distribution in two independent groups. ANOVA (Analysis of Variance) method was used for comparing more than two independent groups, and non-parametric Kruskal Wallis test was used for those who did not show normal distribution. Since the data did not show normal distribution in correlation tests, Spearman's ordinal number correlation coefficient was used. The analysis of qualitative data was carried out by chi-square analysis. Logistic regression analysis was used to determine the variables affecting the two-level qualitative data. The results were evaluated at a 95% confidence interval and $p < 0.05$ significance level.

3. Results

A total of 205 people, including 184 women and 21 men, participated in the study. The EAT-40 score and ORTO-15 score of the participants were evaluated according to the gender and the results are as in Table 1. EAT-40 scores of 94% of the women participating in the study and 95.2% of the men were found to be 20 and below. EAT-40 score was found 21 and above in 6% of women and 4.8% of men participating in the study. It can be said that there is no statistically significant difference between the genders in terms of EAT-40 scores ($p = 0.646 > 0.05$).

The ORTO-15 score of 72.3% of women and 71.4% of men was found to be 40 and below. There was no statistically significant difference between the genders in terms of ORTO-15 scores ($p = 0.934 > 0.05$).

Table 2 summarizes the EAT-40, ORTO-15 and MOCI scale scores according to the gender of the students. According to this, the average EAT-40 score of male students is 9.10 ± 0.91. It is 9.33 ± 0.40 for female students. When the genders were evaluated in terms of EAT-40 scores, no statistically significant difference was found between them ($p = 0.858 > 0.05$).

The ORTO-15 score average of female students is 38.53 ± 0.24, and 39.05 ± 0.55 for male students. There was no statistically significant difference between genders in terms of ORTO-15 scores ($p = 0.590 > 0.05$).

The MOCI scale mean score of female students is 15.83 ± 0.51, while male students are 15.62 ± 1.31. There was no statistically significant difference between genders in terms of MOCI scale scores ($p = 0.981 > 0.05$).

EAT-40, ORTO-15 and MOCI scores according to the BMI values of the students are summarized in Table 3. The EAT-40 score average of those with a BMI of 18.49 kg/m^2 and below is 10.25 ± 1.10; Those with 18.50-24.99 kg/m^2 were found to be 9.21 ± 0.42 and those with 25.00-29.99 kg/m^2 as 8.23 ± 0.76. No statistically significant difference was found between BMI classes according to EAT-40 scores ($p = 0.758 > 0.05$).

ORTO-15 score average of those with BMI value of 18.49 kg/m^2 and below is 39.59 ± 0.54; Those with 18.50-24.99 kg/m^2 were found to be 38.30 ± 0.25 and those with 25.00-29.99 kg/m^2 as 39.54 ± 0.75. There was no statistically significant difference between the

Table 1　Distribution of EAT-40 and ORTO-15 scores by gender.

	Female		Male		Total		p
	n	%	n	%	n	%	
EAT-40 risk assessment							
20 and below	173	94.0	20	95.2	193	94.1	0.646*
21 and over	11	6.0	1	4.8	12	5.9	
ORTO-15 risk assessment							
40 and below	133	72.3	15	71.4	148	72.2	0.934**
41 and over	51	27.7	6	28.6	57	27.8	

* Fisher's Exact Chi-Square. ** Chi-Square

Table 2   Descriptive statistics of EAT-40, ORTO-15 and MOCI scores by gender.

Gender	Female		Male		Mann Whitney U Test	
	Mean ±S.E	Median	Mean ±S.E	Median	z	p
EAT-40	9.33 ±0.40	9.00	9.10 ±0.91	9.00	-0.179	0.858
ORTO-15	38.53 ±0.24	39.00	39.05 ±0.55	39.00	-0.539	0.590
MOCI	15.83 ±0.51	15.50	15.62 ±1.31	14.00	-0.023	0.981

Table 3   Descriptive statistics of EAT-40, ORTO-15 and MOCI scale scores according to BMI values.

BMI (kg/m^2)	Underweight		Normal		Overweight		Kruskal Wallis	
	Mean ±S.E	Median	Mean ±S.E	Median	Mean ±S.E	Median	χ^2	p
EAT-40	10.25 ±1.10	9.00	9.21 ±0.42	8.50	8.23 ±0.76	8.00	0.554	0.758
ORTO-15	39.59 ±0.54	39.50	38.30 ±0.25	38.00	39.54 ±0.75	40.00	4.636	0.098
MOCI	14.19 ±1.20	14.50	16.47 ±0.53	16.00	11.54 ±2.02	11.00	7.896	0.019

BMI classes of the students according to ORTO-15 scores ($p = 0.098 > 0.05$). The mean of the MOCI scale of those with a BMI of 18.49 kg/m^2 and below is 14.19 ± 1.20; those with 18.50-24.99 kg/m^2 were 16.47 ± 0.53 and those with 25.00-29.99 kg/m^2 were 11.54 ± 2.02. A statistically significant difference was found between BMI classes according to the MOCI scale scores ($p = 0.019 < 0.05$).

A negative, statistically significant relationship of 0.312 units was found between the EAT-40 score and the ORTO-15 score ($p = 0.00 < 0.05$). As the eating attitude score increases, the ORTO-15 score will decrease. A negative, statistically significant relationship of 0.214 units was found between the ORTO-15 score and the MOCI scale score ($p = 0.00 < 0.05$). The higher the ORTO-15 score, the lower the MOCI scale score. There was no statistically significant relationship between eating attitude score and MOCI scale score ($p = 0.064 > 0.05$) (Table 4).

Logistic regression analysis was applied to determine the variables affecting the ORTO-15 score. ORTO-15 scores of 40 and below were accepted as "Orthorectic", 41 and above "Normal" as dependent variables, age, gender, place of residence, class, monthly expenditure level, height, body weight, and BMI. BMI was taken as 18.49 kg/m^2 and below, 18.50 kg/m^2 and above. The backward selection process was applied and fit to the model which was found at $p = 0.772 > 0.05$. The correct classification rate of the model is 73% (Table 5).

Of all the variables examined, it can be said that only the BMI value and the EAT-40 score were effective on ORTO-15. The probability of ORTO-15 score being 40 or less in individuals with BMI value of 18.50 and above is 2,328 times higher than individuals with a BMI value of 18.49 kg/m^2 and below. Increasing a person's EAT-40 score by one unit increases the probability that ORTO-15 score is

Table 4   Examining the relationship between students' EAT-40 and ORTO-15 and MOCI scale scores.

Variables	EAT-40	ORTO-15	MOCI
EAT-40	-	rs = -0.312; p = 0.000*	rs = -0.130; p = 0.064
ORTO-15	rs = -0.312; p = 0.000*	-	rs = -0.214; p = 0.002*
MOCI	rs = -0.130; p= 0.064	rs = -0.214; p = 0.002*	-

* Spearman correlation.

Table 5   Variables affecting the Ortho-15 score, predictive values, standard errors and odds ratios.

Variable	Estimate	S.E	p	Odds ratios
Constant	0.107	0.347	0.757	1.113
EAT-40	0.115	0.038	0.003	1.121
BMI (kg/m^2)	-0.845	0.421	0.045	0.429

40 or less by 1,121 times. The logistic regression model equation obtained in this direction is:

$$\pi i = 0.107 + 0.115 \times \text{EAT-40} - 0.5845 \times \text{BMI (18.49 and below)}$$

The probability that an individual with an EAT-40 score of 2 with a BMI of 18.49 kg/m^2 and below has an ORTO-15 score of 40 or less is 0.375 and has the lowest probability. The group with the highest probability of having an ORTO-15 score of 40 or less is an individual with a BMI of 18.50 kg/m^2 and above with a probability of 0.985 and an EAT-40 score of 36.

Generally, individuals with BMI value of 18.50 kg/m^2 and below have an "Orthorexic" probability of less than 0.50 if their EAT-40 score is 6 or less. In addition, individuals with BMI value of 18.50 kg/m^2 and above have an "Orthorexic" probability of over 0.90 if their EAT-40 score is 19 and above.

4. Discussion

Orthorexia neurosa is stated as a pure diet consuming obsession [6, 7]. When the studies were evaluated in terms of ON, medical faculty students, health sector workers, dietitians, etc. deviated to be more risky than other groups [12]. The results of this study, in which obsession with healthy nutrition was evaluated in the Nutrition and Dietetics department students who continue their education at Marmara University Faculty of Health Sciences, also support the prevalence of ON in the health sector. The ORTO-15 test was found to be 40 or less among 205 students (72.2%) who participated in the study, who attended a total of 205 nutrition and dietetics education, and the ORTO-15 test was determined to be orthorexic, and 94% of women and 95.2% of men had 20 and less (Table 1).

According to the literature, women and adolescents are in the higher risk group for ON [8, 9]. In terms of gender factor, literature data show that ED is seen 8-12 times more frequently in female population than men [19]. However, no difference was found between genders in the scales used in the study (Tables 1 and 2). The result of the study may be that the research was conducted among the students of the Department of Nutrition and Dietetics, and therefore the number of male participants was much lower than the number of female participants. Due to the high number of women participants, different results are expected from the literature.

Duran, found the students' mean score of EAT-40 as 18.43 ± 10.56 in his study on health school students, and he found the mean score of 26.95 ± 5.11 by examining ON with the ORTO-11 scale [20]. In the study of Arusoğlu et al. [21], the mean scores on the ORTO-15 scale between genders did not show a statistically significant difference, as in this study [21]. In the same study, the mean score of EAT was found as 91.71 ± 11.81 in men and 87.56 ± 11.10 in women, and the difference between the two groups was statistically significant [21]. Similar to this study by Arusoğlu et al. [21], MOCI scale averages between genders did not show a statistically significant difference.

In a study conducted with undergraduate students of Midwestern University using the ORTO-15 scale, ON tendency was investigated. As a result of the study, it was found that women were more prone to ON than men [22]. In a study conducted with 283 female and 44 male university students in the 18-25 age group in Poland, it was determined that 68.55% of the women and 43.18% of the men had a tendency to ON according to the ORTO-15 scale [23]. In Kazkondu's study, it was found that male students showed more orthorexic tendencies than girls [24]. Similar to this study, in the study conducted by Baş [18] with 75 dieticians in 2014, no statistically significant difference was found between the genders between the ORTO-15 averages (Table 3).

In the study conducted by Arusoğlu et al. [21], an increase was observed in EAT-40 scores as BMI increased. In the study, the symptoms of ED in normal-weight subjects were significantly higher than

in the other group ($p < 0.05$) [21]. In the current study, an increase in the BMI value and a decrease in the EAT were found (Table 3) ($p = 0.758 > 0.05$) and the data revealed opposite results with the study of Arusoğlu et al. [21] Unlike this study, in another study [25] conducted in 2016, BMIs of individuals who attend regular sports in the gym were compared with the scores they got from the MOCI scale, and it was concluded that there was no statistically significant relationship between them. According to the MOCI scale score it was determined in a study we conducted a statistically significant difference between BMI classes (Table 3) ($p = 0.019 < 0.05$).

The distribution of ORTO-15 scores according to their BMI in the study conducted by Dege [26] among nutrition and dietetics students in Edirne is as follows: ORTO-15 points average of students with BMI below 18.5 kg/m^2 39.66 ± 2.74, students with 18.5-24.9 kg/m^2 39.12 ± 4.7, 25-29, students with 9 kg/m^2 are 40.25 ± 3.10. Similar to this study, there was no difference in ORTO-15 scores according to BMI groups of students (Table 3). This situation may be caused by the fact that the study was conducted on students who received nutrition and dietetics education and that the majority of the students participating in the questionnaire weighed normal.

EAT-40 increased in the present study decreased ORTHO-15 score (Table 4). There is a negative, statistically significant difference between the EAT-40 score and the ORTO-15 score ($p = 0.00 < 0.05$). Negative direction is statistically significant between the ORTO-15 score and the MOCI scale score ($p = 0.00 < 0.05$). There was no statistically significant relationship between the EAT-40 score and the MOCI scale score ($p = 0.064 > 0.05$) (Table 4). In a study conducted by Arusoğlu, a direct proportion was found between ortho variable and obsessive-compulsive disorder and EAT-40 test. In the study, as the ortho tendency increases, the tendency to other ED increases. In the same study, when the tendency to orthorexia was evaluated with the MOCI score, it was found that there is a direct proportion between the ortho variable and EAT-40 [21].

In Dege's study, the individuals' EAT-40 score and the ORTO-15 and MOCI scores were evaluated and a negative statistical significance was found between the EAT-40 score and the ORTO-15 score, and the ORTO-15 score and the MOCI score. Similar to Dege's study, as the eating attitude score increases, the ORTO-15 score decreases in this study. In addition, as the ORTO -15 score of the individuals increases in Dege's study, the MOCI score decreases [26]. It is similar to the results of the current study (Table 4). An increase in EAT-40 score increases tendency towards eating behavior disorder, while a decrease in ORTO-15 score increases orthorexic tendency. According to the literature, when ON is considered to be an ED, a significant result is expected. The negative correlation between MOCI and ORTO-15 scale scores is due to the fact that ON displays a similar picture to obsessive compulsive disorders.

Among all variables examined in the study, only the BMI value and the EAT-40 score were found to be effective on ORTO-15 (Table 5). Arusoğlu determined that ortho variables were directly proportional to age, OCD (obsessive compulsive disorder), EAT and BMI. As the orthorexic tendency increases, the tendency towards other ED increases. ON symptoms increased as the age progressed and BMI increased. According to the study, an increase in the duration of education decreases the susceptibility to ON [21].

5. Conclusions

The number of individuals with ON ED is increasing day by day. Research on the subject shows that the number of orthorexic individuals will increase in the coming years. Since it is similar to obsessive-compulsive disorder, it is important to provide psychological counseling support with professional people in addition to diet therapy in ON.

Treatment to be planned in a multidisciplinary manner in orthorexic individuals is important for success. Not being accepted as an ED yet and not being among the DSM-5 diagnostic criteria is among the shortcomings of the study. As stated in the study of Arusoğlu [21], ORTO-15 test should be re-evaluated in order to be accepted as a reliable tool in ON. The preparation of an internationally valid scale that can also reflect cultural differences is important for ON.

Acknowledgements

Conflicts of Interest

There is no conflict of interest declared by the authors or by writing.

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