Available online at www.sciencedirect.com
ScienceDirect
Comprehensive Psychiatry 51 (2010) 49–54
Comprehensive PSYCHIATRY
www.elsevier.com/locate/comppsych

Prevalence of orthorexia among medical students in Erzurum, Turkey

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Abstract

Orthorexia is a new term about eating behavior disorder and consists of pathologic obsession for biologically pure foods, free of herbicides, pesticides, and other artificial substances. It is not an independent diagnostic category, but it has some similarities with other eating disorders. This study was conducted to examine the orthorexia among 878 medical students. Of 878 students, 464 (52.8%) were male and 359 (40.9%) were female. The mean age, height, weight, and body mass index were 21.3 ± 2.1 years, 171.0 ± 8.5 cm, 65.6 ± 12.3 kg, 22.4 ± 2.99, respectively. The rates of the ORTO-11 scores between 0 and 15 was 1.9%; between 16 and 30, 57.5%; and between 31 and higher, 21.1%. There were 17 students with a score of 0 to 15. The mean score for the ORTO-11 test was 27. There were statistically significant differences between age, sex, and smoking habit of the students. In the male students, there was a statistically significantly higher tendency for orthorexia (P = .001), and there was a statistically significant difference between the age groups for tendency for orthorexia (P = .025). In logistic regression analysis, age, sex, Eating Attitude Test-40 (EAT-40), and height affected the ORTO-11 scores.

Keywords: Orthorexia; Eating disorder; Adolescents

1. Introduction

Eating disorders are characterized by changes in eating patterns associated with a series of psychosocial conflicts such as culture, habit, lifestyle, low self-esteem and poor empathy, and an obsession with slimming. In the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, eating disorders are classified as anorexia nervosa (AN), bulimia nervosa (BN), and eating disorder not otherwise specified.

In recent years, a new term, *orthorexia*, was determined as an eating disorder. It is not an independent diagnostic category, but it has some similarities with other eating disorders. It can lead to malnutrition and weight loss as in AN. Unlike in AN and BN, people with orthorexia are preoccupied with consuming healthy and pure foods instead of the quantity of food or its physical appearance. They might spend most of their time following strict rules and are in a state of preoccupation with foods, behaviors that seem similar to obsessive-compulsive symptoms. Consequently, their social functioning may be negatively affected. Nonetheless, some argue that the preoccupation with food in orthorexia is not as distinctive as in AN and BN cases because it is only related to the quality of the food; therefore, it should not be placed in a separate category [1].

Steven Bratman defined this concept for the first time in 1997. *Orthorexia* is a new term about eating behavior disorder and consists of pathologic obsession for biologically pure foods, free of herbicides, pesticides, and other artificial substances. Excessive worry about the techniques and materials used in the food elaboration leads to obsession, loss of social relationships, affective dissatisfactions, and obsessive thoughts about foods [2,3].

In recent years, the number of individuals in public that exhibit different forms of "highly sensitive eating behavior disorders," or "orthorexia nervosa," has been on the rise. These people categorize foods according to whether they are healthy or not and display obsessive concern and excessively sensitive behavior about the consumption of healthy food. Recently, scientific communities, literature, experts in the field of nutrition, and the mass media have started to use a new concept called *orthorexia nervosa*. The term *orthorexia* is produced from *orthos*, which means accurate, right,

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doi:10.1016/j.comppsych.2009.03.001

correct, valid in Latin, and *orexsis*, which means hunger. This term is used for “obsession of healthy and proper nutrition” [4,5].

In the 21st century, healthy nutrition is one of the most important concepts emphasized when considering issues related to health improvement. Foods are classified as natural or not, and there are natural food shops everywhere. Every day in media, there are news about environmental pollution and the protective effects of the foods on health, the causes of cancer, and the ways to prevent cancer.

Healthy eating habits are actually not pathologic; however, excessive preoccupation with consuming healthy food, spending an excessive amount of time with this preoccupation, and experiencing associated dysfunctions in daily life could be evaluated as a disorder that is linked to behavior and personality [6].

Eating habits vary according to culture, habit, and lifestyle. Therefore, this study aimed to determine the prevalence of “highly sensitive behavior on healthy nutrition (orthorexia)” among students of Ataturk University Medical School in Erzurum, Turkey, and to examine the effect(s) of some socioeconomic factors on eating habits.

2. Methods

The study is a cross-sectional research, which encompassed the entire 895 medical students of Ataturk University in January 2008. This study was performed on only volunteer students; voluntary informed consent was taken from each and participation ratio was 98.1% (N = 878). The ORTO-11 test was used to propose a diagnostic proceeding and to try to verify the prevalence of orthorexia. ORTO-15 is adapted into Turkish as ORTO-11 to evaluate orthorexia. It consists of 11 items, and each item is scored on a 4-point Likert scale. Individuals were required to answer using the expressions of “always, often, sometimes, or never” to reflect how often they identified themselves with these expressions. Items that reflect an orthorexic tendency are scored as 1, and items that reflect a tendency toward normal eating behavior are scored as 4. Only one item is reversely coded. Lower scores indicate an orthorexic inclination. The total score of ORTO-11 is between 0 and 44 points [7].

The researchers selected only 11 items with factor loadings of 0.50 or higher for the Turkish version of the scale. Because there was no other study on the factor structure of the original scale, the results could not be compared with the results of earlier studies. It was also aimed to select statistically strong items because orthorexia is a new concept in the literature. The Cronbach α coefficient, which shows the internal consistency of the scale, was found to be 0.44 for ORTO-15 and 0.62 for ORTO-11. Thus, the internal consistency was found to be statistically satisfactory for Turkish language version [7].

Donini et al (2005) found that when a score of 40 was taken as the cutoff point in ORTO-15, the predictive validity of the scale was high and people with an orthorexic inclination could be discriminated. The literature reveals no studies that examined the psychometric properties of ORTO-11, the Turkish version of the scale. Thus, no cutoff point for ORTO-11 test could be determined. A low score in the scale shows a higher tendency for orthorexia.

In this study, weight and height of the patients were measured one by one, and body mass index (BMI) was calculated as the weight in kilograms divided by the square of height in meters. Body mass index was evaluated based on the classifications of the World Health Organization. According to this classification, BMI of less than 18.5 is considered underweight; 18.5 to 24.99, normal weight; 25.0 to 29.99, overweight; and 30, obese [8]. In light of this information, in our study, the students with a BMI value of 18.5 to 24.99 were considered of normal weight group, and the students with any of the other BMI values were considered underweight, overweight, or obese.

The students were also divided into 2 age groups: those with an age of ≤21 years and those with an age of >21 years. At age 21, the students finished their education, and this age is considered the end of adolescence.

2.1. The Eating Attitudes Test

Garner and Grafinkel developed Eating Attitude Test-40 (EAT-40) to measure the eating behaviors and attitudes of anorectic patients, as well as possible problematic eating behaviors in normal individuals. Higher scores indicate problematic eating behaviors and attitudes. Savaşır and Erol conducted the reliability and validity study of the Turkish version of EAT-40 [9,10].

The demographic information of the participants including age, sex, mother’s and father’s occupation and education, height, weight, smoking habit, and packs or number of cigarettes per a day were collected using an information form.

χ^2 test, analysis of variance (univariate) analysis, and logistic regression were used for analyses of the data.

Analysis of variance was used to evaluate the effect of age, sex, smoking, education level of the mother and father, and the occupation of the mother and father on ORTO-11 scores. For the eating attitude variable, the cutoff score for EAT-40 was 30. Based on the scores obtained from EAT-40, 2 groups were formed as EAT-40 <30 with normal eating attitudes and EAT-40 ≥30 with a tendency of having anorexia, an eating disorder. One-way analysis of variance was used to determine the effect of orthorexic tendency on the eating attitudes of the students.

When the ORTO-11 scores were taken as the dependent variable, the effects of independent variables (sex, age, BMI, education level of the mother and father, the occupation of the mother and father, smoking habit, packs or number of cigarettes per a day) on the ORTO-11 score were evaluated in logistic regression analysis. In our study population, the mean and the median ORTO-11 scores were 27 and 26.8, respectively. A logistic model was devised based on this reference category where those who scored less than 27 points on the ORTO-11 test were ascribed as “1” and those who scored more than 27 points on the test were ascribed as “0”.

A forward logistic regression analysis was performed to examine how demographic variables such as age, sex, education level of the mother and father, the occupation of the mother and father, the score of EAT-40, and BMI predicted ORTO-11 score.

As seen in Table 3, based on the logistic regression analysis equation, sex, eating attitude, and age accounted for 15% of total variance. First, sex was used in the equation. This variable was followed by age groups and then eating attitude scores. The father's and mother's occupation and level of education, and BMI groups were not significant. The findings showed that male sex had a distorted eating attitude and younger age predicted orthorexic tendency.

All the continuous variables and sex were considered predictor variables for orthorexic tendency in multiple regression analysis. $P = .05$ was considered statistically significant in all the analyses.

3. Results

This study was conducted on 878 medical students at a participation rate of 98.1%. The weight and height of the students were measured. The BMI of each participant was calculated. To determine orthorexia, an eating behavior, among medical students, we used the ORTO-11 test and EAT-40. For ORTO-11 test, there was no cutoff point. In this test, a low score shows high tendency for orthorexia. The cutoff score for EAT-40 was 30, and in this test, a high score shows high tendency for eating disorders.

Of 878 students, 464 (52.8%) were male and 359 (40.9%) were female. The students were aged between 16 and 29 years (mean age, 21.3 ± 2.1 years). The number of the students younger than 21 years was 376 (42.8%), and those older than 22 years, 363 (41.3%).The height of the students ranged between 149 and 190 cm (mean height, 171.0 ± 8.5 cm), and the weight of the students ranged between 42 and 110 kg (mean weight, 65.6 ± 12.3 kg). The BMI value of the students was between 13.7 and 34 (mean BMI, 22.4 ± 2.99) (Table 1).

The rate of the ORTO-11 scores between 0 and 15 was 1.9%; between 16 and 30, 57.5%; and between 31 and higher, 21.1%. There were 17 students with a score of 0 to 15. The mean score for ORTO-11 test was 27.

Of 878 students, 118 (13.4%) students were smokers, whereas 500 (56.95) were nonsmokers. Thirteen (1.5%) students smoked less than 1 pack a day; 57 (6.5%) students, 1 pack a day; 40 (4.6%) students, 1 to 2 packs a day; and 14 (1.4%), more than 2 packs a day (Table 1).

There were statistically significant differences between age, sex, and smoking habit of the students. The rate of the smokers (67%) older than 21 years was higher than the rate of the smokers (33%) younger than 21 years ($P = .000$). The rate of male smokers (83%) was higher than that of the female smokers (17%) ($P = .000$). Based on the distribution of students according to their BMIs, the students with normal weight smoke statistically significantly more cigarettes than the underweight, overweight, or obese students ($P = .002$).

In the male students, there was a statistically significantly higher tendency for orthorexia ($P = .001$), and there was a statistically significant difference between the age groups for tendency for orthorexia ($P = .025$).

The range of ORTO-11 scores was 0 to 44. The total score was equally divided into 3 groups; thus, each group had 335 of the total score. Seventeen (1.9%) students had a score of 0 to 15; 505 (57.5%) students, a score of 16 to 30; and 185 (21.1%) students, a score higher than 31. Thus, it can be said that 1.9% of all the students with scores of 0 to 15 had a higher tendency for orthorexia than the students in the other groups (Table 1).

The mean and the median scores of ORTO-11 were 26.8 ± 6.24 and 27.0, respectively. The mean score of ORTO-11 (27) was used as the cutoff point. The number of the students with a score of 27 or lower was 324 (36.9%), and the number of the students with a score higher than 27 was 383 (43.6%).

Table 1
The sociodemographic findings of the medical students

	n	%
Age		
≤21	376	42.8
>21	363	41.3
Sex		
Male	464	52.8
Female	359	40.9
Education level (mother/father)		
Uneducated	81/42	9.2/6.4
Primary school	215/108	24.5/16.4
Secondary school	75/59	8.5/9.0
High school	143/150	16.2/22.8
University	142/300	16.1/45.5
Occupation (mother/father)		
Housewife/unemployed	438/15	49.9/1.7
Self-employed	28/159	3.2/18.1
Government employee	101/257	11.5/29.3
Worker	3/28	0.3/3.2
Retired Official	75/186	8.5/21.2
Occupation (mother/father)		
Housewife/unemployed	438/15	49.9/1.7
Self-employed	28/159	3.2/18.1
Government employee	101/257	11.5/29.3
Worker	3/28	0.3/3.2
Retired official	75/186	8.5/21.2
Smoking		
Smoker	118	13.4
Nonsmoker	500	56.9
ORTO-11 scores		
0 and 15	17	1.9
16 and 30	505	57.5
Higher than 31	185	21.1
EAT-40 scores		
0-30	787	89.6
≥30	91	10.4

Table 2
The distribution of the mean ORTO-11 scores of the medical students according to demographic characteristics (age, sex, smoker/nonsmoker, etc)

	n	Minimum-maximum	ORTO-11 scores (mean ± SD)	F	P
Age					
≤21	308	0-42	26.4 ± 6.1	5.01	.025
>21	303	0-41	27.5 ± 5.7		
Sex					
Male	379	0-41	26.3 ± 5.6	11.3	.001
Female	293	0-44	27.8 ± 6.4		
BMI					
<18.5	134	16-42	27.2 ± 4.7	3.1	.025
18.5-24.99	346	0-41	27.2 ± 5.9		
25-30	107	14-38	26.3 ± 5.0		
>30	8	0-32	26.9 ± 5.9		
Educational level of parents	F/M	F/M	F/M	F/M	F/M
Uneducated	41/73	16-40/16-38	27.1 ± 5.0/27 ± 4.6	0.306/0.122	.874/.98
Primary school	95/187	0-41/0-41	27.2 ± 5.9/26.9 ± 6.1		
Secondary school	53/63	14-41/16-41	27.1 ± 5.9/26.4 ± 5.6		
High school	119/109	0-44/0-44	27.1 ± 5.8/27 ± 6.1		
University	240/114	0-42/2-42	26.6 ± 6.0/26.9 ± 6.0		
Occupation of the parents	F/M	F/M	F/M	F/M	F/M
Unemployed/housewife	10/368	22-38/0-44	29 ± 4.7/26.7 ± 5.9	0.77/0.82	.54/.49
Self-employed	128/23	16-44/20-38	26.9 ± 5.5/27.7 ± 4.0		
Government employee	216/68	0-42/12-42	27.0 ± 6.3/27.3 ± 5.4		
Worker	25/-	18-34/-	25.4 ± 3.8/-		
Retired official	161/80	0-41/12-42	27.1 ± 5.6/27.8 ± 6.1		
Smoking					
Smoker	118	16	26.2 ± 5.1	6.5	.011
Nonsmoker	500	12	27.6 ± 5.6		
Cigarettes per day					
<1 Pack	13	22	29.8 ± 5.9		
1 Pack	57	17	27.6 ± 5.4	3.6	.016
1-2 Packs	40	17	25 ± 4.5		
>2 Packs	14	16	25.9 ± 5.7		
EAT-40 score					
0 and 29	787	26.6 ± 5.7	0	4.83	0.028
≤30	91	28.3 ± 9.5	0		

The total score for EAT-40 ranged between 2 and 84 in this study. The mean score of EAT-40 was 18.3 ± 9.3. When the cutoff point was selected as 30, 91 (10.4%) of the students with a score of 30 higher were likely to have an eating disorder [10].

The differences between the ORTO-11 scores of the age and sex groups were statistically significant. The mean score for orthorexic tendency in the male students was lower than in the female students, and the rate of the students younger than 21 years with orthorexia tendency was higher than the rate of the students older than 21 years with orthorexia tendency (Table 2).

As the BMI increased, the ORTO-11 score decreased, and thus, the risk of orthorexia nervosa increased. In addition, the difference between the BMI groups for tendency to orthorexia was statistically significant (P = .025) (Table 2).

The education level of the father/mother and ORTO-11 score and the occupation of the father/mother and ORTO-11 score were not correlated (Table 2).

The mean ORTO-11 scores of the smoking and nonsmoking groups were different. In the nonsmoking group, the mean ORTO-11 score was higher than that of the smoking group, but the difference was not statistically significant (Table 2).

The mean ORTO-11 scores of the groups with EAT-40 scores of 30 or lower were statistically significantly different (P = .028) (Table 2).

In logistic regression analysis, dependent variable was ORTO-11 score, and independent variables were sex, EAT-40, height, and age. In forward selection, age, sex, EAT-40, and height affected the ORTO-11 scores (Table 3).

Table 3
The effect of some demographic characteristics on the ORTO-11 scores according to logistic regression analysis with forward selection

Step	Variables	β	SE	Wald F	P	R^2	95% CI
1.	Sex	−.65	0.19	12.37	.000	.025	0.36-0.75
2	Sex	−.76	0.91	15.9	.000	0.046	0.32-0.68
	Age	−.33	0.10	10,315	.001		0.59-0.88
3.	EAT-40	−.95	0.35	7,22	.007	0.061	0.20-0,80
	Sex	−.70	0.19	13.01	.000		0.34-0.73
	Age	−.32	0.10	9.75	.002		0.60-0.89

CI indicates confidence interval.

4. Discussion

In this study, the prevalence of orthorexia (43.6%) among medical students was high when a score of 27 was considered the cutoff point in ORTO-11 test. In the study by Bağci Bosi et al, 45.5% of the resident physicians involved in their study scored less than 40 in the ORTO-15 test. They regarded participants with a score younger than 40 in the ORTO-15 test as having orthorexia. This result is similar to the results of our study. Erzurum is in the eastern part of Turkey, and socioeconomic level is lower than in Ankara, where the authors conducted their study, but the prevalence rates of orthorexia among medical students from the 2 cities were not different. In both regions, people have televisions and access to the internet and newspapers. Thus, the beliefs of people with such facilities can easily be influenced by the media.

A score of 0 to 15 in ORTO-11 is low; 16 to 30, moderate; 31 and higher, high. Accordingly, in our study, the rates of the ORTO-11 scores between 0 and 15 was 1.9%; between 16 and 30, 57.5; and between 31 and higher, 21.1%. There were 17 students with a low score. These students can be considered more orthorexic than those with moderate or higher scores.

In our study, the prevalence of orthorexia among the male students was higher than that among the female students (F = 11.3, P = .001). The prevalence of orthorexia nervosa in the study conducted in Italy by Donini et al was 6.9% based on ORTO-15 scores, and the rate of orthorexia prevalence was higher in males. Sanlier et al determined eating disorders among the university students in Turkey using EAT-40 test and the Body Cathexis Scale. They found that eating disorders are more prevalent among females compared to males (P < .001) [11]. It is also known that eating disorders of AN and BN are more prevalent among females than among males [12]. However, strikingly, orthorexia was more prevalent in males than in females in the study by Donini et al and in our study [6].

In our study, similarly, orthorexia was more prevalent among the male students of younger age, and the students with potential eating disorders based on the scores of EAT-40 also seemed to have an orthorexic tendency. *Orthorexia* is a new term, and its exact etiology and clinical features are not known. Hence, further studies are needed to determine its differences from other eating disorders.

In the current edition of the *Diagnostic and Statistical Manual of Mental Disorders*, eating disorders fall into 3 categories: AN, BN, and eating disorder not otherwise specified. The biggest difference between someone who is driven by a goal of a perfect diet and someone who is battling anorexia or bulimia is that anorexic and bulimic individuals are motivated by weight loss. The fundamental difference from AN is that in orthorexia, there is no fear about gaining weight but rather about certain foods considered impure and toxic. However, both disorders share many characteristics. People with orthorexia often have a history or features in common with anorexic patients. They are very careful, detailed, and tidy persons with an exaggerated need for self-care and protection. Women, adolescents, and those who practice sports such as bodybuilding or athletics are the groups at higher risk [2,3,6]. We can say that medical physicians and medical students are also in the high-risk group for orthorexia.

In our study, orthorexic tendency and father's or mother's occupation or education level was not correlated. Our study group consisted of medical students, and they do not have an income. Besides, in the eastern part of Turkey, socioeconomic status is lower than in the western part of the country. Thus, family-related factors are dependent on the economic status. In the study by Bağci Bosi et al, the socioeconomic backgrounds of the subjects were higher than most of the general public in Turkey. However, they found a high tendency for orthorexia. Health education messages must be targeted appropriately. Furthermore, poor diet in the manual social classes may not just be a matter of income inequalities; occupational dietary differences may be associated with food availability in and around the workplace and traditional food choices [13]. Thus, having higher or lower socioeconomic status is not fundamental for healthy eating and/or orthorexic thinking.

The interest fields (province), occupational or not, are the vulnerabilities that cause eating disorder development. The initiation of dieting is most strongly affected by perceived social encouragement to diet by family members, peers, and the media. The contribution of the media about health plays an important role in forming these obsessions. "Eating well is important for keeping wellness" [12]. We can say that knowledge on nutrition influences dietary behavior, and knowledge on health and illness is more influential for orthorexic tendency. Bağci Bosi et al have found that "highly sensitive behavior" toward healthy and proper nutrition is quite prevalent among the medical physicians in Ankara who are given education in "healthy nutrition" throughout their undergraduate studies and throughout their internship [14].

We found a negative correlation between BMI and orthorexia scores because being overweight and obese may expose the individual to humiliation and force him or her to diet and consume healthy foods. Young people, males, those on low income, those without qualifications, those who take little exercise, those who lack access to a car, those live in deprived areas, and women who smoke were less likely to show healthy eating behavior in a research conducted by Shelton (2007).

In our study, the education level and occupation of the mother and father did not have any effect on orthorexic tendency. Accordingly, it is obvious that family attitudes and individual personality features such as perfectionism and dependence are more effective in eating behavior. Krug et al [15] suggest that the fragmentation of meals within the family and an excessive importance given to food by the individual and the family are linked to the later development of an eating disorder.

As a limitation of this study, the effect(s) of eating attitudes of the family on orthorexia development was not evaluated. In addition, a study involving a control group is needed to determine whether the knowledge of medical students on health and disease states affected their tendency of having orthorexia. Eating attitudes change according to region and culture. In conclusion, the prevalence of orthorexic tendency among the medical students in Erzurum, a city in the eastern part of Turkey, is high. This study is the first study using ORTO-11 that evaluated tendency to orthorexia among medical students in Turkey.

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