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Original Research

The Relationship between Orthorexic Tendency and Bread Consumption Habits in Adults: A Cross-sectional Study

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Abstract

Objective: Recently, bread is a frequently discussed food whether it is healthy or not, due to its high carbohydrate and gluten content. It is thought that negative attitudes toward bread may effect on eating behavior. The present study examined attitudes toward bread consumption and orthorexic tendency.
Materials and Methods: This study was conducted on 1220 adults. Data including the type and amount of consumed bread, food consumption frequencies and the ORTO-15 scale were collected through a questionnaire. Three stepwise linear regressions were conducted to evaluate the related factors with orthorexic tendency.
Results: It was determined that 66.6% of the individuals had an orthorexic tendency. The idea that bread is an unhealthy food was more common in individuals with an orthorexic tendency ($p<0.05$). Similarly, the percentage of individuals who do not consume any bread was approximately 3 times higher among individuals with orthorexic tendency ($p<0.05$). Also, daily bread consumption amount (134.1±72.22 g vs. 152.9±76.71 g) and carbohydrate intake (200.7±110.45 g vs. 225.7±111.58 g) were found to be significantly lower in individuals with orthorexic tendency ($p<0.05$). High educational level, consuming whole grain bread, and low carbohydrate intake were associated with higher levels of orthorexic tendencies according to ORTO-15 scores ($p<0.05$).
Conclusions: These results indicate that the orthorexic tendency was higher in individuals with negative attitudes toward bread. In this respect, it seems important to increase the awareness of individuals about healthy bread types and the amounts to be consumed in terms of gaining healthier eating behaviors/of improving their eating behaviors.

Keywords: *Bread consumption; Carbohydrate intake; Orthorexic tendency; ORTO-15*

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Introduction

Bread, which has been produced in Anatolia for about eight thousand years, is a widely consumed food item worldwide (Ertürk et al., 2015; Giannou et al., 2003). Bread has an important place in the Turkish population because it is a good source of energy and some nutrients as the annual bread consumption amount is about 2 times that of European countries (Eglite et al., 2017). However, it has been reported that many factors, such as the presence of disease, the fear of weight gain, and the gluten content, affect bread consumption type and amount (Bautista-Castaño & Serra-Majem, 2012; Gül et al., 2003; Shewry & Hey, 2016). It is known that bread is a food that most individuals on weight loss diets restrict their consumption (Loria-Kohen et al., 2012; O'Connor, 2012). Beyond these trends of avoiding bread consumption, healthy bread preferences such as whole grain bread related to important health benefits like being a source of B vitamins and fiber, are usually ignored (Hauner et al., 2012; Rej et al., 2019; Serra-Majem & Bautista-Castaño, 2015). Although there are not many studies in the literature evaluating bread consumption in eating disorders, bread consumption differs in different eating disorders (Lobera & Ríos, 2009; Roustaee et al., 2018). In a study (Lobera & Ríos, 2009) the frequency of bread consumption in individuals with anorexia nervosa was found to be significantly lower than in the controls, and bread consumption in individuals with bulimia nervosa was found to be significantly higher than in the controls in another study (Roustaee et al., 2018).

Orthorexia nervosa (ON) is an eating disorder known as a healthy eating obsession (Scarff, 2017). Diet becomes an essential part of daily life in individuals with ON. Not only the content of the diet but also advanced concerns about food safety can lead people to negativity (Koven & Wabry, 2015). Although many risk factors have been identified that may cause ON, the little information available in the literature is insufficient to determine the exact causes (McComb & Mills, 2019). This obsession in individuals with ON may cause them to apply strict diets, exclude certain foods from diets, and inadequate and unbalanced diets (Varga et al., 2013).

Therefore, individuals with orthorexic tendencies may have different perspectives on bread, and their preferences may differ in terms of bread types due to nutritional content (Plichta & Jezewska-Zychowicz, 2019, 2020; Varga et al., 2014). In this study, it is aimed to determine whether there is a relation between orthorexic tendency and the bread consumption habits, especially the preferred type and the amount of bread.

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Material and Methods

This study was conducted in Ankara, Turkey, between January, and April 2021. In total, 1220 voluntary participants were reached between the ages of 18–64 years. Participants were included in the study by a random sampling method. Individuals with a diagnosed psychiatric disease or eating disorder were excluded from this study. Nutrition and dietetics professionals and students were also not included in this study as this may have affected the results. Before participation, individuals were briefed on this study and written informed consent was obtained from all voluntary participants. This study was conducted with the approval of the Gazi University Ethics Commission, dated 22/12/2020.

Survey data were collected via a questionnaire applied by the researchers by face to face. The first part assessed the sociodemographic characteristics of the participants (age, gender, marital status, presence of chronic disease, etc.). The body weight and height were taken based on self-reports of the participants and body mass index (BMI) was calculated using the weight/height (kg/m^2) equation. The BMI was categorized according to the World Health Organization classification (World Health Organization, 2021).

The second part of the questionnaire consisted of questions about bread consumption. Examples given of the asked questions: "Do you think bread is a healthy food?," "Do you consume bread?," "Which type of bread do you prefer?," "How much bread do you consume a day?."

The third part of the questionnaire consisted of a semi-quantitative food frequency questionnaire. The food and beverage amounts obtained from the applied food frequency questionnaire were entered into the "Nutrition Information System," and the energy and macronutrient intakes of the participants were calculated (BeBİS 7.0).

The orthorexic tendency (OT) was measured via ORTO-15 in this study. The reliability and validity of the Turkish version of the ORTO-15 was performed by Arusoglu (2006). ORTO-15 is a measure instrument for ON comprising 15 multiple-choice items. It is a self-report questionnaire with a four-point Likert scale (never, sometimes, often, and always). ORTO-15 items 3, 4, 6, 7, 10, 11, 12, 14, 15 were scored 1 = always, 2 = often, 3 = sometimes, and 4 = never, items 2, 5, 8, 9 were reversed scored, and two items (1 and 13) were scored 2 = always, 4 = often, 3 = sometimes, and 1 = never. We considered a cut-off value of <40 to be capable of predicting OT in this study. Lower scores would indicate higher levels of OT (Donini et al., 2005).

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Statistical Analysis

All statistical analyses were performed using SPSS (Statistical Package for Social Sciences) version 22. A descriptive analysis was performed using the number and percentages for categorical variables and mean and standard deviation for continuous variables. The t-test was used to compare continuous variables between the two groups. The chi-square test was used for comparison between categorical variables. Three stepwise linear regressions were conducted, taking the ORTO-15 score as the dependent variable. Age and education level in Model 1, age, education level and the presence of chronic disease in Model 2, and age, education level, the presence of chronic disease, preferred bread type, and carbohydrate intake in Model 3 were selected as independent variables. Statistical significance was deemed a p-value less than 0.05 in all analyses.

Results

The mean age of the participants was 30.0±11.71 years, 56.1% were females. The mean ORTO-15 scores of the participants were 37.8±3.74. Based on the ORTO-15 scores, 813 participants (66.6%) had OT and 407 participants (33.4%) had normal eating habits. The descriptive information and bread consumption habits of the participants according to the ORTO-15 score are summarized in Table 1. The education level of the participants in the OT group was significantly higher ($p<0.05$). Additionally, the presence of chronic disease was higher in the OT group ($p<0.05$). There was no significant difference between the groups in terms of gender, marital status, place of residence, and BMI classification ($p>0.05$). The idea that bread is an unhealthy food was more common in the OT group ($p<0.05$). The percentage of individuals who do not consume bread was approximately 3 times higher in the OT group ($p<0.05$). Also, daily bread consumption amount (134.1±72.22 g vs. 152.9±76.71 g) and carbohydrate intake (200.7±110.45 g vs. 225.7±111.58 g) were found to be significantly lower in individuals with OT ($p<0.05$).

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Table 1: Descriptive information and bread consumption habits of the participants according to ORTO-15 scores.

	ORTO-15 score <40 (n: 813)	**ORTO-15 score ≥40 (n: 407)**	**p**
	n (%)	**n (%)**	
Gender			
Male	363 (%44.6)	172 (%42.3)	0.232
Female	450 (%55.4)	235 (%57.7)	
Marital status			
Married	315 (%38.7)	139 (%34.2)	0.066
Single	498 (%61.3)	268 (%65.8)	
Place of residence			
Urban	624 (%76.8)	316 (% 77.6)	0.393
Rural	189 (%23.2)	91 (%22.4)	
Education level			
Primary	106 (%13.0)	71 (%17.4)	0.005*
High school	260 (%32.0)	156 (%38.3)	
University	447 (%55.0)	180 (%44.3)	
Presence of chronic disease			
Yes	141 (%17.3)	52 (%12.8)	0.023*
No	672 (%82.7)	355 (%87.2)	
BMI classification			
<18.5 (Underweight)	34 (4.2%)	21 (5.2%)	0.643
18.5-24.9 (Normal)	449 (55.3%)	219 (53.8%)	
25.0-29.9 (Overweight)	223 (27.4%)	125 (30.7%)	
30.0-34.9 (Obesity class I)	107 (13.1%)	42 (10.3%)	
Do you think you are eating healthily?			
Yes	359 (%44.2)	171 (%42.0)	0.258
No	454 (%55.8)	236 (%58.0)	
Do you think bread is healthy food?			
Yes	355 (%43.7)	223 (%54.8)	0.000*
No	364 (%44.8)	120 (%29.5)	
No idea	94 (%11.5)	64 (%15.7)	
Do you consume bread?			
Yes	775 (%95.3)	401 (%98.5)	0.002*
No	38 (%4.7)	6 (%1.5)	
Preferred bread type	**n: 775**	**n: 401**	
White bread	519 (%67.0)	305 (%76.1)	0.001*
Whole grain bread	195 (%25.2)	85 (%21.2)	
Phyllo dough/Flatbread	6 (%0.8)	1 (%0.2)	
Homemade bread	36 (%4.6)	6 (%1.5)	
Other	19 (%2.4)	4 (%1.0)	
	Mean±SD (n: 775)	**Mean±SD (n: 401)**	
The amount of daily bread consumption (g)	134.1±72.22	152.9±76.71	0.000*

BMI: body mass index, SD: standard deviation. *p<0.05

Table 2 shows the daily energy and nutrient intake of participants according to the ORTO-15 score. While carbohydrate, soluble fiber, and insoluble fiber intakes were significantly lower in the OT group, the protein and fat percentages (according to energy) were significantly higher ($p < 0.05$).

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Table 2: Daily energy and nutrient intake according to the ORTO-15 scores.

	ORTO-15 score <40 (n: 813)	ORTO-15 score ≥40 (n: 407)	p
	Mean±SD	Mean±SD	
Energy (kcal/day)	1930.7±881.33	2016.9±851.21	0.100
Carbohydrates (g/day)	200.7±110.45	225.7±111.58	0.000*
Carbohydrates (%)	41.6 ±9.14	44.8±8.89	0.000*
Soluble fiber (g/day)	6.3±3.57	7.0±3.79	0.004*
Insoluble fiber (g/day)	14.5±8.06	15.6±7.91	0.029*
Protein (g/day)	74.8±36.57	75.8±33.35	0.619
Protein (%)	16.1±3.68	15.6±3.35	0.012*
Fat (g/day)	89.4±43.35	88.1±39.59	0.599
Fat (%)	42.6±9.82	39.7±8.64	0.000*

SD: standard deviation. *p<0.05

Three stepwise linear regression model was developed with the ORTO-15 scores as the dependent variable and five independent variables (age, educational level, presence of chronic disease, preferred bread type and carbohydrate intake) that showed the highest correlation with the ORTO-15 (Table 3). In the last model, it was found that higher age (β = − 0.100), high educational level (β = − 0.125), consuming whole grain bread (β = -0.140) and low carbohydrate intake (β = 0.086) were associated with a higher level of OT.

Table 3: Multivariable analysis according to ORTO-15

	ORTO-15 score				
	Unstandardized Beta	Standardized Beta	p-value	Confidence interval	
				Lower bound	Upper bound
Model 1					
Age	-0.040	-0.124	0.000*	-0.060	-0.020
Educational level	-0.466	-0.125	0.000*	-0.700	-0.232
Model 2					
Age	-0.033	-0.104	0.002*	-0.054	-0.013
Educational level	-0.499	-0.134	0.000*	-0.734	-0.264
Presence of chronic disease	0.735	0.072	0.018*	0.126	1.344
Model 3					
Age	-0.031	-0.100	0.003*	-0.052	-0.011
Educational level	-0.460	-0.125	0.000*	-0.694	-0.226
Presence of chronic disease	0.573	0.056	0.065	-0.035	1.181
Preferred bread type	-0.286	-0.140	0.000*	-0.402	-0.171
Carbohydrate intake (g)	0.003	0.086	0.003*	0.001	0.005

*p<0.05

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Discussion

Although various prevalence has been reported depending on the diagnostic tools used, it should be kept in mind that the main criteria of ON are an obsessive focus on healthy eating and avoidance of unhealthy foods (Strahler et al., 2018). In this study, the mean ORTO-15 score of the participants was 37.8±3.74 and 66.6% of them had OT. Similar to other studies, we found a relatively high prevalence of OT (Missbach et al., 2015; Plichta & Jezewska-Zychowicz, 2019; Varga et al., 2014).

Bread is an important food that contains essential nutrients such as carbohydrates, fiber, protein, B vitamins and can be enriched with many minerals (O'Connor, 2012). Especially whole grain bread and high-fiber diets are associated with a reduced risk of many non-communicable diseases such as cancer, diabetes, and coronary artery diseases (Hauner et al., 2012). In this study, it was observed that there was a significant difference between the groups in terms of bread consumption amount and preferred bread types. The amount of bread consumption was lower and the preference for whole grain bread was higher in the OT group (Table 1). Similarly, Ormancı (2022) found that daily bread consumption in women with ON tendency was significantly lower than in women without ON tendency. Recently, especially in the media, the discussion of carbohydrate-rich and gluten-containing foods such as bread as unhealthy may be associated with less consumption in participants with OT (Pollard et al., 2017). It is thought that whole grain bread is preferred more in participants with OT because of higher fiber and protein content than white bread. Hauner et al. (Hauner et al., 2012) reported that consumers who were more willing to eat fiber-fortified bread were the ones who attached more importance to their health. As another result in this study, the homemade bread preference was higher in participants with OT. This situation can be associated with the preference for homemade products due to the concern of healthy eating (Donini et al., 2004).

The low-carbohydrate diet trend questioned whether foods rich in carbohydrates, such as bread, which are important in the daily diet, are healthy (Gunnarsson & Elam, 2012). In this study, it was found that the opinion that bread is an unhealthy food and the rate of those who do not consume bread was higher in the OT group (Table 1). In a study, 75% of the participants stated that they were aware of bread's health benefits, and one-third of them stated that it was difficult to determine healthy bread alternatives (Sandvik et al., 2018). Raising awareness of the characteristics of healthy bread can prevent the evaluation of bread as unhealthy. For this purpose, it is thought that providing informative media publications and training on healthy nutrition education in public health centers may be effective.

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Studies on the nutrition of individuals with OT in the literature have generally focused on food preferences rather than energy and nutrient intakes (Plichta et al., 2019; Plichta & Jezewska-Zychowicz, 2019). Also, different results were found in research evaluating energy and nutrient intakes in ON (Yeşildemir and Acar Tek, 2022; Grammatikopoulou et al., 2018). Yeşildemir and Acar Tek (2022) stated that the percentage of energy from carbohydrates was lower in orthorexic men than in non-orthorexic men, and the percentage of energy from protein was higher in orthorexic women than in non-orthorexic women ($p<0.05$). In another study, no significant difference was found between the protein, carbohydrate, and fiber intakes of orthorexic and non-orthorexic individuals (Grammatikopoulou et al., 2018). In this study, it was found that individuals with OT had lower carbohydrate and fiber intake compared with participants with normal eating habits. Additionally, it was observed that the percentage of energy from protein and fat was higher in these individuals (Table 2). The opinion of carbohydrates, especially bread, is unhealthy and may be associated with decreased carbohydrate intake and increased percentage of energy from protein and fat. Considering the studies, participants with OT have a higher consumption of fruits, vegetables, nuts, legumes, grains, and meat, while less consumption of sweets, snacks, refined bread, and animal fats has been reported (Plichta & Jezewska-Zychowicz, 2019; Sandvik et al., 2018). In line with this information, it is surprising that the fiber intake was significantly lower in the OT group in our study. It is thought that this may be due to the avoidance of consumption of foods with high carbohydrate content.

Higher age, high educational level, consuming whole grain bread, and low carbohydrate intake were associated with higher levels of OT (Table 3). The influence of defining characteristics such as gender, age, and economic status in OT is not as clear as in other eating disorders. However, in studies conducted in Turkey, it has been reported that OT is positively associated with age, similar to this study (Bağci Bosi et al., 2007; Fidan et al., 2010). This may be explained by the development of healthy eating habits by time and dietary restrictions due to the presence of chronic disease. In this study, it was observed that participants with the presence of chronic disease had a higher OT (Table 1).

When the relationship between education level and ON is examined, the results of the studies are conflicted (Aksoydan & Camci, 2009; Asil & Sürücüoğlu, 2015; Barnes & Caltabiano, 2017). In this study, higher education level associated with OT. Similar to our results, the study by Barnes and Caltabiano (Barnes & Caltabiano, 2017) found a more common OT in bachelor graduates than in high school graduates. Although the education level of

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individuals increases their tendency to make healthier choices, knowledge is not enough for the healthy behaviors. However, it should not be forgotten that focusing too much on these issues may increase the OT risk. Therefore, it is of great importance to increase social awareness of access to correct information sources and nutritional literacy.

Although the use of the scale (ORTO-15) with international validity and reliability and a large sample size are the strength of the study, it also has some limitations. ORTO-15 is a self-reported scale and only describes OT and does not diagnose clinical conditions. However, there was no other valid and reliable ON scale adapted to Turkish during the development phase of this study.

In conclusion, this study showed that OT can affect the bread preferences of Turkish adults. It has been observed that while the obsession with healthy nutrition decreases the amount of bread consumption, it increases the preferences for healthier bread types. However, the desire to choose a healthy food can imbalance the macronutrient composition of the daily diet. Raising the awareness of society about healthy bread choices can help resolve the prejudices against bread.

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Conflicts of interest

The authors report no conflict of interest.

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