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Original article

Types of Bread Preferred by Adult Individuals and Bread's Place in Daily Nutrition

Havvanur Yoldas Ilktac[1], Merve Sadik[2], Muazzez Garipagaoglu[3]

[1]Istanbul Medeniyet University, Faculty of Health Sciences, Department of Nutrition and Dietetics; [2]Istanbul Medipol University, Faculty of Health Sciences, Department of Nutrition and Dietetics; [3]Fenerbahçe University, Faculty of Health Sciences, Department of Nutrition and Dietetics.

Abstract. Bread, one of the most consumed food by humankind throughout history, has a global importance in nutrition. The common belief in recent years that bread is fattening and is harmful to health causes bread to be excluded from daily nutrition. This study aims to determine the individuals' bread preferences and the contribution of the bread consumed to daily nutrition. It was carried out in Turkey with 1766 volunteer participants aged between 18-65 years. The data were collected with a questionnaire form applied by face-to-face interview method. In order to determine the nutritional status, 2-day food consumption records were kept. The body mass index average of individuals was 26.4±8.25 kg/m^2. The waist circumference averages of male and female participants were found as 97.8±12.97 cm, 91.1±16.13 cm, respectively. It was found that the most consumed bread was white bread (87.3%), followed by whole-grain bread (40.8%). It has been found that the consumption of whole grain bread is higher in women compared to men. Female participants' whole-grain bread consumption was found to be higher than male participants, while male participants' cornbread consumption was higher than female participants ($p<0.00$ and $p=0.026$). It was found that male participants consume 182.3±105.07 g of bread per day, while females 124.5±78.11 g. It was observed that bread constitutes 27.1% of total daily energy intake in male participants, while 22.1% in females and this difference was found statistically significant ($p<0.001$). These results reveal that bread is the main ingredient in nutrition for Turkish society. The type of bread, which makes up the majority of carbohydrates, is as important as the amount. It is thought that training on healthy consumption of bread at the national level, and national and public service announcements and government-backed activities can positively change the bread consumption habits of individuals.

Key words: Bread; nutrition; health; diet; grains

Introduction

Bread is one of the most consumed foods by mankind throughout history. The archaeological works have shown that the world's oldest bakeries and the bread baked in these ovens belonged to the Babylonians around 4000 BC. In Ancient Egypt, bread was described as the most important food, even a blessing, in almost every ceremony from birth to death. Bread has been shrined in almost all religions (1). In Turkey, bread also expresses sweat of the brow, sharing, and plentifulness. Bread to be cheap, filling, and easy-to-supply makes it the main nutrient. Being included in a healthy and balanced diet, the bread has global importance in nutrition (2).

Compared to previous years, the scientific data increased 5 times between 2002-2012 are clear indications of the interest in grains and bread (3). In dietary

guidelines published in many countries around the world, it has been stated that the most to be consumed food group should be grains. In terms of its geographic location, Turkey is a Mediterranean country. In Mediterranean countries, grains such as pasta, rice, bulgur, corn, especially bread, constitute the basis of daily nutrition (4). The common belief in recent years that bread is fattening causes it to be excluded from and/or limited in daily nutrition (5,6). In the Nutrition and Health Research (TNHS) conducted in Turkey in 1974, 1984, 2010, 2019 the daily per capita bread consumption was determined to be 402, 360, 248 and 180 grams, respectively (7,8). Studies have reported that the consumption of bread has decreased over the years, whereas the incidence of obesity continues to increase (9,10). Although the increasing awareness of consumers and interest in different types of bread in recent years has led to increased consumption of high fiber bread types, studies have revealed that the most consumed bread type is white bread (5,11). Large-scale randomized-controlled trials are needed to determine the effects of bread on energy intake, appetite, and satiety (12,13). This study was aimed to examine the bread preferences of individuals living in Istanbul, the most crowded city of Turkey where people from many cultures live, and the contribution of bread to daily energy, carbohydrate, and fiber intake. In addition, it is thought that it may be more remarkable to investigate which food group consumption has increased rather than the decrease in bread consumption over the years. The data obtained will help to develop public health messages that help individuals maintain proper body mass index within the framework of recommendations on healthy eating habits that help prevent abdominal obesity.

Methods

Place and Date of the Research, Sample Selection

1766 volunteers between the ages of 18-65 and living in Beykoz district of Istanbul province participated in the study. For 95% and 80% statistical power, the sample size required 384 subjects. Data were collected between January-October 2018. Individuals with chronic diseases and pregnant women were excluded from the study. The Ethics Committee Approval was obtained from the Ethics Committee at Medipol University (numbered 386 and dated October 04, 2017), confirming that it conforms to the provisions of the Declaration of Helsinki in 1995 (as revised in Edinburgh, 2000).

Data Collection

The data of the study were collected through a questionnaire form applied by the face-to-face interview method. Demographic information, anthropometric measurements, and the most consumed bread types were examined in the questionnaire form. Bodyweight measurements of individuals were measured with Tanita UM-07 brand device, while their height, waist, hip, and neck circumferences were measured with a non-stretching measuring tape. To measure the height of individuals, feet were placed parallel to each other and the head was placed in Frankfurt Plane position. Body mass indexes of individuals were calculated using the body weight (kg) / height (m^2) formula.

An inelastic tape measure was used to measure waist circumference. After placing the arms loose on both sides of the body and the feet parallel to each other, the circumference passing through the midpoint between the lower rib and the iliac crest was measured. In order to determine the food consumption status, the types and amounts of foods consumed by individuals within 2 days (1 day on weekdays, 1 day on weekends) were recorded. Information was given about the portion sizes (tea glass, water glass, tablespoon, dessert spoon, bowl, ladle, etc.) so that the individuals could accurately record the types and amounts of the foods they consume. The guide named 'Photograph catalog of food and dishes: portion sizes and amounts' was used in determining the type and amount of bread consumed (14). Bread cards were created with the bread photos included in the document. Through these cards, individuals were asked to show the type and amount of bread they consume and were recorded.

Data Analysis

The classification of WHO was taken as a basis for evaluating the Body Mass Index (15). The

recommended sex-specific cut-off points for waist circumferences are ≥94 cm (men) and ≥80 cm (women) for increased risk, and ≥102 cm (men) and ≥88 cm (women) for a substantially increased risk (16).

The Nutrition Information Computer Programme (BeBIS) was used to determine the daily energy and nutrient consumption (17). The values obtained were compared with the recommendations specified in the Turkey Dietary Guidelines (18).

Statistical Analysis

Statistical analysis of the study was performed using the SPSS (Statistical Package for Social Sciences) 22.0 package program (19). Descriptive values were given as mean and standard deviation (SD). Qualitative data were expressed as number (n) and percentage (%). Whether the distribution of variables fit the normal distribution was evaluated by the Kolmogorov-Smirnov and Shapiro-Wilk tests and two-independent samples t-test was used for group comparisons. $p<0.05$ was considered statistically significant.

Results

Table 1 shows some demographic data of the individuals. Of the participants, 41.6% were female and 58.4% were female, about half of them (48.2%) were in the age group of 31-50 years. In terms of educational status, one-third of the participants were primary, 14.7% were secondary, and 31.7% were high school graduates. It was found that 64% of the individuals were employed.

Body weights of males and females were 79.6±13.72 kg and 68.2±19.80 kg, respectively. The BMI mean of the individuals was determined as 26.4±8.25 kg/m^2. The difference between the BMI values of male and female participants was not statistically significant ($p=0.84$). The waist circumference of female participants was found to be 91.1±16.13 cm, whereas 97.8±12.97 cm of male participants (Table 2).

When the bread types consumed by the individuals were investigated, it was seen that the most consumed bread by the individuals was white bread (87.3%), followed by whole-grain bread (40.8%). Cornbread, on the other hand, was preferred at a rate of 15.3%. The most secondly preferred bread type after white bread was whole-wheat bread for male participants, while whole-grain bread for female participants. Female participants' whole-grain bread consumption was found to be higher than male participants, while male participants' cornbread consumption was higher than female participants ($p<0.00$ and $p=0.026$) (Table 3).

Both male and female participants were found to take energy under the recommended values on daily average with 1823.5 kcal and 1522.8 kcal, respectively. The ratio of energy coming from carbohydrate and protein in both groups were found to be within the recommended values. The ratio of daily total energy from carbohydrate and protein in male participants

Table 1. Demographic characteristics of individuals

Demographic Characteristics	**n**	**%**
Gender		
Male	735	41.6
Female	1031	58.4
Total	1766	100
Age Groups (years)		
19-30	505	28.6
31-50	852	48.2
51-65	409	23.2
Total	1766	100
Age (Mean±SD)	39.4±12.5	
Educational Status		
Primary	652	36.9
Secondary	259	14.7
High School	559	31.7
University or higher	296	16.7
Total	1766	100
Employment Status		
Employed	635	36
Unemployed	1131	64
Total	1766	100
Number of Family Members		
From 1 to 3	559	31.7
4 persons and over	1207	68.3
Total	1766	100

Table 2. Anthropometric measurement averages of individuals

Anthropometric measurements	Male (n=735)	Female (n=1031)	Total (n=1766)
	X±SS	X±SS	X±SS
Height (cm)	174.2±6.90	160.3±6.35	166.2±9.43
Body weight (kg)	79.6.±13.72	68.2±19.80	74.3±18.36
BMI (kg/m²)	26.2±10.74	26.5±5.88	26.4±8.25
Waist circumference (cm)	97.8±12.97	91.1±16.13	94.2±15.09

Table 3. Distribution of bread types consumed by gender

Types of bread*		Male		Female		p	Total	
		n	%	n	%		n	%
White flour	White bread	650	88.4	892	86.5	0.23	1542	87.3
	Flat bread	198	26.9	248	24.1	0.17	446	25.3
	Phyllo-lavash	163	21.9	268	26	0.48	429	24.3
	Flat baked bread	62	8.4	103	10	0.26	165	9.3
Whole-wheat flour	Whole-grain	259	35.2	462	44.8	**0.000**	721	40.8
	Whole-meal	279	38	410	39.8	0.44	689	39.0
	Rye bread	155	21.1	246	23.9	0.17	401	22.7
	Oats	37	5	46	4.5	0.57	83	4.7
Corn flour	Cornbread	129	17.6	141	13.7	**0.026**	270	15.3

*more than one option can be selected

was significantly higher than in female participants (p=0.03 and p<0.001). In the whole group, it was determined that the daily fiber intake was below the recommended values and the fat intake was above the recommended values (Table 4).

It was seen that male participants consume 182.3±105.07 g of bread per day, while females 124.5±78.11 g. Individuals took 402.8±262.44 kcal/day energy through bread consumption. Bread constituted 27.1% of total daily energy intake in male participants, while 22.1% in females and this difference was found to be statistically significant (p<0.001). Energy of bread consumed daily constituted almost half (48.5%) of the energy supplied from the total carbohydrate (Table 5).

Discussion

Turkish culture, which has a very deep-rooted history in terms of its origin, has the widest cultural map in the world in terms of its geography. Bread takes an important place in this deep-rooted history.

Body Mass Index, an index based on height and body weight, is frequently used in medical screenings of societies and used to classify the owerweight or obesity (7). BMI values of male participants in our study were 26.2±10.74 kg/m², while 26.5±5.88 kg/m² for females. BMI means of male and females in Italy were found to be 25.3±3.5 kg/m² and 23.9±4.4 kg/m², respectively (20). BMI mean of the adult population in the Netherlands was found to be 27.3±5.2 (21). According to the TNHR, BMI means were 26.4±4.5 kg/m² and 28.9±6.4 kg/m² for males and females, respectively (7). It was observed that the mean BMI values of the male individuals in our study were similar to the TNHR data, whereas the mean BMI values of the female participants in our study were higher than the results of the Italian study and lower than the mean values in Turkey. Individuals were found to be in the pre-obesity category (between 25-29.9 kg/m²) according to the WHO classification. It has been reported that the global BMI

Table 4. Daily energy and macronutrient intakes of individuals

Energy and Nutrients	Intake				Recommended	
	Male	Female	Total	p	Male	Female
	X±SS	X±SS	X±SS		X±SS	X±SS
Energy (kcal)	1823.5±304.03	1522.8±315.19	1647.9±344.09	<0.001	2145	1730
Carbohydrates (%)	51.2±26.40	48.05±19.29	49.3±22.57	0.003	45-60	45-60
Fiber (g)	19.7±7.27	17.5±5.91	18.4±6.61	<0.001	25	25
Protein (%)	17.7±9.84	15.9±7.02	16.6±8.35	<0.001	12-20	12-20
Fat (%)	36.9±10.23	38.6±9.25	37.9±9.70	<0.001	20-35	20-35

Table 5. Daily bread consumption of individuals and its contribution to energy

Bread consumption	Male	Female	p	Total
Amount (g/d)	182.3±105.07	124.5±78.11	<0.001	148.6±94.67
B_e (kcal/d)	495.5±286.52	337.2±222.43	<0.001	402.8±262.44
B_e /T_e (%)	27.1	22.1	<0.001	24.4
B_e/CHO_e (%)	52	46	<0.001	48.5

g: grams, d: day, kcal: kilocalorie, B_e: Energy of Bread, T_e: Total Energy, CHO_e: Energy of carbohydrates

values have increased by 2.5 units in men (21.7 kg/m^2 to 24.2 kg/m^2) and 2.3 units in women (22.1 kg/m^2 to 24.4 kg/m^2) compared to years (22).

Waist circumference is an important indicator of abdominal obesity and the regional distribution of fat in the body, and it is widely used to determine the risk for diet-related chronic diseases (23). The results of measurements to be over 102 cm in men and 88 cm in women poses a high risk of chronic diseases. In our study, the mean waist circumference values were found to be 97.8±12.97 cm in men and 91.1±16.13 cm in women. In another study, these values were found to be as 87.9±8 cm and 79.6±9.7 for men and women, respectively (24). In a study carried out in Turkey, the mean waist circumference values of men and women were found to be as 98.2±19.6 cm and 85.0±16.2, respectively (25). According to the Turkey Nutrition and Health Research, the mean waist circumference values of men were 93.1±12.7 cm, while 90.1±15.2 cm in women (7). It was observed that the values were significantly higher than the upper limit (80 cm for women, 94 cm for men) recommended by the International Diabetes Federation (IDF) for European, Eastern Mediterranean, and Middle Eastern people, especially for women (25,26). This finding indicates that the rate of male-pattern fat deposition is high in Turkish women. Turkish women with the highest obesity rate among European countries paint a closer picture to Middle Eastern countries, especially in terms of abdominal obesity prevalence (5).

There are many types of bread that are consumed locally and regionally in every region of Turkey. These include whole-wheat, whole meal, rye, corn, village breads, phyllo, flat bread, lavash, etc. It was found that compared to female participants, male participants prefer white bread more (p=0.23), whereas females prefer whole-wheat bread more compared to males (p<0.001). In two studies carried out in Turkey, it was found that women preferred bread made of whole-wheat flour at a higher rate (5,27). This result shows that women are more conscious about choosing healthy breads compared to men. In our study, similar to the studies conducted in Turkey, it was found that the most consumed bread type was white bread (87.3%). In two different studies carried out in Turkey, it was determined that the most consumed bread type was bread made of white flour (28,29). In a national study conducted in Sweden, the most consumed bread types were found to be whole-grain bread and white bread with 37% and 36%, respectively (30). According to the Turkey Nutrition and Health Research, it was identified that the consumption of white bread types

was 85.4%, whereas the consumption of whole-grain bread was quite low (22.7% in women, 13.6% in men) (7). Besides, the cornbread consumption rate of the individuals in our study was also remarkable (15.3%). Cornbread, a traditional type of bread, is frequently consumed in the Black Sea Region of Turkey. The fact that cornbread took place in daily consumption suggests that this may be due to the living of individuals who migrated from the Black Sea region in the region where the study was conducted. Bread preferences of the individuals in our study were similar to other studies in Turkey. Although the bakery industry produces many types of bread today, individuals may prefer local bakeries that are more familiar and easily accessible. Bread varieties may be limited in local bakeries and more white bread is produced there. This may explain why the most consumed bread is white bread.

Recommended daily energy for adults is 2145 kcal for men and 1730 kcal for women (18). In our study, the energy intake of men was 1823 kcal/day and 1522 kcal/day for women. According to the health research conducted in Austria between 2010-2012, it was determined that men and women in the adult group took 2172 kcal/day and 1854 kcal/day, respectively (31). In other studies, the energy intake of men and women was found to be 2652 kcal/1955 kcal in Belgium, 2390 kcal/1939 kcal in Italy, 2398 kcal/1747 kcal in Portugal, respectively (32–34). According to Turkey Nutrition and Health Research, the energy intake of men and women was found 2203 kcal/day and 1638 kcal/day, respectively (7). Daily energy intake values in our study were lower than other studies. This may have resulted from the difficulty in quantification, a common problem in food consumption methods, despite the use of visual measuring instruments. Carbohydrates should constitute 45-60% of daily energy (18). The ratio of daily energy resulting from carbohydrates in all individuals in our study was within the recommended limits, but close to the lower limit (49.3%). In a study conducted in Israel, the ratio of the daily energy of individuals resulting from carbohydrates was found 61.9% (35). In another study carried out in Lebanon, this rate was found to be 48.8% (36). According to the national study of Turkey, this rate was determined as 51% and 50% for men and women, respectively (7). The fact that the ratio resulting from carbohydrates was close to the lower limit makes us wonder about which nutrient was consumed instead of carbohydrates. Table 4 shows that the protein was within the recommended limits, while the fat was above the recommended values. Despite the consumption of carbohydrates, which is believed to increase weight, was close to the lower limit, the fact that BMI and waist circumferences of the study group were above normal was thought-provoking.

Recommended fiber amount for adult individuals is 25g/day (18). The fiber consumption in our study was found to be 18.5 g/day. The fiber consumption in several studies were 16g/day in Lithuania, 17 g/day in Iceland, and 18 g/day in France (34,37,38). The fiber consumption in Turkey, on the other hand, was 23g/day and 20 g/day for men and women, respectively (7). The values for fiber consumption in our study were found to be similar to other countries, but below the recommendations. The fiber content of bread varies by the purification state of the wheat. The fact that bran (rich in fiber) and extract of wheat, which has high nutritional value, are separated during wheat processing causes losses in many nutrients, especially fiber. Fiber has an important place due to its physical and physiological functions and different local and systemic effects in the gastrointestinal tract. The main high-fiber foods are whole-grains, vegetables, and fruits. The fact that white bread was mostly preferred in our study group and the ratio of daily energy resulting from carbohydrates was close to the lower limit was thought to negatively affect the daily fiber intake. Based on these data, preferring bread made of whole-wheat flour instead of bread made of white-flour is thought to have a significant effect on providing dietary fiber intake.

The countries' bread consumption amounts are quite variable. Turkish people take first place with 150 kg of bread consumption per capita per year. Iranians are the second-largest bread consumers all around the world, with 117 kg per capita per year (320 g per day), while this value corresponds to 4.5 times the global average (39,40).

Daily bread consumption in our study was 182,3±105,07 g and 124.5±78.11 g in men and women, respectively. The mean bread consumption in Sweden is 86 grams per day (30). In Finland, men consume an

average of 52 g of bread per day, and women 41 g, while these amounts in Lebanon are 282 g and 126 g for men and women, respectively (36,41). The bread consumption per capita in the United States of America, France, and the United Kingdom was 165 g/day, 137 g/day, and 101 g/day, respectively (39). While daily bread consumption per capita was 400 grams in 1993 in Turkey, according to Turkey Nutrition and Health Research 2010 results, the mean bread consumption for men in urban areas was found to be 237.63 g for the 19-30 age group, 236.61 g for 31-50 age group, and 205.65 g for 51-64 age group. In females, these rates were 142.83 g in the 19-30 age group, 143.15 g in the 31-50 age group and 140.18 g in the 51-64 age group, respectively (7). In our study, the energy coming from bread constitutes about 25% of the daily energy and about half (48.4%) of the energy obtained from daily carbohydrates. In the studies of various countries, the ratio of energy coming from bread in daily nutrition was found to be 11%, 32.7%, 38%, and 47%, respectively (30,35,36,39). In addition, in another study conducted in Turkey, it was determined that the energy provided from bread constitutes 46.4% of the energy provided from the total carbohydrate (5). The amount of bread consumption in our study was found to be considerably higher than the Swedish and Finnish studies. In addition, the contribution of bread (energy, carbohydrate) to daily nutrition is quite high. These data underline the fact that bread is the main ingredient in nutrition for Turkish society. There is a belief in the society in recent years that bread causes weight gain and it is tried to be removed from the daily diet. Despite the fact that bread is considered guilty to this extent, increasing and continuing obesity incidence in the world is thought-provoking.

Conclusion

Today, the amount of carbohydrates in the diet is a controversial topic. Carbohydrate types (bread, rice, pasta, potatoes) may vary by different geographical location of the countries. In this study the energy coming from bread constitutes about 25% of the daily energy and about half of the energy obtained from daily carbohydrates so it does not seem very possible to exclude bread, the most basic food in the nutrition of Turkish society, from the daily diet. Nutrition guideliness still say that carbohydrates should make up about half of the daily diet. The type of bread, which makes up the majority of carbohydrates, is as important as the amount. Whole grains are considered among the high fiber foods. In our study, the preference of white bread the most negatively affected daily fiber intake. Bread types made of rough grain flours are an important source of dietary fiber and vitamin B. It is thought that training on healthy consumption of bread at the national level, and national and public service announcements and government-backed activities can positively change the bread consumption habits of individuals.

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Correspondence
Havvanur Yoldas Ilktac
Istanbul Medeniyet University, Faculty of Health Sciences, Department of Nutrition and Dietetics
Address: Kartal Cevizli Yerleşkesi - Atalar Mh. ehit Hakan Kurban Cd. 34862. Kartal - Cevizli / Istanbul
Email: havvanur.yoldas@medeniyet.edu.tr; havvanuryoldas55@hotmail.com
Phone: +90 530 663 41 18
Orcid ID: 0000-0002-7433-6370