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Factors affecting on perception and knowledge of portion size in young adults

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Received 9 October 2020
Revised 9 November 2020
Accepted 10 November 2020

Abstract

Purpose – The purpose of this study is to evaluate the perception and knowledge of standard food/meal portion size and related factors in young adults.

Design/methodology/approach – The present study was conducted on 1,000 volunteer young adults, consisting of 504 men and 496 women (18 and 28 years). The portion size of food/meal, amount of food measuring utensils and also nutritional knowledge were evaluated via a questionnaire and some visual materials.

Findings – Knowledge of portion sizes, amount of food each utensil holds and nutrition was evaluated via a questionnaire and some visual materials. Knowledge of portion size with respect to food groups ($p = 0.015$), meals ($p < 0.001$) and food measuring utensils ($p = 0.002$) and nutritional knowledge scores ($p = 0.011$) differed based on body mass indexes (BMI). Women had on mean a higher nutritional knowledge score than men (2.0 ± 1.3, 1.9 ± 1.1 points, respectively). The probability of having knowledge about food measuring utensils was 1.4-fold greater for individuals who had been previously educated about nutrition ($p = 0.034$). Individuals of the faculty of health sciences had higher mean scores for all portion scores ($p < 0.05$).

Originality/value – The study findings highlighted that portion knowledge and perception of young adults were affected by gender, BMI, enrolled faculty and nutritional knowledge status. This is the first study, through which the portion knowledge and perception subcomponents (food, meal and measuring utensils) are evaluated, indicating each subcomponent to be affected by distinct factors.

Keywords Nutrition knowledge, Food measuring utensil, Portion perception, Portion size, Food

Paper type Research paper

Introduction

The early adulthood period is important for shaping nutritional habits, as individuals start to make independent choices during that time (Mazıcıoğlu and Öztürk, 2003; Ermiş *et al.*, 2015). A sufficient and balanced diet is important for a healthy lifestyle. Unhealthy diet and excessive energy intake because of increasing portion sizes are among the causes of obesity. It is understood that people tend to eat more when portion size increases, and this is defined as the portion size effect (Herman *et al.*, 2016). Although epidemiological studies show the

The author thank all the participants who devoted their time to participate in this study. They are warmly acknowledged for their helpful and wholehearted cooperation.
Funding: None.
Conflict of interest: Author declares no conflict of interest.

Nutrition & Food Science
Vol. 51 No. 6, 2021
pp. 947-958
© Emerald Publishing Limited
0034-6659
DOI 10.1108/NFS-10-2020-0391

increase in portions over time (Young and Nestle, 2002; Ercan and Öktem-Güngör, 2015), portion sizes consumed are positively correlated with body weights of children and adults (Piernas and Popkin, 2011; Burger *et al.*, 2007).

Individual vision and perception and meanings and values associated with the images perceived emotionally are significantly related to the knowledge and life experience of the individual (Erişti *et al.*, 2013; Özerk *et al.*, 2017). Visual differentiation is the ability to identify similarities and differences such as in size, color and shape; visual perception is the ability to recognize visual stimuli and interpret them by combining them with previous experiences (Erişti *et al.*, 2013; Özerk *et al.*, 2017; Akaroğlu and Dereli, 2012). Visual perception and differentiation also affect the portion perception. The data obtained as a result of recent studies indicate that big portions are usually believed to be smaller portions whereas small portions are assumed to be more (Rolls *et al.*, 2002; Wansink and Kim, 2005).

Preference of portion size may be based on the satiety capacity of the food (Brunstrom, 2014; Brunstrom and Rogers, 2009). Beyond hunger-fullness situations, many individual factors such as age, the meaning associated with the food, loss of control, learned answers and body weight, as well as body mass index (BMI), may affect the perception of portion size (Burger *et al.*, 2007; English *et al.*, 2015).

The literature also indicates that gender is an important factor in portion perception and knowledge, and men frequently have more inaccurate portion estimations than women (Almiron-Roig *et al.*, 2013). Furthermore, flavor, energy density, food shape and color may affect the perception of portion size (English *et al.*, 2015). Moreover, plate size, quantity of the ingredients and packed size of the food are other factors. Some previous studies found that plate size or ingredient quantities are positively correlated with portion size (Wansink *et al.*, 2006; Penaforte *et al.*, 2014; Wansink and Cheney, 2005).

In conclusion, there are many factors affecting portion perception and knowledge level, and a clear manifestation of these would allow for the development of potential strategies to be able to reduce the prevalence of obesity. The aim of this study was to evaluate the perception and knowledge of standard food/meal portion size and related factors in young adults comprehensively.

Materials and method

Participants

This cross-sectional study was conducted on 1,000 volunteer young adults, consisting of 504 men and 496 women (aged 18–28 years and non-athletes) enrolled in different colleges in Ankara, Turkey between 2017 and 2018 years.

This study was approved by the Gazi University Clinical Research Ethics Committee (approval number 18744377–903.07.02–58386 dated 19/04/2017). Clear explanations were provided to participating individuals with regard to the purpose of the study, after which written informed consent was obtained from all participants in accordance with the Declaration of Helsinki (World Medical Association).

Procedure

Study data was collected through the face-to-face interview method. A questionnaire including questions that evaluated socio-demographic characteristics, nutritional habits, portion perceptions (knowledge about food groups and meals and amount held by food measuring utensils) and nutritional knowledge level was used as a data collection tool. Furthermore, 24-h recall food records were obtained.

Instruments

Evaluation of general characteristics. General characteristics such as socio-demographic and health history of the individuals were investigated by using a questionnaire form.

Determination of nutritional habits and situations. The components such as food label reading habits, e.g. being aware of portion quantities while reading the food label, were learned; it was investigated whether plate size, shape and color affect the portion size. Furthermore, participants' knowledge of the amount of actual parts of specific foods that they could not eat was assessed.

Daily dietary energy intake was determined based on 24-h dietary recall. A computer-assisted nutritional program known as a nutritional information system – Beslenme Bilgi Sistemi (version 7.2) – was used to determine the amount of daily dietary energy intake. Individual daily dietary energy intake was classified as "insufficient," "sufficient" or "over intake" through the reference values of the Republic of Turkey Ministry of Health's Turkey Dietary Guidelines (Republic of Turkey Ministry of Health, 2016).

Evaluation of portion knowledge/perception. Individual portion perception was assessed at three stages.

The first stage included the evaluation of the portion size knowledge of each individual in relation to food groups. Different photos of seven foods in the food and nutrition photograph catalog used commonly in nutrition and dietetic practice in Turkey (Rakıcıoğlu *et al.*, 2014) were shown to the participants. It has been noted that different food groups are involved in the selection of foods. Besides, some foods daily consumed in the Turkish population were included in the study. The participants were asked to select the photo reflecting one portion of a food from different photos shown for each food (standard milk, traditional cheese, meat, egg, bread, fruit and vegetable).

In the second stage, the participants were asked to estimate the portion size of 17 meals served in standard white plate through visual materials. Some popular meals traditionally consumed in the Turkish population (Toyga soup, grilled meatball, chicken dish with vegetable, baked anchovies, chickpeas with meat, red lentil dumplings, omelet, ground spinach, cooked aubergine with lentil, French fries, cauliflower dish, green beans, rice, pasta, kısır, baklava and semolina dessert) were included in the study.

Definition of the standard measurement tools is required for the determination of the standard portion size of foods. However, in Turkey standard measurement tools and weighing instruments are not used generally in food preparation and service. Portions amounts of foods or meals are expressed through service equipment, which exist in everybody's home such as glass, bowl spoon and ladle (Republic of Turkey Ministry of Health, 2016). For this reason, we conducted the last stage, which was consisted of asking the participants to estimate volumes of certain measuring tools, such as a water glass, a tea glass, a tablespoon and a coffee cup by viewing the food and nutrition photograph catalog again (Rakıcıoğlu *et al.*, 2014). Accurate answers were given a score of 1, whereas inaccurate answers were scored as 0.

The total knowledge score for each sub-component was calculated. The range of scores for food portions of different food groups, meals, food measuring utensils and overall nutritional knowledge were 0–7 points, 0–17 points, 0–4 points and 0–6 points, respectively. Evaluation of the answers was performed on the basis of the Republic of Turkey Ministry of Health's Turkey Dietary Guidelines (Republic of Turkey Ministry of Health, 2016).

A pilot study was conducted on 30 participants at the beginning of the study, and minor changes were made to the confusing questions and visual materials.

Determination of nutritional knowledge level. The previous level of nutritional education for each participant was investigated in the questionnaire form. To evaluate nutritional

knowledge, questions about "consumption recommendations" of flavors such as salt/sugar and food groups were asked. For each item, correct answers were scored with 1 point, whereas inaccurate answers were scored with 0. Total score was then calculated. The accuracy of this information was assessed on the basis of the Republic of Turkey Ministry of Health's Turkey Dietary Guidelines (Republic of Turkey Ministry of Health, 2016).

Anthropometric measurements

Trained dieticians obtained the anthropometric measurements in the study. Body weight measurements (kg) were taken using a calibrated and 0.5 kg sensitive scale. Measurements were made early in the morning while the participants were hungry, wearing light clothes and without shoes. The height of the individuals were measured in Frankfort position by means of a stadiometer. BMI was calculated using the "body weight/height^2" (kg/m^2) formula. According to the BMI classification of the World Health Organization, The BMI values of the participants were grouped into four categories, namely, underweight (BMI $<$ 18.5 kg/m^2), normal weight (18.5–24.9 kg/m^2), overweight (25.0 $\leq$ BMI kg/m^2) and obese (30.0 $\leq$ BMI kg/m^2).

Data analysis

All statistical analyzes were performed using the statistical package for social sciences version 20.0. Counts, percentage (per cent) and mean $\pm$ standard deviation ($\bar{x} \pm$ SD) values were taken for the evaluation of the data. To compare the mean scores, the Mann-Whitney U and Kruskal-Wallis tests were considered for two groups and more than two groups, respectively.

Using the median scores, portion knowledge of the food groups, portion information about meals and nutritional knowledge were labeled as less than median and greater than the median. Accurate answers were given a score of 1 and inaccurate answers were given a 0 in each section. Logistic regression models were also considered once these groups were labeled. The forward selection method was used to obtain logistic regression. So, all the important variables were included in the model, and the excluded variables were not important. *P*-value $<$0.05 was considered significant for all analyzes.

Results

General characteristics of the participants and portion information/perceptions are shown in Table 1. The frequency of participants who were not diagnosed with any disease was 95.7%. In total, 36.1% of all participants, including 33.7% of the men and 38.5% of the women had received previous nutrition education. Besides, 51.3% of the participants attend the Faculty of Health Sciences and 48.7% attend the Faculty of Medicine. Among the participants, 66.7% were at normal weight, 25.8% were overweight, 5.9% were underweight and 1.6% were obese (data not shown in the table). In the evaluation of gender-based BMIs of the participants, 60.7% of men had normal body weight, 36.7% were overweight, 1.6% were underweight and 1.6% were obese. Among the women, 66.7% were at normal weight, 25.8% were overweight, 5.9% were underweight and 1.6% were obese. A statistically significant association was found between gender and BMI ($p < 0.001$) (Table 1). Furthermore, while the daily dietary energy intake of individuals was 1,905 $\pm$ 594 kcal/day, this value was 2,043 $\pm$ 596 kcal/day for men and 1,765 $\pm$ 559 kcal/day for women ($p < 0.001$) (data not shown in the table).

Evaluation of food label reading revealed that 47.7% of all participants had food label reading habits and this was gender associated (men: 41.9%; women: 53.9%; $p < 0.001$) of the frequency of participants who were aware of portion size on food label information was 28.3% of the participants. The frequencies of participants who considered themselves able

Variables	Gender				
	Male (n = 504)		Female (n = 496)		
	n	(%)	n	(%)	p-value
BMI (kg/m^2)					<0.001*
Underweight	8	1.6	51	10.3	
Normal weight	303	60.1	364	73.4	
Overweight	185	36.7	73	14.7	
Obese	8	1.6	8	1.6	
Habit of food label reading					<0.001*
Yes	211	41.9	266	53.6	
No	293	58.1	230	46.4	
Portion size being affected by plate color					<0.001*
Yes	140	27.8	200	40.3	
No	364	72.2	296	59.7	
Self-reported knowledge on inedible amount of foods					<0.001*
Yes	53	10.5	102	20.6	
No	451	89.5	394	79.4	

Notes: BMI: body mass index. Pearson's Chi-square test, *$p < 0.05$. No significant differences were found between men and women for disease status, previous nutrition education, enrolled faculty, being aware on portion amount in the label, ability of estimation of one portion of foods and meals, perception about portion size being affected by plate size and plate shape ($p > 0.05$)

Table 1. General characteristics and knowledge/ perception about portions of individuals

to accurately estimate a single portion of the foods and meals were 57.7% and 62.4%, respectively. Those who specified that plate size would affect portion size made up 66.5% of the participants. Those who indicated that the plate color might affect the portion size consumed included 27.9% of men and 40.3% of women ($p < 0.001$). The frequency of participants who think that plate shape might affect portion size was 44.5%. Knowledge of the amount of certain parts of specific foods that participants could not eat was gender-based; 10.5% of men and 20.6% of women thought that they knew that amount of food ($p < 0.001$) (Table 1).

Portion and nutritional knowledge scores of the participants according to gender, faculty, BMI, previous education on nutrition and food label reading habits are presented in Table 2. Accordingly, there was a statistical difference between genders only for the nutritional knowledge score ($p < 0.05$). Women had on mean a higher nutritional knowledge score than men (2.0 ± 1.3, 1.9 ± 1.1 points, respectively) ($p = 0.031$). None of the other scores differed regarding gender ($p > 0.05$). In evaluating the participants according to the faculties that they attend, it was found that all scores were significantly different according to the faculty. Individuals enrolled in the Faculty of Health Sciences had higher mean scores for all points compared to the scores of the students of the Faculty of Medicine ($p < 0.05$) (Table 2).

The evaluation according to BMI revealed that scores for portion knowledge of the food groups for obese, normal, underweight and overweight individuals were 2.3 ± 1.1 points, 2.0 ± 1.2 points, 1.9 ± 1.3 and 1.9 ± 1.1 points, respectively ($p = 0.015$). Underweight individuals had the highest portion knowledge of meal scores (8.4 ± 4.4 points), whereas the obese participants had the lowest scores (7.6 ± 4.4 points) ($p < 0.001$). Besides, the scores of knowledge regarding food measuring utensils differed according to BMIs ($p = 0.02$); the underweight group had the highest knowledge score (2.0 ± 0.96 points), whereas the obese group had the lowest scores (1.1 ± 0.81 points). Nutritional knowledge scores for underweight, normal weight, overweight and obese groups were, 2.7 ± 1.1, 2.5 ± 1.1,

Table 2.
Portion and nutritional knowledge scores of the individuals

Gender	Portion knowledge score of food groups		Portion knowledge score on meals		Knowledge score of food measuring utensils		Nutritional knowledge score	
	$\bar{x}\pm$ SD	*p*-value	$\bar{x}\pm$ SD	*p*-value	$\bar{x}\pm$ SD	*p*-value	$\bar{x}\pm$ SD	*p*-value
Gender								
Male	1.9 ± 1.1	0.42	8.0 ± 4.4	0.61	1.6 ± 1.0	0.13	2.4 ± 1.2	0.031*
Female	2.0 ± 1.3		7.7 ± 4.3		1.7 ± 1.1		2.6 ± 1.2	
BMI								
Underweight	1.9 ± 1.3	0.015*	8.4 ± 4.4	<0.001*	2.0 ± 0.9	0.002*	2.7 ± 1.1	0.011*
Normal	2.0 ± 1.2		7.8 ± 4.3		1.6 ± 1.0		2.5 ± 1.2	
Overweight	1.9 ± 1.1		7.8 ± 4.5		1.6 ± 1.2		2.5 ± 1.1	
Obese	2.3 ± 1.1		7.6 ± 4.4		1.1 ± 0.81		2.1 ± 1.2	
Previous nutrition education								
Yes	2.1 ± 1.3	0.12	7.7 ± 4.7	0.13	1.9 ± 1.0	<0.001*	2.8 ± 1.2	<0.001*
No	1.9 ± 1.1		8.0 ± 4.1		1.5 ± 1.0		2.3 ± 1.1	
Faculty								
Health Sciences	2.1 ± 1.2	<0.001*	8.2 ± 4.4	0.026*	1.7 ± 1.1	0.029*	2.6 ± 1.3	0.028*
Medicine	1.8 ± 1.1		7.5 ± 4.3		1.6 ± 1.0		2.4 ± 1.1	
Food label reading								
Yes	2.0 ± 1.2	0.20	7.9 ± 4.6	0.80	1.9 ± 1.0	<0.001*	2.7 ± 1.2	<0.001*
No	1.9 ± 1.2		7.8 ± 4.1		1.4 ± 1.0		2.3 ± 1.1	

Notes: Mann-Whitney U and Kruskal-Wallis tests were used for two groups and more than two groups, respectively, *$p < 0.05$. BMI = body mass index. SD = standard deviation

2.5 ± 1.2 and 2.1 ± 1.2 points, respectively (p = 0.011). According to food label reading habits, there was a statistically significance difference for knowledge regarding food measuring utensils and nutritional knowledge scores. Those who responded affirmatively to the question on food label reading had higher scores for food measuring utensils and nutritional knowledge when compared with those who answered negatively ($p < 0.001$) (Table 2).

The logistic regression models of nutritional knowledge scores, as well as food groups and meal portion knowledge scores, are presented in Table 3. Accordingly, portion and nutritional knowledge scores were classified as below and above the median as a result of the advanced selection method. The results indicate that the probability of those who responded affirmatively to the question about the accurate estimation of the food portion being on or below the median is 1.4-fold (1/0.70) more than the probability of those who responded negatively being below the median (p = 0.01). The probability of those who responded affirmatively to the question about accurate knowledge of inedible amounts being above the median is 1.7-fold more than those who responded negatively being above

Independent variables	B ± SE	OR (95% CI)	p-value
Knowledge score of food group portion			
Self-reported-accurate estimation of food portion = yes	−0.353 ± 0.14	0.70 (0.53–0.92)	0.01*
Being aware on inedible amount of food	0.557 ± 0.18	1.7 (1.2–2.5)	0.003*
Faculty = health sciences	0.498 ± 0.13	1.6 (1.2–2.1)	<0.001
Constant	−0.881 ± 0.12	0.41	<0.001*
Portion knowledge score of meals			
Food label reading = yes	0.339 ± 0.13	1.4 (1.0–1.8)	0.01*
Being aware of portion size on the label = none			0.01*
-Always	−0.622 ± 0.21	0.53 (0.35–0.82)	0.004*
-Frequently	−0.343 ± 0.21	0.71 (0.46–1.0)	0.11
-Sometimes	−0.205 ± 0.22	0.81 (0.52–1.2)	0.36
Table size affecting the portion consumption = yes	0.279 ± 0.13	1.3 (1.0–1.7)	0.04*
Previous nutrition education = yes	−0.282 ± 0.14	0.75 (0.57–0.99)	0.04*
Energy intake = over			0.05
-Energy intake = insufficient	−1.610 ± 0.79	0.20 (0.04–0.94)	0.04*
-Energy intake = sufficient	−1.411 ± 0.79	0.24(0.05–1.15)	0.07
Faculty = health sciences	0.330 ± 0.13	1.4 (1.0–1.7)	0.01*
Constant	1.400 ± 0.81	4.0	0.08
Knowledge scores of amounts of food measuring utensils			
Food label reading = yes	0.545 ± 0.16	1.7 (1.2–2.3)	0.001*
Self-reported accurate estimation of food portion = yes	0.703 ± 0.17	2.0 (1.4–2.8)	<0.001
Previous nutrition education = yes	0.346 ± 0.16	1.4 (1.0–1.9)	0.03*
BMI group = obese			0.008*
-Underweight	1.414 ± 1.0	4.1 (0.48–34.9)	0.19
-Normal	1.171 ± 1.0	3.2 (0.40–25.5)	0.26
-Overweight	1.742 ± 1.0	5.7 (0.71–45.7)	0.10
Gender = male	−0.574 ± 0.16	0.56 (0.40–0.78)	0.001*
Faculty = health sciences	0.382 ± 0.15	1.4 (1.0–1.9)	0.01*
Constant	−3.246 ± 1.0	0.03	0.002*

Notes: BMI = body mass index. B = regression coefficient, SE = standard error, OR = odds ratio, CI = confidence interval. *$p < 0.05$

Table 3. Logistic regression models for knowledge scores of food group and meal portions and knowledge scores of amounts of food measuring utensils

the median ($p = 0.03$). Those attending the Faculty of Health Sciences are 1.6-fold more likely to be above the median than those attending the Faculty of Medicine ($p < 0.001$) (Table 3).

When portion knowledge score regarding meals was classified as below and above the median, the probability of those with food label reading habits being above the median was 1.4-fold more likely than those who did not read food labels. The probability of those who thought that plate size affects portion size being above the median was 1.3-fold greater than the probability of individuals who thought that it did not being above the median ($p = 0.04$). The probability of those attending the Faculty of Health Sciences being above the median compared to those attending the Faculty of Medicine was 1.3-fold greater ($p = 0.01$). The probability of the portion knowledge scores of those who had nutrition education being below the median was 1.3 (1/0.75) times more compared to uneducated individuals (Table 3).

The logistic regression analysis results and the quantity of knowledge regarding measuring utensils are shown in Table 3. Accordingly, the probability of the participants with food label reading habits being above the median is 1.7-fold higher than it is for individuals who do not read food labels ($p = 0.001$). The probability of participants who believed that they had accurate estimations of food portions being above the median when compared with those who did not believe this is 2.0-fold greater ($p < 0.001$). The probability of the score of measuring utensils knowledge for individuals who were previously educated on nutrition being above the median was 1.4-fold greater ($p = 0.03$). The probability of male individuals being below the median when compared with women was 1.7-fold (1/0.56) greater ($p = 0.001$). The probability of the measuring utensil knowledge scores of those attending to the Faculty of Health Sciences being above the median compared to those attending the Faculty of Medicine was 1.4-fold greater ($p = 0.01$) (Table 3).

Discussion

This study was the first study determining the factors related to young adults' knowledge level on portions and perception status, as well as evaluating food groups, meals and measuring utensils, separately.

Aside from various environmental factors, there are several characteristics of food/meals, including nutritional ingredients, energy density and taste and a number of social factors that affect portion knowledge/perception (English *et al.*, 2015). It is reported that some socio-demographic characteristics, including gender, age and BMI, affect the meal portion size perception variance by 2%–19%, the psychological variables by an additional 3%–8% and the food-related features by an additional 2%–12% (Spence *et al.*, 2016). The evidence within the literature suggests that gender is a substantial factor and men tend to misinterpret portion sizes more frequently than women (Almiron-Roig *et al.*, 2013). Moreover, previous studies indicate that women are prone to consuming some foods in smaller or bigger portions depending on the foods, and this is called "feminine." On the other hand, men have a tendency to consume in bigger portions, which is called the "masculine style." Therefore, specific foods and socio-demographic gender are reported to bear a gender stereotype (Cavazza *et al.*, 2017). In a study, when compared to men, it is suggested that women more frequently consume a Caprese salad or a small-sized hamburger with an elegant presentation than foods with larger portion sizes and simpler in nature; thus, this group of foods are considered feminine food (Cavazza *et al.*, 2015). On the other hand, men and women have been identified as perceiving portion sizes of particularly healthy foods differently. Women tend to perceive the portions of high energy density foods as bigger while men are prone to perceiving healthy food portions as bigger (Cavazza *et al.*, 2015). One of the most substantial results of the present study is that there is no difference between genders in terms of nutritional groups and food portion knowledge/perception status. However, being

male is associated with a 1.7-times lower amount of knowledge regarding measuring utensils. The foods/meals used in this study are culturally familiar to the sampling group. The reason for determining no difference in meal portion knowledge and perception between genders might be related to culturally familiar meals being visually shown within the study. Additionally, the huge difference between genders in terms of knowledge of amounts held by measuring utensils is an interesting result. Although there is no difference in previous nutrition education status, this result is considered to be caused by males' lower nutritional knowledge scores.

Another finding of this study is that there is a significant difference between BMI groups in terms of all portion knowledge scores, and particularly obese individuals have the lowest scores for knowledge regarding meals and measuring utensils and also nutritional knowledge. The biggest reason of the energy imbalance is having a lack of nutritional knowledge in the addition to large portions triggering eating behaviors is attractive (Ercan and Öktem-Güngör, 2015). In one study, BMI and high energy density snacks and high-carbohydrate food preferences were found to be strongly correlated. On the other hand, foods with high fat content are associated with smaller low-portion sizes when compared with high-carbohydrate foods (Burger *et al.*, 2007). Additionally, alcoholic beverages and soft-drinks are found to be preferred in the biggest size, and this is positively correlated with increasing body weight (Bezerra and Alencar, 2018). In studies for describing the mechanism underlying the relationship between portion sizes and eating behavior, it is reported that the activity in the brain's insula, nucleus accumbens and limbic areas changed following the food slide show, and this activity differs in obese and underweight individuals. This phenomenon has been found be a motivation factor for high energy density foods (Ng *et al.*, 2011; Stoeckel *et al.*, 2008) and limbic areas (Killgore *et al.*, 2003). The portion size, especially in terms of high energy density foods and drinks, affects energy intake and obesity (Barbara *et al.*, 2014). This study provides an insight, in that portion perceptions and nutritional knowledge status differ in individuals with different body weights, and participant's perception is negative; however, their effects on energy intake have not been evaluated. The energy intake of overweight and obese individuals can only be regulated by individuals being conscious of the portion they consume.

In this study, it was found that young adults have different portion knowledge and perceptions based on their faculties, and the literature on this subject is highly limited. So, this paper would make a vulnerable research brief to report on the portion size attitudes in a subpopulation of future health professionals. In particular, the students of the Faculty of Health Sciences have 1.6, 1.4 and 1.4 times more knowledge regarding amounts and portions than those from the Faculty of Medicine in terms of food, meals and measuring utensils, respectively. Also, the nutritional knowledge scores of the students of the Faculty of Health Sciences are comparatively higher. This situation is thought to result in greater portion knowledge, and thus, more accurate perception among students of the Faculty of Health Sciences. In another study, this phenomenon is supported, and it is found that nutrition education for college students would help drinks after exercise be preferred and consumed with more accurate serving sizes (Lewis *et al.*, 2017).

One of the most interesting findings of this study is that the nutrition education status increases the possibility of obtaining knowledge regarding food measuring utensils, thus allowing individuals to accurately perceive the measuring utensils. This result is the first study to provide the insight that portion sizes of more standardized materials might be more accurately perceived as a result of nutrition education. In addition, in this study, it was found that individuals who think their food portion guesses are accurate are more prone to

more accurately estimate amounts of food measuring utensils and, on the contrary, to less accurately estimate amounts of individual food groups.

In addition to the food measuring utensils, the idea that the size of the plate is closely correlated to the amount that individuals put on their plates has become widespread (Güngör, 2014). It has been consistently revealed, in this study as well, that 66.5% of young adults think that plate size would affect the portion amount consumed. Moreover, it has been reported that the plate color might affect the portion amount consumed more commonly among female individuals. Materials, including type of dish and packaging, used in daily nutritional behavior are underrated tools affecting cooking and food intake (Ercan and Öktem-Güngör, 2015). However, the studies demonstrate that there is a close correlation between the food amount consumed and these tools (Sharp *et al.*, 2014; Libotte *et al.*, 2014). In this study, it was found that the portion knowledge of individuals who think the plate size would affect the portion size consumed is 1.322 times more accurate than those who do not think so. In experimental studies, it has been found that the portion served in a bigger plate would seem smaller (Sharp *et al.*, 2014; Ercan and Öktem-Güngör, 2015). In another study, it was determined that plates with varying sizes would not affect individuals' portion size perception. However, it would affect the classification of portion size as small, medium and large (Penaforte *et al.*, 2014). In another experimental study, individuals were asked to select a food with a portion control plate, and it was found that vegetables are less preferred than recommended for the control, as well as the regular plate (Hughes *et al.*, 2017). This phenomenon reveals that the preferred food/meal and the plate size plays a major role. This concern is recommended to be considered for future studies.

In conclusion, portion knowledge and perception of young adult individuals are affected by their gender, BMI, faculty and nutritional knowledge status. This is the first study, through which the portion knowledge and perception subcomponents (food, meal and measuring utensils) are evaluated, indicating each subcomponent to be affected by distinct factors. Therefore, we think that these components should be considered in future studies.

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