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Fruit and Vegetable Consumption, Attitudes and Knowledge in Preschool Children and Adolescents

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ABSTRACT

Aim: The aim of the study was compared to the daily consumption servings, attitudes, and knowledge of fruit and vegetable consumption in preschool children and adolescents. **Materials and Methods:** The study sample consists of 906 participants within two groups including preschool children (n=453) and adolescents (n=453) living in Konya, Turkey. A survey model was used in the study and participants were selected randomized. The data were obtained by a questionnaire consisting of four parts. **Results:** According to results, 30.9% of the preschool children were found to be overweight and 11.7% obese, whereas 16.3% of the adolescents were overweight and 11% obese. The recommended daily consumption serving (RDS) for fruits was found to be high in both children (98.7%) (p>0.05) and adolescents (95.1%) (p=0.000), but in vegetables it was 26.7% (p>0.05) and 74.4%, respectively (p=0.000). The mean nutrition knowledge score of preschool children's parents and adolescents was found (x̄±SE) 53.8±0.807 and 36.2±0.508 respectively (p=0.000). **Conclusion:** It was determined that preschool children and adolescents consumed enough for fruit, but in preschool children the vegetable consumption was low. The fruit and vegetable consumption can be increased by developing healthy eating habits in the preschool and adolescence period.

Keywords: Fruit and Vegetable Consumption, Preschool Children, Adolescents.

Okulöncesi Çocuklar ve Adölesanların Meyve ve Sebze Tüketimi, Tutum ve Bilgileri

ÖZ

Amaç: Araştırmanın amacı, okul öncesi dönem çocukları ve ergenlerin günlük tüketim porsiyonları, meyve ve sebze tüketimine ilişkin tutum ve bilgileri ile karşılaştırılmasıdır. **Gereç ve Yöntem:** Araştırmanın örneklemini Konya'da yaşayan okul öncesi çocuklar (n=453) ve ergenler (n=453) olmak üzere iki grupta 906 katılımcı oluşturmaktadır. Araştırmada tarama modeli kullanılmış ve katılımcılar rastgele seçilmiştir. Veriler, dört bölümden oluşan bir anket ile elde edilmiştir. **Bulgular:** Sonuçlara göre okul öncesi çocukların %30.9'unun hafif şişman ve %11.7'sinin obez, adölesanların ise %16.3'ünün hafif şişman ve %11'inin obez olduğu belirlendi. Meyveler için günlük önerilen porsiyon tüketimi (RDS) çocuklarda (%98.7) (p>0.05) ve adölesanlarda (%95.1) (p=0.000) yüksek bulunurken, sebzelerde ise sırasıyla %26.7 (p>0.05) ve %74.4 (p=0.000) olarak bulundu. Okul öncesi dönem çocuklarının anne-babalarının ve adölesanların beslenme bilgi puan ortalamaları sırasıyla (x̄±SE) 53.8±0.807 ve 36.2±0.508 bulundu (p=0.000). **Sonuç:** Okulöncesi çocukların ve adölesanların yeterince meyve tükettikleri, ancak sebzelerde özellikle okul öncesi çocuklarda tüketim düzeyini düşük olduğu belirlendi. Okulöncesi dönem ve adölesan dönemde sağlıklı beslenme alışkanlıklarının geliştirilmesiyle meyve ve sebze tüketim düzeyi artırılabilir.

Anahtar Kelimeler: Meyve ve Sebze Tüketimi, Okulöncesi Çocuklar, Adölesanlar.

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INTRODUCTION

Vegetable consumption is a matter of importance in terms of adequate, well-balanced, and healthy nutrition in all periods of human life (Kähkönen et al., 2020; Kamphuis et al., 2006). Today, the benefits of vegetable consumption are well known. By consuming a sufficient intake of vegetables, protein, carbohydrate and lipid, vitamins and minerals are provided to the body, however, it is also used in the protection and growth of many health factors such as bioactive compounds and antioxidants (Olimat et al., 2017; Wallace et al., 2020). Vegetable consumption is considered as recommended in the nutrition guidelines all over the world, but also plays an important role in the fight against nutritional diseases (e.g., obesity, cardiovascular diseases, nutrient deficiencies) (Kelishadi and Azizi-Soleiman, 2014; Pem and Jeewon, 2015; Song et al., 2010). And also, WHO emphasize that low fruit and vegetable consumption is responsible for gastrointestinal cancer, ischemic heart disease and all stroke deaths and to decrease the risks of related diseases, 400 g daily consumption of fruit and vegetable recommended (WHO, 2015). Many studies (De Cosmi et al., 2017; Holley et al., 2017; Nicklaus, 2017; Scaglioni et al., 2018) show that the dimensions of nutrition attitudes, habits and behaviors started to be acquired in preschool age, but the profile exhibited in school and adolescence period and even in adult life is shaped depending on lifestyle, demographic and social factors and individual-related characteristics (Kähkönen et al., 2018). Primary prevention strategy for reducing the risk of chronic diseases encourage healthy eating among children and adolescent may therefore represent an effective (Boeing et al., 2012). This is caused by the development and expansion of fast-food and mass catering systems, shortening the time spent on eating, and especially family, parents, and friends (Slavin and Lloyd, 2012). Presence of vegetables different tastes is a major obstacle to gaining consumption habits, food neophobia develops prevents preschool children from accepting or leading to rejection. The taste, appearance, perception, peer environment and socio-demographic factors of vegetables continue to be important even when children are adolescents (Smith et al., 2017). Furthermore, numerous programs and interventions are being carried out on WHO recommendations, such as school programs on increasing fruit and vegetable consumption both preschool children and adolescence (Slavin and Lloyd, 2012). This paper aimed to determine the consumption, and attitudes and nutrition knowledge of fruit and vegetable in preschool children and adolescents in Turkey.

MATERIALS AND METHODS

Model

This study was designed as a survey model through face-to-face interviews in preschool children's parents and adolescents from September-December 2021.

Sample

The study sample were calculated two independent means (two groups) applied by power analysis with G*Power 3.1.9.2 software program. The parameters were entered in G*Power as 0.24 for effect length, 0.05 for error (α) and 0.95 for power (1-β). Result of the calculation, the sample size was found 453 for each group, and 906 in total. First group was constituted by 3-5-year-old preschool children (n=453), the second one was formed by 14-16-year-old adolescents (n=453). Each group has generated by randomized participants residing in Konya, Turkey. The data were obtained by the parents in preschool group and by themselves in adolescents.

Variables

The independent variables of this research are gender, age group, Body Mass Index (BMI), and schools. The dependent variable is fruit and vegetable consumption, attitudes, and knowledge.

Procedures

The questionnaire form was constituted by (Neslişah & Emine, 2011; Onur et al., 2017) and Turkish Dietary Guide (TDG) (TDG, 2016) from the literature and it was prepared with the help of 3 experts. The draft pre-applied to 15 parents and 15 adolescents, and the necessary corrections were made to form by researchers and then finalized form performed to participants. The questionnaire consists of four main parts. First part demographic variables and anthropometric measurements, second part fruit and vegetable serving consumption per day, third part was situated 25-question fruit and vegetable attitude statements, fourth part was comprised close-ended and multiple-choice 25-question fruit and vegetable knowledge test. First part consists of demographic variables such as gender, age, and the anthropometric measurements height (m), weight (kg) of all participants is based on BMI (kg/m^2) and categorized WHO Growth Standards of Children and Adolescents (WHO, 2006) and TDG by age and gender (TDG, 2016). According to TDG and WHO percentile values of BMI was used to identify children and adolescents as skinny ($BMI<3^{th}$), underweight ($3^{th}<BMI<15^{th}$), normal ($15^{th}<BMI<85^{th}$), overweight ($85^{th}<BMI<97^{th}$), and obese ($97^{th} < BMI$). The second part is for determining the consumption servings of the participants for fruits and vegetables. The 24-hour recalled food consumption record method was used and the fruit and vegetable consumed in the last 24 hours were questioned. Then consumption data (amounts) was converted into servings as 4 and above, 4, 3, 2, 1 and 0 (never) was made to reveal the daily consumption servings. In the third part, a Likert-type tool consisting of 25 statements was used to determine the attitudes of the participants towards fruits and vegetables. Statements were composed of (TDG, 2016), WHO Measuring Intake of Fruit and Vegetable Workshop and other literature outputs (Wallace et al., 2020; Wang et al., 2014) Attitudes were determined 5-point Likert-type scale (1, Strongly disagree; 2, Disagree; 3, Indecisive; 4, Agree; 5, Strongly agree) were used to identifying participant's perceived attitudes to fruit and vegetables. In last part, nutrition knowledge score was collected using nutrition knowledge questionnaire, which included 25 items on the fruit and vegetable related not only knowledge but also applications (e.g., storage, cooking techniques). All items were closed-ended, multiple choice. The score of nutrition knowledge was computed as the sum of the correctly answered items

4 points. The min and max scores are 0 to 100. Cronbach's α score was found 0.73.

Statistical analysis

The data analyze was performed using SPSS (Ver.22.0) software program. Descriptive statistics like frequency (n), ratio (%), mean ($\bar{x}$), standard error of mean (SE) computed for all two groups' items. Parametric (e.g., One sample independent test) and non-parametric tests (e.g., Chi-square) were used to examine the differences between predictor variables. Significance level was considered for $p<0.05$ in all statistical analyzes.

Ethical approval

An ethical approval numbered 2021/850 received from the Selcuk University Health Sciences Faculty Ethics Committee of Non-Invasive Research.

RESULTS

The study sample consists of totally 906 participants in two groups. Preschool children group, 48.3% girl and 51.7% were boy and adolescents were 51.4% girl and 48.6% boy. Another demographic data is 84.4% of preschool children have educated in public schools and 12.6% in private schools. All adolescents were educated in public schools.

In Table 1 it was seen preschool children and percentiles for ages and for standards TDG (TDG, 2016) for girls and boys and WHO (WHO, 2006). BMI are often used to assess anthropometric measures to help evaluate children's growth and nutritional status. In preschool group, subdivided into 3, 4, and 5 ages, overweight were found 39.0%, 28.0%, and 28.1% and obese 11.0%, 8%, and 13.7% respectively. On the other hand, it has seen in 14, 15, and 16 years old in adolescent group, overweight was calculated 15.5%, 16.1%, and 18.3% and obese 10.8%, 7.2%, and 18.3% respectively (Table 1). Fruit consumption frequency of preschool children and adolescents was examined, it was determined that the 4-serving/day fruit consumption was higher in apple, banana, orange, and strawberry in both groups. Apple, banana, and pomegranate consumption is higher in adolescents than preschool children in 4 servings per day. While the fruits consumed in 4 or more servings were apricot, cherry, grape, orange, peach, pear and pomegranate in the preschool group, apple, banana, sand strawberries in adolescents. All fruit consumption was differed between two group ($p=0.000$) but grape not ($p>0.05$).

Table 1. BMI groups of preschool children and adolescents[*].

Preschool Children				Adolescent			
Age	**BMI**	**n**	**%**	**Age**	**BMI**	**n**	**%**
3 years (n=118)	Skinny	8	6.8	14 years (n=110)	Skinny	-	-
	Underweight	10	8.5		Underweight	28	25.5
	Normal	41	34.7		Normal	53	48.2
	Overweight	46	39.0		Overweight	17	15.5
	Obese	13	11.0		Obese	12	10.8
4 years (n=100)	Skinny	5	5.0	15 years (n=261)	Skinny	-	-
	Underweight	22	22.0		Underweight	49	18.8
	Normal	37	37.0		Normal	151	57.9
	Overweight	28	28.0		Overweight	42	16.1
	Obese	8	8.0		Obese	19	7.2
5 years (n=235)	Skinny	13	5.5	16 years (n=82)	Skinny	-	-
	Underweight	29	12.3		Underweight	6	7.3
	Normal	95	40.4		Normal	42	51.2
	Overweight	66	28.1		Overweight	19	23.2
	Obese	32	13.7		Obese	19	18.3

[*] Percentiles categorized TDG reference data for BMI.

Table 2. Fruit and vegetable recommended daily servings (RDS) of TDG for BMI.

	Group	BMI	RDS				p*
			Yes		No		
			n	%		%	
Fruit	Preschool Children [a]	Skinny	26	5.7	-	-	0.821
		Underweight	61	13.5	-	-	
		Normal	170	37.5	3	0.7	
		Overweight	138	30.5	2	0.4	
		Obese	52	11.5	1	0.2	
		Total	447	98.7	6	1.3	
	Adolescent [b]	Skinny	-	-	-	-	0.000
		Underweight	83	18.3	-	-	
		Normal	243	53.6	-	-	
		Overweight	74	16.3	3	0.7	
		Obese	31	6.8	19	4.2	
		Total	431	95.1	22	4.9	
Vegetable	Preschool [c] Children	Skinny	15	3.3	46	10.2	0.162
		Underweight	7	1.5	19	4.1	
		Normal	45	9.9	128	28.3	
		Overweight	46	10.2	94	20.8	
		Obese	8	1.8	45	9.9	
		Total	121	26.7	332	73.3	
	Adolescent [d]	Skinny	-	-	-	-	0.000
		Underweight	45	9.9	38	8.4	
		Normal	200	44.2	46	10.1	
		Overweight	42	9.3	32	7.1	
		Obese	50	11.0	-	-	
		Total	337	74.4	116	25.6	

Fruit Recommended Daily Serving: [a] 2-6 age Children: Yes 1.5-2, No <-1.5; [b] 14-18 age Adolescent: Yes 2.5-3, No <-2.5
Vegetable Recommended Daily Serving: [c] 2-6 age Children: Yes 1-2, No <-1; [d] 14-18 age Adolescent: Yes 3.5-4, No <3.5
* Chi-Square Test

Table 3. Fruit and vegetable knowledge scores of groups.

Variable			x̄±SE	p*
Preschool children parents (n=453)	Education level	Primary	47.6±1.856[a]	0.000
		Secondary	47.7±1.737[a]	
		High School	52.7±1.532[b]	
		Bachelor	61.4±1.186[c]	
		Total	53.8±0.807	
Adolescent (n=453)	BMI	Underweight	34.7±1.143[a]	0.016
		Normal	38.3±0.724[b]	
		Overweight	35.7±1.164[a]	
		Obese	34.5±1.443[a]	
		Total	36.2±0.508	

* Oneway ANOVA; [a, b, c] Differences between groups according to Duncan test.

Vegetables consumed in 4 or more portions were spinach (28.3%, 22.1%) and carrots (25.6%, 20.1%) in preschool and adolescents, respectively. At least 2 servings of green leafy vegetables (e.g., spinach, broccoli) or other vegetables such as tomatoes, citrus fruits such as oranges, lemons, or other fruits rich in antioxidants are recommended. In Table 2, the level of RDS those who supply fruit consumption in the preschool and adolescent groups was found to be 98.7% and 95.1%, respectively. All groups provided RDS of fruit and did not differ significantly between the BMI in preschool children (p>0.05). However, RDS of fruit differed in terms of BMI in the adolescents (p=0.000). Otherwise, RDS of vegetable was determined 26.7% in preschool children, 74.4% in adolescents. The fruit RDS is high in adolescents, but it is the opposite for vegetables for both groups. In preschool children RDS of vegetable is not differed by BMI (p>0.05), on the contrary in adolescents (p=0.000). Attitude statements towards fruits and vegetables in the preschool group were taken by the parents, and findings suggest that parents have a higher

strongly agree than adolescents in terms of well and balanced nutrition, consumption, disease relationship, and production to vegetable and fruits. In addition, it's clear that result is far from the attitudes of adolescents, especially about consumption, nutrients and disease relationship to the fruits and vegetables. Moreover, both groups had a moderate or undeceive participation in the attitude statements such as the interaction of the family in terms of fruit and vegetable consumption, negative purchase and consumption behaviors, type of consumption and service, preservation applications, and their consumption in the meal patterns. It was observed that some fruit and vegetable attitudes were similar in both groups. When all 25 attitude statements were evaluated in terms of both groups, difference was determined between the Likert type participation levels ($p<0.05$).

Another aspect of the study was to determine the fruit and vegetable knowledge levels of preschool children's parents and adolescents about fruits and vegetables. In Table 3, the mean ($\bar{x}\pm SE$) of fruit and vegetable knowledge score of preschool children's parents and adolescents was found 53.8±0.807 and 36.2±0.508 respectively. Parents' fruit and vegetable knowledge scores were differed by education level ($p=0.000$). The test scores were also found to be higher according to the higher education level. It was determined that the normal group had a higher score in BMI than the others. Significant test scores were obtained among adolescents according to BMI ($p<0.05$) (Table 3).

DISCUSSION

The study is aimed to compare the fruit and vegetable consumption, attitudes, and knowledge in preschool children and adolescents. According to the report of Monitoring the Growth of School-Age Children in Turkey 2013 (Ministry of Health, 2014), it has been reported that the overweight and obese levels of 6-year-olds are 12.4% and 5.5%. In addition, according to the Turkey Nutrition and Health Survey (TNHS) report (Ministry of Health, 2017), the prevalence of obesity is 8.5% (boys 10.1%, females 6.8%), overweight is 17.9%, overweight and obese were found to be 26.4% in 0-5-year-old children. The results of the study coincide with the data in Turkey. The BMI results of the preschool group are similar to the several study (Lasarte-Velillas et al., 2015; Mei et al., 2008; Müller et al., 2014; Nazarova & Kuzmichev, 2016) findings. On the other hand, adolescents BMI finding overlapped recent Turkish studies (Akman et al., 2010; Bahar et al., 2020; Yosmaoğlu et al., 2010) and in USA according to the National Health and Nutrition Examination Survey (NCHS) (Ogden et al., 2012) the frequency of obesity was found adolescents aged 12-19 years was 19.6% for boys, 17.1% for girls, and 14.4% on average. The prevalence of overweight and obesity in children aged under five years was found as 10.9%–17.9% in Turkey (Ministry of Health, 2017).

When discussing with the literature of fruit and vegetable consumption; in TDG (TDG, 2016) represented that; 400 g fruit and vegetable consumption is equal to 5 serving/day and 1 serving of raw fruit and cooked vegetables recommended daily servings (RDS) is 150 g. In addition to this, at least 5 servings (at least 400 g/day) of vegetables and fruits should be consumed per day, and 2.5-3 servings should be vegetables and 2-3 portions should be fruit in adults. But another recommendation in 2-6 aged children and 14-18 aged adolescents fruit recommendation is 1.5-2 and 2.5-3 serving, vegetable is 1-2 and 3.5-4 serving per day respectively in TDG (TDG, 2016).

In Turkey Nutrition and Health Survey (Ministry of Health, 2017), daily consumption rates of vegetables, potatoes, citrus fruits, and fruits were reported to be 47.6%, 10.1%, 16.2%, and 51.5%, respectively. (Di Noia and Cullen, 2015) reported that adolescents were believe more fruit and vegetable consumption than their owns. Many studies (Cooke et al., 2004; Orlet Fischer et al., 2002; Vereecken et al., 2004) suggested that the positive association between children's and parents' fruit and vegetable intake and other studies (McClain et al., 2009; Tibbs et al., 2001; Wind et al., 2006) involving preschool-aged children and older children and adolescents and supports previous recommendations for modification of parental diet. Beech et al. (1999) implied that adolescents' fruit and vegetable consumption changed between 2.17 to 2.69 serving per day and girls reported being more confident in their ability to eat five servings of fruits and vegetables per day than did boys. On the other hand, Salwa et al. (2021) reported that 14-18 aged adolescents' the average daily consumption of fruit and vegetables was 1.22 and 1.99 servings, respectively. Only one-fifth of the respondents (21%) reported eating five servings of fruit and vegetables a day. Rasmussen et al. (2006) revealed that age, gender, parental education and occupation, parental consumption, preferences, and home availability- all contribute to adolescents' eating less fruit and vegetables. Seidu et al. (2021) found that the prevalence of adequate fruits, adequate vegetables, and adequate fruit and vegetable consumption were 35.7%, 26.8%, and 27.8%, respectively. Wyse et al. (2011) suggest that a range of factors within the home food environment appear to be associated with young children's fruit and vegetable intake. Another study (Lally et al., 2011) conducted on low-income adolescents showed that youth misperceived their own and their peers' fruit and vegetable intake (i.e., overestimated intake of fruit and underestimated intake of vegetables) and believed that peers held less favorable attitudes toward eating consumptions than was the case. Hill et al. (2020) draws attention to the fact that adolescents have attitudes towards consuming more vegetables than fruits when they are together in different environments (e.g., peer meetings). Beech et al. (1999) reported that 39% correct fruit and vegetable knowledge scores in adolescents.

CONCLUSION

Several studies and reports comparing relationship between the factors in preschool children and

adolescents' fruit and vegetable consumption. The represented study is precious because fruit and vegetable consumption is very important for well and balanced nutrition and growth as possible as important to stay healthy in the future and to control weight and prevent obesity with healthy eating habit and behaviors. BMI results were correlated to the other countries and national surveys. Many studies focused on the daily consumption but in fact, it is the serving consumption that matters. All national authorities were recommended fruit and vegetables emphasized servings for the reason it is more understandable and applicable by the society. It can be said that the consumption of fruits is very close to the recommended servings by the national and international authorities in both groups. On the other hand, vegetable consumption serving was lower than fruit consumption in both groups. While fruit consumption was found to be higher than the reference values given in both groups, it would be wrong to say the same about vegetable consumption, especially in the preschool group. It is also a fact that vegetables, whether cooked or raw, are less preferred than fruits. The fruit and vegetable knowledge score results found to be insufficient in both groups and education level also effected fruit and vegetable knowledge. This situation reveals once again the necessity of increasing the effectiveness of other informative tools, especially for fruits and vegetables, within the scope of nutrition information in the society. In future direction, considerable further works is needed in for all population groups to increase awareness, healthy eating behavior, purchasing foods and sustainable nutrition knowledge on parents and adolescences.

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Conflict of Interest
No potential conflict was declared by the authors.

Author Contributions
Plan, design: MAC; **Material, methods and data collection:** MAC; **Data analysis and comments:** EB, EB; **Writing and corrections:** MAC, EB.

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