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Original article

Legumes And Oilseed Consumption Frequency

Gülcan Arusoglu[1], Ahmet Ozturk[2], Selma Firat[1], Yasemin Seyfeli[2]

[1]Kirklareli University, School of Health, Nutrition and Dietetics, Kayali Merkez Kampusu, Kirklareli Merkez; [2]Erciyes University, Fac. of Medicine, Dept. of Biostatistics, Melikgazi, Kayseri

Abstract. *Introduction:* Nuts, seeds, and legumes are all nutrient-dense foods. Preclinical and clinical studies show that legumes are functional foods that modulate biological processes that facilitate obesity, including thermogenesis, visceral fat accumulation, and satiety. *Purpose:* This study aims to determine the consumption of legumes and oilseeds consumed locally in children living in the Kirklareli (Thrace) region and evaluate their relationship with anthropometric measurements. *Methods:* A total of 1075 volunteer students and their families, 513 (47.7%) girls and 569 (52.3%) boys between the ages of 3-9, studying in pre-school and primary schools, participated in the study. The students' anthropometric data (body weight, height, waist circumference, neck, and wrist circumference) were taken. *Results:* When their legume consumption was examined, it was found that 2.5% stated that they consumed it every day, 29.3% between 3-5 days a week, 45.3% once a week, 7.2% every 15 days, rarely 7.5% and 8.2% of the participants stated that they did not consume it. The most common legumes consumed by the participants were dried beans, lentils, and chickpeas. The most common oilseeds consumed "3-5 days a week" were determined as walnuts, roasted hazelnuts, and almonds. There was no statistically significant effect of legumes and oilseed consumption on anthropometric values. *Conclusion:* Legumes and oilseed consumption habits did not have a significant effect on growth and development. However, weakness, stunting, and obesity continue to be important problems as indicators of insufficient and unbalanced food consumption.

Key words: Legumes, nuts, anthropometry, preschool children, school-aged children

Introduction

Nuts, seeds, and legumes are all nutrient-dense foods and have been a regular component of nutrition in human history since pre-agricultural times (1).

Legumes are annual crops with a life cycle of 1 year from germination to seed production and are members of the Leguminosae family. Legumes are estimated to have been consumed for at least 10,000 years and are among the most widely used foods (2). WHO / FAO currently lists 16 edible legume species. Of these, the production and consumption of four legumes are dominant worldwide: beans (Phaseolus vulgaris, L.), chickpeas (Cicer arietinum L.), dried peas (Pisum sativum L.), and lentils (Lens culinaris L.). In terms of human health, the common point of these legumes is that they contain very low levels of lipid and high protein and dietary fiber content (3). A wide variety of legumes can be grown worldwide, making them both economically and nutritionally important (4).

Legumes are part of multiple food groups in the Dietary Guidelines for Americans 2015-2020 (DGAs): protein and vegetable groups (5). Legume consumption is increasing globally due to its high nutritional value, low calorie, and low glycemic index (GI). Legumes are the richest source of dietary fibers and complex carbohydrates that make them low in GI and help lower cholesterol and triglycerides. They also

have a more negligible effect on blood sugar since they contain more amylose than amylopectin (6).

Legumes are low on average in energy density and average 1.3 kilocalories per gram (7). Legumes are high in fiber; contain both insoluble and soluble fibers (8). Pulses have a very low oil content (0.8– 1.5%) compared to oilseeds such as soybeans, canola, and flax; they contain mono and polyunsaturated fatty acids and plant sterols beneficial to the body (2). Legumes are a good source of digestible protein, rich in essential amino acids lysine and threonine, which are typically low in other plant-based protein sources but are low in other amino acids, including methionine tryptophan and cysteine (9). Eating a variety of foods is beneficial for maintaining a balanced diet, and the inclusion of legumes as part of a healthy diet can increase the overall consumption of micronutrients (2).

Legumes are an essential source of vitamins and minerals such as iron, zinc, folate, magnesium, and protein and fiber. Additionally, the phytochemicals, saponins, and tannins found in legumes have antioxidant and anti-carcinogenic effects, indicating that legumes can have significant anti-cancer effects. Legume consumption also improves serum lipid profiles and positively affects many other cardiovascular disease risk factors such as blood pressure, platelet activity, and inflammation (4). Legumes are high in fiber and low in GI, which helps maintain healthy blood sugar and insulin levels (10). New research examining the impact of legume components on HIV and patterns of consumption with an aging population shows that legumes may significantly impact health (4). However, preclinical and clinical studies have proven that legumes can be helpful as functional foods that modulate biological processes that facilitate obesity, including thermogenesis, post-meal substrate exchange/oxidation, visceral fat accumulation, and satiety (11). Results from the NHANES cohort showed that adults who regularly consumed beans were less likely to be classified as obese (-22%) and waist circumference (-23%) than those who did not (12). Also, it was found that those who consumed beans in the 12-19 age group had significantly less weight and lower waist measurements than those who did not consume them (13).

Nuts are dry, thick fruits with prickly seeds. The best known are almonds, hazelnuts, Brazil nuts, cashew nuts, Macadamia nuts, walnuts, and Pistachios. Peanut and Baru almonds are edible seeds classified as legumes because their seeds are produced in the shell. However, peanuts' properties and nutritional composition are similar to nuts and are considered fatty fruits (14). Although chestnut (Castanea sativa) is a tree nut, it differs from all other common nuts in that they are starchy and have a different nutritional profile (1).

Nuts (tree nuts and peanuts) are nutrient-dense foods with complex matrices rich in unsaturated fatty acids and other bioactive compounds: high-quality vegetable protein, fiber, minerals, tocopherols, phytosterols, and phenolic compounds. Thanks to their unique composition, nuts are likely to affect health outcomes (1) beneficially. The phytochemicals found in nuts have bioactive properties such as antioxidant, antiproliferative, anti-inflammatory, antiviral, and hypocholesterolemic properties (14). The fiber and polyphenol content of nuts can modulate the intestinal microbiota profile, aid intestinal homeostasis, increase butyrate synthesis, and exert anti-inflammatory effects by maintaining enteric barrier integrity. Therefore, the consumption of nuts and edible seeds can help treat obesity and other inflammatory diseases (15). However, nuts are likely to affect cardiovascular health positively. Although epidemiological studies have associated nut consumption with a reduction in the incidence of diabetes in women, no such relationship was found in men.

Studies on nutrition have clearly shown that consumption of all kinds of nuts has a cholesterol-lowering effect, even in the context of a healthy diet. Blood pressure, visceral fat, and metabolic syndrome also appear to be positively affected by nut consumption (16). When the food consumption frequency of preadolescent children living in different regions was evaluated in terms of legumes, it was reported that the rate of those who did not consume legumes at all was substantially high, and one out of every four people between the ages of 9-11 did not consume legumes (17).

The aim of this study, which is an assessment of the situation, is to determine the legumes and oilseed consumption status of preschool and school children in the province of Kirklareli and determine the obesity status by evaluating the relationship with the anthropometric status of the children. To our knowledge, this will be the first study in the Trakia region on this issue.

Methods

Anthropometric measurements of the students and their families were obtained by visiting preschool institutions and primary schools in Kirklareli city center. It is a cross-sectional study conducted between October and December 2019, and attention has been paid to the schools, which are public schools. Informed consent was obtained from the family. The questionnaires were delivered to the families in envelopes, and the collection of the questionnaires was done by classroom teachers one week later. The study was found ethically appropriate with the protocol code P0165R00 dated 11/10/2019 by Kirklareli University, Institute of Health, Ethical Committee Chair. In the study, demographic data, anthropometric measurements of the students, information on nutritional habits and food consumption frequency were taken. It has been paid attention to that the legumes and nuts that are consumed frequently are local. The participation of volunteer families and students was taken as a basis by going to all Kirklareli central schools. Families were asked to sign consent forms. During the visits to schools with the permission of the provincial directorate of national education and our university, the group leaders were trained, and measurements were taken from each class. The number of state primary schools affiliated with the national education directorate in the city center is 12 and has a universe of 3648. The number of kindergartens is 11, and the total number of students is 451. Only 17 of these schools were randomly visited by cluster sampling, and a net number of 1075 was reached.

1. Anthropometric measurements

BMI values of the children were calculated by taking height and body weight measurements and evaluated according to the WHO tables. Also, waist circumference, neck and wrist circumference were taken, and waist/neck ratios were calculated.

Body Weight and Height

Individuals were provided with light clothing and without shoes. The body weight and height measurements of all individuals were made with the same devices. After determining the body weight, individuals without shoes, heels, back, shoulders, and the back of the head touching the wall, standing upright, ready to stand, with the head on the Frankfurt plane and feet together, measuring the distance from the highest point of the head to the ground. (18).

BMI

BMI values calculated in children were evaluated using NCHS (National Center for Health Statistics) growth curves (weight for height, height for age, and weight for age). The definition of "overweight" is 25-29.9 kg/m² in adults, and BMI value in children is 85-95 between percentiles, the definition of "obesity," which is 30 kg / m² and above in adults, is accepted as having a BMI value of the 95th percentile and above in children (19).

Waist circumference

Measurements of waist circumference were measured with a 0.1 cm sensitive tape measure that cannot stretch but bend. In these measurements, the individuals were taken in an upright position with hands and arms on both sides and feet close to each other (12-15 cm), providing the Frankfort plane (the canal of the ear and the lower border of the orbit-eye socket being aligned and parallel to the ground). The distance between the right lowest rib and the iliac bone was measured, the middle point was marked, and the waist circumference was measured by keeping the tape parallel to the floor (18). Hatipoglu et al. (2008) in Turkey (20), by gender and age of their work in Turkey with 4770 children and adolescents between ages 7-17 determined reference values of waist circumference.

Waist-to-height ratio

A waist-to-height ratio of 0.5 and above is considered an indicator of abdominal fat. Another study stated that waist circumference and waist-to-height ratio could determine cardiovascular risk better than BMI and waist-to-hip ratio (21). The waist-to-height ratio is a sensitive and specific index used to determine a higher likelihood of developing metabolic and cardi-

ovascular risks among overweight/obese children and is more closely related to central body fat distribution than total fat (22).

Neck circumference

Neck circumference measurement is an easy and practical screening method used to evaluate upper extremity fat distribution in adolescents, children, and adults. The neck circumference measurement was made with an inelastic tape measure in a plane parallel to the floor, from where the thyroid cartilage is most protruding, while the child's head is upright and the eyes are facing straight ahead (23).

Wrist circumference

Studies are showing that the degree of obesity is correlated with the measurements of the neck circumference, skin thickness, and especially wrist circumference (21).

Wrist circumference was measured using a tension gated tape measure positioned over the Lister's tubercle of the distal radius and the distal ulna, with subjects in a seated position. Lister's tubercle, which is the dorsal tubercle of the radius, can be easily palpated on the dorsal side of the radius, around the level of the ulna head, approximately 1 cm proximal to the radiocarpal joint space. A tape measure with tension gates was used to ensure equivalent tape pressure between subjects (22).

Height/wrist circumference ratio

Body structure is also determined by finding the ratio of height to wrist circumference.

2. Food Frequency Questionnaire

The consumption frequency of the most consumed legumes and oilseeds in the region has been taken. The "Food Consumption Frequency Form" was prepared separately and consisted of a total of 36 foods measuring different frequencies from "every day" to "never consume" of legumes and oilseeds that students and parents consume the most in the region.

3. Statistical Analysis

The independent two-sample t-test was used to compare the difference between the means of the two independent groups. The one-way analysis of variance (ANOVA post hoc test: Tukey) is used to determine whether there are any statistically significant differences between the means of three or more independent (unrelated) groups. Chi-Square tests were applied to categorical variables as appropriate. Pearson correlation analysis was used to investigate the relationship between two quantitative variables. Data analysis was performed in TURCOSA Cloud (Turcosa Ltd Co, www.turcosa.com.tr) statistics software. The significance level was accepted as $p < 0.05$.

Results

513 of the participants (47.7%) are girls, and 562 are boys (52.3%). While the average of their monthly income is 5305.3 TL, the part allocated to the nutrition share is 1617.1 TL. 41.7% of mothers and 44.9% of fathers are university graduates. While 32.9% of the fathers are civil servants, 31.7% are self-employed, 22.1% of the mothers are civil servants, and 53.5% are not working. The number of people in the family is with 3 or less (31%), four people (52.7%), 5 people (12%), and 6 or more people (4.2%). 6.9% of the participants stated that they had a disease, 3.3% of them stated that their disease was Diabetes Mellitus, and 2.4% had a respiratory disease. 71.92% of the mothers stated that they do not smoke. 57.8% of the mothers rated the health condition of their children as good and 39.1% as very good. It was determined that 66.4% of the children received breast milk between 6-24 months, and the starting age for complimentary food was 21.4% before the 6th month and 74.3% after the 6th month.

In Table 2, the average height, body weight, BMI, waist circumference, neck circumference, waist/height ratio, wrist circumference values among the gender groups of the children participating in the study are compared. The difference between the anthropometric data obtained between girls and boys in the 3 and 7 age groups was not statistically significant ($p > 0.05$). It was determined that the neck circumference in males

Table 1. Demographic characteristics.

Quantitative variables		**Median (min-max)**
Monthly income (TL)	5305.54±3853.87	4500 (300-80000)
Nutritional margin (TL)	1617.16±1165.64	1500 (100-20000)
Categorical variables	**n**	**%**
Gender		
Female	513	47.7
Male	562	52.3
Mother education status		
Illiterate	3	0.3
Literate	6	0.6
Primary school	112	10.5
Middle school	110	10.3
High school	392	36.7
University degree	446	41.7
Father education status		
Illiterate	1	0.1
Literate	1	0.1
Primary school	84	7.9
Middle school	127	12.0
High school	370	34.9
University degree	476	44.9
Mother profession		
Not working	570	53.5
Farmer	5	0.5
Seasonal worker	3	0.3
Freelance	79	7.4
Worker	173	16.2
Officer	236	22.1
Father profession		
Not working	30	2.9
Farmer	22	2.1
Seasonal worker	7	0.7
Freelance	333	31.7
Worker	312	29.7
Officer	345	32.9
Number of family persons		
3 and less	329	31.0
4 persons	559	52.7
5 persons	128	12.0
6 and more	44	4.2
Does the child have an illness?		
No	968	93.1
Yes	72	6.9

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Categorical variables	**n**	**%**
Cardiovascular disease		
No	1033	99.3
Yes	7	0.7
Gastrointestinal system		
No	1033	99.3
Yes	7	0.7
Bone joint disease		
No	1037	99.8
Yes	2	0.2
Diabetes mellitus		
No	1040	96.7
Yes	35	3.3
Liver biliary disease		
No	1039	99.9
Yes	1	0.1
Anemia		
No	1027	98.7
Yes	13	1.3
Kidney disease		
No	1035	95.5
Yes	5	0.5
Respiratory diseases		
No	1015	97.6
Yes	25	2.4
Mother's smoking status		
No	743	71.9
Yes	290	28.1
Child's health status		
Weak	32	3.0
Good	610	57.8
Very good	413	39.1
Breast milk intake		
None	36	3.5
>6 months	139	13.4
6 months	174	16.8
6-24 months	689	66.4
Starting complementary feeding		
Before 6 months	223	21.4
After 6 months	774	74.3
Other	45	3.4

Table 2. Anthropometric measurements comparison by age group and gender.

Variable	Height (cm)		Weight (kg)		BMI (kg/m²)		Waist (cm)		Neck (cm)		Waist/height		Wrist (cm)	
Gender	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
Age (year)														
3	104.16±6.61	102.78±4.85	16.70±2.98	16.38±2.19	15.33±1.76	15.45±1.35	53.43±4.52	53.62±3.32	25.53±2.20	26.15±1.55	0.51±0.34	0.52±0.33	12.22±1.06	12.67±1.08
	n=44	n=39	n=44	n=39	n=44	n=39	n=44	n=39	n=43	n=39	n=44	n=39	n=44	n=39
p	0.266		0.594		0.722		0.835		0.142		0.230		0.059	
4	108.78±5.15	108.68±5.10	18.84±2.82	18.89±3.21	15.90±1.96	15.93±2.00	54.75±3.70	55.40±4.01	25.57±1.87	26.66±2.75	0.50±0.03	0.51±0.04	12.68±1.16	12.83±1.14
	n=66	n=87	n=66	n=87	n=66	n=87	n=66	n=87	n=66	n=83	n=66	n=87	n=66	n=87
p	0.903		0.922		0.932		0.309		**0.007**		0.273		0.447	
5	113.43±5.76	115.21±6.17	20.69±3.48	20.99±3.61	16.07±2.36	15.81±2.34	55.75±5.25	56.36±4.69	25.97±1.78	26.80±1.82	0.49±0.05	0.49±0.04	12.69±1.24	13.11±1.19
	n=131	n=151	n=131	n=151	n=131	n=151	n=131	n=148	n=128	n=150	n=131	n=148	n=130	n=150
p	**0.013**		0.472		0.352		0.301		**<0.001**		0.780		**0.004**	
6	122.71±6.40	123.67±7.03	24.86±4.73	24.63±5.27	16.46±2.58	16.01±2.60	59.46±5.55	59.42±5.96	26.19±1.80	27.15±1.69	0.49±0.05	0.48±0.05	12.79±1.13	13.22±1.23
	n=70	n=61	n=70	n=61	n=70	n=61	n=70	n=61	n=70	n=61	n=70	n=61	n=70	n=61
p	0.416		0.790		0.324		0.963		**0.002**		0.601		**0.040**	
7	128.22±6.37	128.40±5.79	29.54±7.71	28.05±5.70	17.76±3.45	16.93±2.81	62.95±8.33	62.06±6.27	27.48±2.25	27.64±2.11	0.49±0.05	0.48±0.05	13.91±1.30	13.77±1.18
	n=59	n=70	n=59	n=70	n=59	n=70	n=59	n=70	n=59	n=70	n=59	n=70	n=59	n=70
p	0.867		0.209		0.136		0.493		0.692		0.439		0.537	
8	131.15±6.59	133.88±6.98	30.74±6.60	32.45±8.32	17.78±2.94	17.90±3.28	62.30±7.50	64.39±8.19	27.20±1.92	28.29±2.07	0.47±0.05	0.48±0.05	13.44±1.26	13.97±1.35
	n=79	n=85	n=79	n=85	n=79	n=85	n=79	n=85	n=79	n=85	n=79	n=85	n=79	n=85
p	**0.011**		0.150		0.798		0.091		**0.001**		0.463		**0.010**	
9	139.70±6.34	140.25±6.10	36.84±8.97	35.49±6.71	18.77±3.95	17.97±2.79	66.10±9.08	66.21±7.36	28.27±2.60	29.34±1.84	0.47±0.06	0.47±0.05	14.03±1.20	14.33±1.28
	n=64	n=69	n=64	n=69	n=64	n=69	n=64	n=69	n=62	n=69	n=64	n=69	n=63	n=68
p	0.615		0.325		0.182		0.944		**0.007**		0.968		0.171	
3-9	121.01±12.71	121.80±13.04	25.26±8.46	25.13±8.16	16.83±2.97	16.55±2.70	59.06±7.22	59.50±7.22	26.56±2.21	27.42±2.23	0.49±0.05	0.49±0.05	13.08±1.34	13.41±1.32
	n=513	n=562	n=513	n=562	n=513	n=562	n=513	n=559	n=507	n=557	n=513	n=559	n=511	n=559
p	0.319		0.804		0.100		0.326		**<0.001**		0.752		**<0.001**	

Table 3. BMI percentiles according to age and gender.

Variables		BMI Groups									
		Very thin		Thin		Normal		Overweight		Obese	
Age (year)	Gender	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
3	n	2	5	7	8	26	26	2	4	2	1
	%	5.1	11.4	17.9	18.2	66.7	59.1	5.1	9.1	5.1	2.3
p						0.725					
4	n	8	3	8	3	**43**	**48**	**13**	**2**	15	10
	%	9.2	4.5	9.2	4.5	**49.4**	**72.7**	**14.9**	**3.0**	17.2	15.2
p						**0.024**					
5	n	15	9	12	9	90	78	15	17	19	18
	%	9.9	6.9	7.9	6.9	59.6	59.5	9.9	13.0	12.6	13.7
p						0.822					
6	n	4	5	10	8	29	31	5	13	13	13
	%	6.6	7.1	16.4	11.4	47.5	44.3	8.2	18.6	21.3	18.6
p						0.501					
7	n	6	3	4	5	37	25	6	11	17	15
	%	8.6	5.1	5.7	8.5	52.9	42.4	8.6	18.6	24.3	25.4
p						0.390					
8	n	6	2	4	4	38	50	12	6	25	17
	%	7.1	2.5	4.7	5.1	44.7	63.3	14.1	7.6	29.4	21.5
p						0.139					
9	n	4	3	4	6	34	28	12	13	15	14
	%	5.8	4.7	5.8	9.4	49.3	43.8	17.4	20.3	21.7	21.9
p						0.908					
Total 3-9	n	45	30	49	43	297	286	65	66	106	88
	%	5.8	8.0	8.4	8.7	55.8	52.8	12.9	11.6	17.2	18.9
p						0.550					

in the 4 age group, the average neck circumference and ankle circumference in males at the age of 6, and the height (cm), neck circumference, and wrist circumference in males in the 5 and 8 age group were found to be higher, and the difference between the genders was statistically significant ($p < 0.05$). While there is no statistically significant difference in height, body weight, BMI, waist circumference, waist/height ratio averages between girls and boys between the ages of 3-9, it was found that the average of neck circumference and wrist circumference was higher in boys and the difference was statistically significant ($p <0.001$).

For each age, there was no significant relationship between gender and BMI at 3, 5, 6, 7, 8, 9, and 3-9 years ($p> 0.05$), while a significant correlation was found at age 4 ($p = 0.024$). What constitutes significance in the fourth year is that the rate of normal weight (72.7%) of girls is significantly higher than that of boys (49.4%). Also, boys (14.9%) were significantly higher in the overweight group than girls (3.0%).

Table 4. Children's legumes and oilseed consumption frequency.

Consumption frequency	Every day		3-5 days a week		Once a week		1 in 15 days		Rarely		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
Legumes in general	26	2.5	306	29.3	472	45.3	75	7.2	78	7.5	86	8.2
Broad beans	7	0.7	16	1.6	55	5.5	65	6.5	217	21.7	641	64.0
Kidney beans	2	0.2	21	2.1	139	13.8	174	17.2	269	26.7	404	40.0
Red kidney beans	5	0.5	17	1.7	61	6.1	102	10.2	197	19.7	616	61.7
Red beans	3	0.3	21	2.1	75	7.6	89	9.0	130	13.2	670	67.8
Haricot beans	4	0.4	72	7.1	404	39.6	241	23.7	128	12.6	170	16.7
Red lentil	14	1.4	167	16.2	484	46.9	193	18.7	75	7.3	99	9.6
Green lentils	5	0.5	86	8.4	394	38.5	237	23.2	133	13.0	168	16.4
Yellow lentils	5	0.5	67	6.6	207	20.5	132	13.1	166	16.5	432	42.8
Chickpea	5	0.5	67	6.5	314	30.6	299	29.2	159	15.5	181	17.7
Pea	4	0.4	41	4.0	196	19.3	271	26.6	194	19.1	312	30.6
Flax seeds	0	0.0	10	1.0	12	1.2	14	1.4	64	6.4	903	90.0
Poppy	1	0.1	5	0.5	18	1.8	16	1.6	106	10.6	857	85.4
Oilseed in general	18	1.8	124	12.5	185	18.7	78	7.9	205	20.7	379	38.3
Cashew roasted	14	1.4	77	7.5	111	10.8	88	8.6	405	39.5	331	30.8
Raw cashew	5	0.5	32	3.1	41	4.0	36	3.5	270	26.4	637	62.4
Walnut	236	22.5	349	33.2	175	16.7	75	7.1	135	12.9	80	7.6
Pecans	13	1.3	34	3.4	24	2.4	15	1.5	82	8.1	839	83.3
Raw hazelnuts	51	5.0	176	17.3	133	13.1	59	5.8	231	22.7	367	36.1
Roasted hazelnuts	72	7.1	255	25.0	176	17.3	113	11.1	214	21.0	188	18.5
Coconut	5	0.5	17	1.7	30	3.0	45	4.4	245	24.2	671	66.2
Peanut	25	2.5	199	19.6	133	13.1	117	11.5	272	26.8	268	26.4
Chickpea varieties	30	2.9	188	18.4	171	16.8	134	13.1	306	30.0	191	18.7
Chestnut	7	0.7	37	3.7	56	5.5	80	7.9	555	54.9	276	27.3
Pistachios	21	2.1	203	19.9	168	16.5	166	16.3	330	32.3	133	13.0
Almond	62	6.1	255	25.0	189	18.5	143	14.0	249	24.4	123	12.0
Raw almond	40	4.0	143	14.2	107	10.6	78	7.7	246	24.4	396	39.2
Pumpkin seeds	19	1.9	86	8.5	112	11.1	106	10.5	331	32.7	359	35.4
Watermelon seeds	1	0.1	13	1.3	17	1.7	17	1.7	116	11.6	838	83.8
Sesame	9	0.9	29	2.9	52	5.2	64	6.4	295	29.3	557	55.4
Pine nuts	9	0.9	57	5.7	79	7.9	64	6.4	270	26.8	527	52.4
Sunflower seeds	27	2.6	174	17.0	200	19.6	155	15.2	321	31.4	146	14.3
Corn boiled	16	1.6	75	7.4	196	19.3	218	21.5	409	40.3	101	10.0
Popcorn	22	2.1	115	11.2	277	27.0	212	20.7	308	30.0	91	8.9
Corn, sauce	4	0.4	32	3.2	63	6.2	84	8.3	296	29.3	532	52.6
Apricot kernel	3	0.3	8	0.8	21	2.1	26	2.6	161	16.1	779	78.1
Hazelnut butter	12	1.2	78	7.7	76	7.5	58	5.8	261	25.9	523	51.9
Peanut butter	8	0.8	38	3.8	52	5.2	38	3.8	225	22.5	638	63.9

Consumption of legumes is 2.5% "every day," "3-5 days a week" 29.3%, "once a week" 45.3%, "once in 15 days," 7.2%, "rarely" 7.5% and "not consuming" percentage of participants was found as 8.2%. While the most common legumes consumed by the participants are dried beans, lentils, and chickpeas, it is seen that those who give "no" answer to the consumption frequency of other legumes in the table are more. While 38.3% of the participants stated that they do not consume oilseeds, it is 1.8% who consume them "every day." The most common oilseeds consumed by the participants "3-5 days a week" were found to be walnuts, roasted hazelnuts, and almonds. Among the oilseeds on the table, peanut, pistachio, chestnut, and roasted chickpea varieties were mostly consumed "rarely," while the others were not consumed "at all" with a high percentage.

According to the results of one-way analysis of variance in Table 5, in the study we conducted with 1043 people, we examined the frequency of eating legumes every day, 3-5 days a week, 1 day a week, 1 day in 15 days, rarely and none. There was no statistically significant difference in terms of body weight, BMI, waist circumference, neck circumference, waist-height ratio, wrist circumference, number of family members ($p > 0.05$). Although it is not statistically significant, it is observed that the average BMI and wrist circumference are lower, and the average height is higher in those who consume legumes "every day" compared to other consumption frequencies.

According to the results of one-way analysis of variance in Table 6, in the study we conducted with 989 people, where we looked at the frequency of eating

Table 5. The relationship between the frequency of legumes consumption of children and some variables.

Variables	Frequency of eating legumes						
	Every day (n=26)	3-5 days a week (n=306)	Once a week (*n*=472)	1 in 15 days (n=75)	Rarely (n=78)	None (n=86)	*p-value*
Age (year)	6.62±2.06	6.15±1.77	5.93±1.86	6.00±1.91	5.97±1.89	6.10±1.82	0.332
Family person	4.08±1.15	3.80±0.91	3.80±0.82	3.77±0.77	3.99±2.24	3.94±1.03	0.402
Weight (kg)	26.24±9.30	25.58±8.49	25.08±8.22	25.14±8.12	25.07±8.11	24.75±8.62	0.924
Height (cm)	124.81±15.81	122.13±11.99	121.27±13.32	121.08±13.14	121.21±12.86	120.67±13.05	0.692
BMI (kg/m^2)	16.26±2.70	16.75±3.13	16.65±2.72	16.74±2.58	16.66±2.48	16.58±3.09	0.967
Waist (cm)	60.79±8.65	59.45±7.39	59.00±7.31	60.17±7.14	59.32±7.54	59.29±8.21	0.712
Neck (cm)	26.98±2.13	27.01±2.16	27.07±2.25	26.86±2.82	26.98±2.34	26.82±2.29	0.938
Waist/height ratio	0.49±0.05	0.49±0.05	0.49±0.05	0.50±0.04	0.49±0.05	0.49±0.05	0.612
Wrist circumference (cm)	13.08±1.53	13.26±1.25	13.25±1.38	13.21±1.35	13.51±1.31	13.17±1.37	0.599

Table 6. The relationship between children's consumption frequency of nuts and some variables.

Variables	Nuts Eating Frequency						
	Every day (n=18)	3-5 times a week (n=124)	Once a week (n=185)	1 in 15 days (n=78)	Rarely (n=205)	None (n=379)	*p-value*
Age (year)	6.28±1.74	6.24±1.88	5.94±1.86	5.74±1.92	6.17±1.78	6.09±1.82	0.370
Family person	3.44±0.62	3.78±0.89	3.87±0.86	3.77±0.92	3.95±1.53	3.78±0.88	0.237
Weight (kg)	22.92±4.67	26.05±9.15	24.68±7.78	23.93±6.42	25.72±8.92	25.68±8.44	0.231
Height (cm)	122.39±10.28	122.15±12.80	120.63±13.07	119.79±11.95	121.97±13.12	122.41±12.98	0.489
BMI (kg/m^2)	15.20±1.67	16.98±3.31	16.56±2.29	16.44±2.45	16.81±3.03	16.76±3.00	0.179
Waist (cm)	56.42±3.67	59.81±7.55	58.71±6.44	58.15±5.64	59.64±8.56	59.84±7.61	0.127
Neck (cm)	26.31±1.98	27.15±2.06	26.98±2.30	26.85±2.40	27.12±2.42	26.99±2.24	0.682
Waist/height ratio	0.46±0.03	0.49±0.05	0.49±0.04	0.49±0.05	0.49±0.05	0.49±0.05	0.298
Wrist circumference (cm)	12.81±0.62	13.31±1.34	13.27±1.33	13.14±1.23	13.19±1.52	13.34±1.31	0.434

nuts, there was no statistically significant difference in terms of body weight, BMI, waist, and neck circumference, waist/height ratio, wrist circumference, number of family members (p> 0.05). Although it is not statistically significant, it is observed that the average body weight, BMI, waist circumference, neck circumference, waist/height ratio, and wrist circumference are lower in those who consume oilseeds "every day" compared to other consumption frequencies.

Discussion

This study was carried out to determine the local legumes and nuts consumption status in preschool and primary school children in Kirklareli province and evaluate its relationship with anthropometric measurements. A total of 1075 volunteer students and their families, 513 (47.7%) girls and 562 (52.3%) boys between the ages of 3-9, studying in different kindergartens, and primary schools, participated.

According to the Turkey Nutrition and Health Survey (TBSA) report in 2017, while the rate of illiteracy among males is 2.1%, this rate is 12.6% for females. While 26.2% of males are high school or equivalent graduates, 29.9% of females are primary school graduates (24). While smoking of any tobacco group was found to be 19.4% in women, according to TBSA 2017 (24), this rate was found to be 28.1% in our mothers in our study.

In a study by Kutlu et al. (2009) in which BMI percentile values were obtained in students of different age groups in a private school in Konya, "thinness" was found only in 14-year-old girls and girls in 7 and 9-year-old boys and girls, 10-year-old boys, 11 and 12-year-old girls. It has been determined that there is no "overweight" in males and "obesity" in only 11-year-old males. It has been determined that "thinness" is at the highest level with 13.3% in 14-year-old girls, "overweight" with 33.3% in 7-year-old boys, and "obesity" in 10-year-old boys with 20.0% (25).

According to the Childhood Obesity Survey (COSI-TUR) of the Turkish Ministry of Health conducted in 2016, the prevalence of obesity in school children was found to be 9.9% (26).

There are studies conducted in different cities and regions and reporting prevalence. Height and weight measurements of healthy school children (1.100 boys, 1.019 girls) were taken twice a year by Bundak et al. (2006) to create body mass index reference curves for Turkish children aged 6-18 and determine the prevalence of overweight/obesity. For 18-year-old boys, the rate of being "overweight" was reported 25%, "obesity" 4%, and for 14-year-old girls as "overweight" 15%, and "obesity" 1% (27). In the study in which 2207 students aged 2-18 were evaluated in Elazig, the prevalence of obesity was 13.5% (28), the prevalence of "obesity" in Aydin was 10.2%, and in Edirne, the prevalence of 12-17 age group was similar to Aydin (29). In different studies, the frequency of "obesity" was significantly higher in men than in women (28, 30).

In a study comparing the BMI of 29242 children aged 13 and 15, covering the United States of America and 15 European countries, the highest "obesity" rate was found in America, and the lowest "obesity" rate was found in Lithuania (31). Considering the whole of Europe, the prevalence of "obesity" in adolescents between the ages of 12-17 has been reported as 8-25% (32).

In our study, in the percentile evaluations made according to WHO, most students were within normal weight limits. What constitutes significance in the fourth year is that the rate of having normal weight (72.7%) of girls is significantly higher than that of boys (49.4%). Also, in the overweight group, boys (14.9%) were significantly higher than girls (3.0%) (p = 0.024). In our study, it was determined that neck circumference in men at age 4, neck circumference and wrist circumference in males at age 6, and height, neck circumference, and wrist circumference in males in the age group of 5 and 8 years, and the difference between genders was statistically significant (p <0.05). While there is no statistically significant difference between the averages of height, body weight, BMI, waist circumference, waist/height ratio between girls and boys between the ages of 3-9, the average of neck circumference and wrist circumference is higher in males, and the difference is statistically significant (p <0.001). A total of 4581 children and adolescents participated in the study conducted by Mazicioglu et al. (23) in Kayseri between 2008-

2009. The importance of neck circumference in defining "obesity" for different age groups was determined by ROC analysis. The relationship between increased neck circumference and the prevalence of obesity was observed in all age groups. Using the Turkish Children's Anthropometry (ATCA-06) study database, Kondolot et al.'s study conducted in 2017 to provide neck circumference percentiles to evaluate obesity in 1766 preschool children aged 0-6 years. It has been stated that the average neck circumference is higher in males than in females and may help define obesity in preschool children (33). To obtain wrist circumference percentile values in Turkish children and adolescents in Kayseri / Turkey, "Determination of Turkey Children and Adolescents Anthropometric Measurements" (DAMTC II) study from a total of 4330 children between the ages of 6-17 is applied. In both sexes, wrist circumference increased linearly with age. In all age groups, ankle circumference values were higher in boys than in girls (34). In our study, in line with these data, mean values of neck circumference were higher in boys than girls in all age groups. Average values of ankle circumference were higher in boys than girls in all age groups except the 7 age group. Average values of wrist and neck circumference increased with the increase in BMI percentile value. In our study, when their legumes consumption was examined, the rate of participants who stated that they did not consume "every day" 2.5%, "3-5 days a week" 29.3%, "once a week" 45.3%, "once in 15 days" 7.2%, "rarely" 7.5% and "never" consumption was found to be 8.2%. It was observed that the most common legumes consumed by the participants were dried beans, lentils, and chickpeas. While 38.3% of the participants stated that they do not consume oilseeds, it is 1.8% consume it every day. The most common oilseeds consumed by the participants "3-5 days a week" were found to be walnuts, roasted hazelnuts, and almonds.

According to Turkey Nutritional Health Survey (TBSA) 2010 data, the average daily consumption of legumes in our country for individuals in the 19-64 age group is 9 g and dried nuts 7 g (24). The frequency of consumption of legumes in general in the 15 and over age group male in Turkey is 25% 2-3 times a week, 0.9% every day, and 2.1% not being consumed. The average daily intake of men in this age group is 18.3 ± 36.71 grams. In the 15-18 age group women, the average is 15.9 ± 21.57 g. In women aged 15-18, the consumption frequency of legumes is 4.6% at all, 1.1% every day, and 25.5% 2-3 days a week. While consumption of legumes in both genders is 9.1 g per day according to TBSA 2010, it is 14.9 g according to TBSA 2017. Oilseed consumption is 6.9 g per day in total (TBSA 2010), while it is 9.9 g according to 2017 TBSA data (24). 130 g (8-10 tablespoons) of cooked legumes is 1 serving. 30 grams (1 handful) of hazelnuts and walnuts is 1 portion. The recommended portion amounts of legumes consumed for children and adolescents are 1-2 servings per week for 4-6 years old and 3 portions per week for 7-10 years and 11-14 years. This amount varies between ½ and 1 serving per day for the same age groups for oilseeds. The energy value of 1 standard portion of both food groups is between 150-200 kcal on average (35).

According to the results of the analysis frequency of food consumption in general in the 15-18 age group, men Turkey, the frequency of not consuming legumes "at all" is 2.4%, the frequency of consuming them "every day" is 0.6%, and the frequency of "once a week" is 45.1%. The frequency of those who do not consume hard shellfish (hazelnut, peanut, walnut, etc.) "at all" is 9.0%, the frequency of those who consume "every day" is 10.8%, and the frequency of those who consume "4-5" times a week is 15.1%. According to the analysis results of the food consumption frequency of women in the 15-18 age group in Turkey general, the frequency of "never" consumption of legumes is 4.6%, the frequency of "every day" consumption is 1.1%, and the frequency of "2-3 days a week" is 25.5%. The frequency of those who do not consume hard shellfish (hazelnut, peanut, walnut, etc.) "at all" is 7.6%, the frequency of those who consume "every day" is 13.4%, and the frequency of those who consume "4-5 times a week" is 7.2% (24). These results, which are different from the findings of our study, may have been reached due to the age group and number of our sample and the fact that our study was only in a particular province. In a study conducted by Kutlu et al. (2009), in which legumes consumption was examined, among students of different age groups in a private school in Konya, it was determined that 49.0% consumed legumes "1-2

times a week" (25). This result is also consistent with the results of our study. In a meta-analysis conducted by Kim et al. in 2016, evaluating the effects of legumes on weight loss, it was stated that adding legumes to the diet could be a helpful weight loss strategy due to the decrease in the total energy of the diet (36). A cross-sectional study conducted with 246 women to examine the relationship between dry bean consumption and body fat ratio and waist circumference found that women who consumed medium or high amounts of beans had less body fat and lower waist circumference than women who consumed less (37). Similarly, a study in adolescents aged 12-19 years found that those who consumed dry beans had significantly less body weight and lower waist circumference than those who did not consume them (13).

The European Association for Diabetes Studies conducted a comprehensive review of prospective cohort studies and an updated systematic review and meta-analysis to evaluate the relationship between legumes and cardiometabolic diseases to update clinical practice guidelines in nutritional therapy. Current evidence suggests that consumption of legumes in the diet is associated with a reduced incidence of CVD, CHD, hypertension, and obesity (38). In a meta-analysis for the health benefits and positive results of legume consumption about the required quantities, it has been found that daily consumption of 150 g legumes (min-max: 54-360 g / day; cooked) cause positive changes in blood lipid profile, blood pressure, inflammation biomarkers as well as body composition (39).

In a systematic review conducted to determine the relationship between dietary patterns and obesity risk among children, it has been concluded that a diet with a lower percentage of obesogenic foods such as low sugar and fat content, mostly vegetables, fruits, nuts, legumes, etc. is effective in reducing the risk of developing obesity (40). A study of children adhering to vegetarian diets or dietary patterns rich in vegetables, whole grains, nuts, legumes, and legumes showed consistent protective effects on the risk of being overweight (41). BMI values of adolescents who consume fruits, vegetables, legumes, and nuts "three or more times a week" are lower than the group with "never" or "occasionally"; The BMI value of those who consumed "three" or more nuts per week was found to be 0.274 kg / m^2 lower than the group that did "never" consume ($p < 0.001$) (42). In our study, although it was not statistically significant in line with these findings, it was observed that BMI and wrist circumference were lower and height was higher in those who consumed legumes "every day" compared to other consumption frequencies. In order to examine the relationship between nut consumption and long-term weight change, 51,188 women aged 20-45 years without cardiovascular disease, diabetes, (or cancer in Nurses' Health Study II, from 1991 to 1999, body weight gain of excess nut consumption during the 8-year follow-up period. It was found that it is not related. Instead, it is associated with a slightly lower risk of weight gain and obesity (43). Again, in order to examine the relationship between nut consumption and weight gain, the average daily consumption of 373,293 men and women between the ages of 25-70 who participated in the Cancer and Nutrition Prospective European Research (EPIC) study from 10 European countries between 1992-2000 was obtained through the food consumption frequency survey. In this study, where the 5-year monitoring was evaluated, more nut intake was associated with a decrease in weight gain and decreased risk of being overweight or obese (44). In a meta-analysis conducted by Li et al. in 2018, it was stated that consumption of nuts would be a beneficial option in the prevention of metabolic syndrome and overweight/obesity. (45). A systematic review and meta-analysis of controlled studies evaluating the effects of walnut consumption on blood lipids and other cardiovascular disease risk factors found that including walnuts in the diet improved blood lipid profile without adversely affecting body weight or blood pressure (46).

In the study conducted by Wall et al., it was revealed that there was an inverse relationship between nut consumption and BMI in both adolescents and children and that the estimates were significantly higher in adolescents who consumed "three or more nuts per week" (42). This finding of the negative association of oilseed consumption on BMI is consistent with previous clinical studies and epidemiological studies on the effects of oilseed consumption in adults (43-45, 47). In our current study, consistent with these results, it is observed that body weight, BMI, waist circumference, neck circumference, waist/height ratio,

and wrist circumference are lower in those who consume oilseeds "every day," although it is not statistically significant.

Nuts and edible seeds, especially dietary fiber and polyphenol contents, show that the mechanisms of weight gain prevention can occur by affecting the gut microbiota through their prebiotic properties. Intestinal microbiota appears to play an important role among the etiological factors associated with obesity. Dysbiosis causes an imbalance in energy homeostasis that contributes to obesity. The potential roles of nuts and edible seeds consumption on intestinal homeostasis and body weight control have been explained by three mechanisms: preservation of enteric barrier integrity, improvement of anti-inflammatory state, and enhancement of butyrate synthesis (48). Also, several reasons that may explain why nut consumption is associated with a lower BMI include increased satiety, incomplete fat absorption of oilseeds, increased resting metabolic rate, and consequently decreased intake of other foods. Nuts are energy-intensive due to their high-fat content, a good source of protein, and low in saturated fat (47). Nuts are also high in dietary fiber, which increases satiety and suppresses appetite (49).

In our results, it was determined that there was no statistically significant difference between the consumption of legumes and oilseeds and anthropometric measurements in children aged 3-9 years, and BMI values were found to be quite low in those who consumed "every day." Also, those who consume legumes "every day" have lower BMI and wrist circumference averages and higher average height than other consumption frequencies. It is observed that the average body weight, BMI, waist circumference, neck circumference, waist/height ratio, and wrist circumference are lower in those who consume oilseeds "every day" compared to other consumption frequencies. By supporting global findings, these findings support nutritional recommendations emphasizing the consumption of legumes and oilseeds given the health benefits and the prevention of overweight and obesity. At the same time, there is no study examining the relationship between the consumption of legumes and nuts, and the wrist and neck circumference in the literature in children reveals the value of our study on this subject.

Limitations

These surveys, which are carried out at all socioeconomic levels, should also be carried out in peripheral districts. Also, epidemiological and cohort studies with broader patterns covering different regions should be conducted to demonstrate the relationship between legume/oilseed consumption and anthropometric measurements in children and adolescents. This work carried out on pre-school and primary school students cannot be attributed to families living in the entire Thrace region.

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Correspondence:
Gulcan Arusoglu,
Kirklareli University,
School of Health, Nutrition and Dietetics, Kayali Merkez Kampusu, Kirklareli Merkez,
Orcid No: 0000-0002-9676-0025
Phone: +905334262799
Fax: +90 (0 288) 214 70 86
Email: arusoglugulcan@gmail.com