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Nutritional Status of Roma Children Attending Middle School in Turkey

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Abstract

To investigate the nutritional status of Roma children attending middle school, evaluate their energy and nutrient intake with anthropometric measurements, and identify factors affecting their nutrition status. This cross-sectional study was conducted between December 2019 and March 2020 with 94 students. The sociodemographic characteristics of the participant children and their parents were evaluated using a questionnaire. Energy and nutrient intakes were determined based on food consumption records taken over two days (one weekday and one weekend day) and evaluated according to the recommendations of the Turkish Dietary Guideline (TUBER). Anthropometric measurements and bioelectrical impedance analyses were undertaken. Physical activity characteristics and levels were also determined. It was determined that 92.6% of the Roma children had a height-for-age z-score within the normal range, and 59.6% had a body mass index-for-age z-score within the normal range. When their physical activity levels (PALs) were evaluated, 52.1% were underactive, and the PAL value was higher in the boys than in the girls ($p<0.05$). The daily fat intake of the girls was higher than that of the boys ($p<0.05$). Daily macronutrient intake met the TUBER recommendations. However, vitamin D (24.1%), potassium (39.1%), and calcium (62.5%) intakes did not meet the recommendations. This study showed that Roma children had low PALs and were undernourished in terms of some nutrients.

Keywords: Children, Health inequality, Nutrient, Nutritional state, Roma

Türkiye'de Ortaokula Giden Roman Çocukların Beslenme Durumları

Özet

Ortaokula giden Roman çocukların beslenme durumları araştırmak, antropometrik ölçümlerle enerji ve besin ögesi alımlarını değerlendirmek ve beslenme durumlarını etkileyen faktörleri belirlemektir. Çalışma Aralık 2019-Mart 2020 tarihleri arasında yürütülen kesitsel bir çalışmadır. Çalışmaya 94 öğrenci katılmıştır. Çocuğa ve aileye ilişkin sosyodemografik özellikler anket formu ile sorulanmıştır. Enerji ve besin ögesi alımları iki günlük (1 gün hafta içi, 1 gün hafta sonu) besin tüketim kayıtları alınarak belirlenmiş ve Türkiye Beslenme Rehberi (TÜBER) önerileri ile karşılaştırılmıştır. Antropometrik ölçümleri ve biyoelektriksel impedans analizleri yapılmıştır. Fiziksel aktivite özellikleri ve düzeyleri belirlenmiştir. Roman çocukların %92,6'sının yaşa göre boy uzunluğunun, %59,6'sının yaşa göre beden kütle indeksinin normal aralıkta olduğu belirlenmiştir. Fiziksel aktivite düzeylerine (PAL) göre %52,1'inin az aktif olduğu, PAL değerinin erkek çocuklarda kızlar çocuklardan daha yüksek olduğu bulunmuştur ($p<0.05$). Kız çocukların günlük yağ

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alımlarının, erkek çocuklardan daha yüksek olduğu ($p<0.05$), günlük makro besin ögesi alımlarının TÜBER önerilerini karşılarken; D vitamini (%24,1), potasyum (%39.1) ve kalsiyum (%62.5) alımlarının önerileri karşılamadığı tespit edilmiştir. Bu çalışma; Roman çocukların fiziksel olarak az aktif olduklarını ve bazı besin ögeleri açısından yetersiz beslendiklerini göstermektedir.

Anahtar kelimeler: Çocuk, Sağlık eşitsizliği, Besin ögesi, Beslenme durumu, Roman

1. INTRODUCTION

Nutrition is one of the most important factors affecting the health status and quality of life of children [1]. Nutritional habits acquired during childhood affect health status and nutritional behaviours in later years [2]. Children need to meet their energy and nutrient needs adequately in every developmental period [3]. Problems such as income inequality and poverty are directly reflected in the nutritional status of the society [3,4]. In addition to being an important social determinant of health, poverty also causes health inequality among children [5,6], leading to the development of a wide variety of diseases, especially in young children [7,8]. It has been stated that the height and body weights of poor children are three times lower than the international reference values for their age groups. In low- and middle-income countries, 15% of children aged under five years' experience severe food deprivation [9].

The Roma is a universal community living in different parts of the world [10]. Among the factors that negatively affect the health of the Roma are low socioeconomic and education levels and unsuitable working conditions [11,12]. Compared to other disadvantaged groups, the Roma are reported to have worse health conditions and higher rates of premature death [12,13]. In observational studies conducted with immigrant groups, including the Roma, it has been reported that children are malnourished as observed from their physical appearance and appear younger than their age. The Roma children are undernourished in terms of protein and micronutrients, especially due to poverty [14].

To respond to the various needs of society, there is a need for a team of professionals from different fields of expertise working with a holistic approach. Maltepe University Research and Application Center for Children Living and Working on Streets (SOYAÇ) aims to contribute to the quality of education and society by combining higher education and community-based practices. In cooperation with the relevant institutions of the state, SOYAÇ provides psychological support for children that are trauma victims, those that are most excluded from society and most vulnerable, and those that are the most difficult to access in society by creating an environment within the university in which these children can feel safe emotionally and socially and bond with university students of similar ages. SOYAÇ activities are carried out in an interdisciplinary manner with the active participation of various departments of universities, especially their psychology departments. SOYAÇ also aims to respond to the needs of disadvantaged children by conducting community-centred studies in schools [15-17].

Within the scope of the "We are at School: Uskudar Project" implemented by SOYAÇ, this study was conducted to evaluate the nutritional status, nutrient intakes, and physical activity habits of students with low socioeconomic levels, mostly Roma children, attending middle school. When the literature was examined, only a few studies were found on the nutritional status of the Roma children, and none of these studies was undertaken in Turkey. Therefore, this is the first national study to investigate the nutritional status of the Roma children attending middle school.

2. SAMPLE AND METHODOLOGY

This cross-sectional study was carried out between December 2019 and March 2020 in a middle school where the Roma children mostly attend in Uskudar, Istanbul, within the scope of the "We are at School: Uskudar Project" implemented by SOYAÇ. This study aimed to reach the whole population without selecting the sample (n=237). Prior to the study, the children were informed about the study by their classroom guidance teachers, and the parents provided written

signed consent for both their and their children's participation in the study. Fifty children who did not attend school due to the low socio-economic status of their families or working on the street, six children with missing child or parent consent forms, and 87 non-Roma children were excluded. As a result, the study was completed with 94 Roma children.

Research questions:

1. Do the anthropometric measurements and body composition of Roma children vary according to gender?
2. Are there gender-based differences in the energy and nutrient intakes as well as food group consumption patterns of Roma children?
3. To what extent do the energy and nutrient intakes of Roma children differ by gender in relation to national dietary recommendations?

The dietary habits questionnaire used to collect data includes information on demographics, nutrient intakes, and physical activity habits. Body weight (kg), height (cm), and waist circumference (cm) were measured, and body mass index (BMI) (kg/m^2) was calculated by dividing body weight by the square of height. The height-for-age and BMI-for-age z-scores were calculated to determine nutritional status. Data were evaluated with WHO Anthro Plus (v.1.0.4) software (www.who.int, accessed February 12, 2020). Bioelectrical impedance analysis was performed using the Tanita DC-360 device. Body fat mass (kg and %), body lean mass (kg), muscle mass (kg), and body fluid mass (kg and %) data were obtained. To determine the 24-hour physical activity levels (PALs) of the children, their physical activity status was retrospectively questioned for the past day. To determine their nutrient intakes, their food consumption was recorded over two days (one weekday and one weekend day) using the 24-hour reminder method. The energy and nutritional values of the foods consumed were calculated using BEBIS v.8 software. The adequacy of the energy and nutrient intake of the children was evaluated with reference to the recommendations of the Turkish Dietary Guidelines (TUBER) [18], and the percentages of energy and nutrient requirements met were calculated.

In the analysis of the data, mean, standard deviation, minimum, and maximum values were calculated using SPSS v.23. The conformance of variables to the normal distribution was checked with the Kolmogorov-Smirnov test. The paired-sample t-test, Wilcoxon test, Kruskal-Wallis test, chi-square test, and Mann-Whitney U test were used to evaluate the relationship between the data. The relationship between continuous variables and BMI z-score was determined using the Pearson-Spearman correlation coefficient.

3. RESULTS

The demographic data of the Roma children are given in Table 1. The rate of male children was 52.1%. The participant children were aged 9-14 years, with a mean age of 11.4±1.2 years. When the educational status of the parents was examined, it was determined that 51.1% of the mothers and 41.5% of the fathers were primary school graduates.

Table 2 presents the physical activity habits of the Roma children. The majority of the children were determined to perform physical activity (83.0%). In this group, 26.9% of the children engaged in regular physical activity every day, while 51.3% performed team sports. The mean PAL value was determined as 1.6±0.1. Accordingly, 52.1% of the children were underactive. The mean sleep duration was 8.0±1.4 hours. The mean time spent in front of the screens of devices, such as a computer, tablet, phone, and TV was calculated as 2.6±1.9 hours. When the type of physical activity was compared according to gender, the rate of those that engaged in team sports was found to be significantly higher among the boys ($p<0.05$). When PALs were compared, the rate of underactive girls was statistically significantly higher than that of underactive boys ($p<0.05$), and the PAL value was found to be significantly higher in the boys ($p<0.05$).

Table 1. Sociodemographic characteristics

Demographic data	Mean±SD	Minimum-Maximum
Age (years)		
Boy	11.7±1.2	9.0-14.0
Girl	11.1±1.2	9.0-14.0
Total	11.4±1.2	9.0-14.0
	n	%
Gender		
Male	49	52.1
Female	45	47.9
Grade level		
Fifth	29	30.9
Sixth	21	22.3
Seventh	26	27.7
Eighth	18	19.1
Family type		
Both parents alive and together	84	89.4
Both parents alive but separated	9	9.5
Neither parent alive	1	1.1
Parental education status		
Illiterate	10	10.6
Literate	11	11.7
Primary school graduate	48	51.1
Middle school graduate	21	22.3
High school graduate	4	4.3
Father's education status		
Illiterate	3	3.2
Literate	8	8.5
Primary school graduate	38	41.5
Middle school graduate	32	34.0
High school graduate	12	12.8
Perceived income status		
Very good	13	13.8
Good	46	48.9
Moderate	20	21.3
Low	14	14.9
Very low	1	1.1
Number of siblings		
Single child	3	3.2
1	21	22.3
2	37	39.4
3	24	25.5
≥4	9	9.6
Number of family members		
3	6	6.3
4	33	35.2
5	31	33.0
6	9	9.6
7	9	9.6
≥8	6	6.3

[1]*SD: Standard deviation.*

Table 2. Physical activity habits, sleep duration, and screen time[1]

Physical activity habits	n	%
Presence of physical activity		
Present	78	83.0
Absent	16	17.0
Type of physical activity (n=78)		
Team sport (football, basketball, etc.)	40	51.3
Individual sport (swimming, running, etc.)	24	30.8
Active games in a park	14	17.9
Frequency of physical activity (n=78)		
Every day	21	26.9
Once a week	13	16.7
Two to four times a week	32	41.0
Five or six times a week	10	12.8
Once a month	2	2.6
PAL classification		
Underactive	49	52.1
Moderately active	27	28.7
Active	15	16.0
Very active	3	3.2
PAL value	Mean±SD	Minimum-Maximum
Boy	1.6±0.1	1.3-2.1
Girl	1.5±0.1	1.3-2.1
Total	1.6±0.1	1.3-2.1
Sleep duration (hour)		
Boy	7.9±1.5	4.0-11.0
Girl	8.2±1.3	5.0-11.0
Total	8.0±1.4	4.0-11.0
Screen time (hour)		
Boy	2.2±1.4	0.0-5.0
Girl	3.0±2.3	0.0-12.0
Total	2.6±1.9	0.0-12.0

[1]*PAL: Physical activity, SD: Standard deviation.*

When the anthropometric characteristics of the Roma children were compared by gender (Table 3), it was determined that 64.4% of the girls and 55.1% of the boys had values within the normal range according to the BMI z-score classification for age. When the height-for-age z-score was evaluated, 93.3% of the girls and 91.8% of the boys were found to have values within the normal range. The body fat mass of the girls was higher than that of the boys ($p<0.05$ for body fat mass in kg and $p<0.05$ for body fat mass in %). The percentage of the body fluid mass of the boys was statistically significantly higher than that of the girls ($p<0.05$). When the height-for-age and BMI-for-age z-scores of the children were compared according to the educational status of their parents, it was observed that the frequency of tall children with literate fathers was 37.5%, which was significantly higher compared to the other education level groups ($p<0.05$). The comparison of the physical activity habits of the children according to the BMI z-score classification revealed no statistically significant difference ($p>0.05$). In addition, no statistically significant relationship was found between the BMI z-score groups and the PALs and the time spent sleeping and in front of a screen.

Table 3. Comparison of the anthropometric measurements by gender[1]

	Boy			Girl				
	n	Median (25^{th}-75^{th} percentile)	Mean rank	n	Median (25th-75th percentile)	Mean rank	Z	p
Body weight (kg)	49	46.0 (35.0-53.8)	47.14	45	45.8 (36.3-54.1)	47.89	-0.132	0.895
Height (cm)	49	153 (146.0-163.0)	49.28	45	152.0 (145.0-161.0)	45.57	-0.659	0.510
Waist circumference (cm)	49	68.0 (60.5-79.0)	51.93	45	63.0 (61.0-70.5)	42.68	-1.644	0.100
Body fat mass (kg)	39	5.9 (3.3-13.5)	32.19	38	11.9 (7.2-14.2)	45.99	-2.705	**0.007***
Body fat mass (%)	39	13.7 (9.8-44.9)	29.21	38	24.4 (19.1 -28.3)	49.05	-3.892	**<0.001***
Fat-free mass (kg)	39	37.0 (30.9-44.9)	42.71	38	36.0 (28.3-39.2)	35.20	-1.472	0.141
Muscle mass (kg)	39	35.1 (29.2-42.9)	42.63	38	34.2 (26.8-37.2)	38.23	-1.442	0.149
Body fluid mass (kg)	39	27.1 (22.6-32.9)	42.74	38	26.4 (20.7-28.7)	35.16	-1.488	0.137
Body fluid mass (%)	39	63.2 (54.9-65.9)	48.86	38	55.3 (52.4-59.0)	28.88	-3.918	**<0.001***
BMI (kg/m²)	49	17.8 (15.7-23.2)	45.45	45	19.5 (16.7-21.8)	49.73	-0.761	0.447
Waist/height ratio	49	0.4 (0.3-0.5)	51.05	45	0.4 (0.3-0.4)	43.63	-1.317	0.188
BAZ	49	0.3 (-0.4-1.2)	46.49	45	0.5 (-0.2-1.0)	48.60	-0.375	0.708
HAZ	49	-0.1 (-1.1-1.8)	45.53	45	0.5 (-0.5-1.2)	49.64	-0.730	0.465

*[1]Z: Mann-Whitney U test, BMI: Body mass index, BAZ: BMI-for-age z-score, HAZ: Height-for-age z-score, *p<0.05*

When the energy and nutrient intakes of children are evaluated, the weekend values were found to be statistically significantly higher than the weekday values in terms of energy ($p<0.05$) and fat intake ($p<0.05$). The weekend intakes of vitamin D ($p<0.05$), vitamin E ($p<0.05$), vitamin B_3 ($p<0.05$), and vitamin B_{12} ($p<0.05$) were also statistically significantly higher compared to the weekday evaluation. However, vitamin B_2 intake ($p<0.05$) was statistically significantly higher on weekdays. The evaluation of mineral intakes revealed that the weekend intakes of iron ($p<0.05$), zinc ($p<0.05$), copper ($p<0.05$), and fluorine ($p<0.05$) were statistically significantly higher than during the week (Table 4). When evaluated according to gender, the daily fat intake of the girls was statistically significantly higher than that of the boys ($p<0.05$ for g and $p<0.05$ for %). There was a weak inverse relationship between BMI and carbohydrate and fiber intakes ($r=-0.225$, $p<0.05$ and $r=-0.295$, $p<0.05$, respectively).

When the daily nutrient intakes were evaluated with reference to the TUBER recommendations according to gender (Table 5), a statistically significant difference was found in relation to vitamin E, calcium, magnesium, copper, and iodine ($p<0.05$). It was determined that while the girls met the adequate intake level for vitamin E (69.6%), the boys did not meet the adequate intake level (50.3%) ($p<0.05$). The magnesium intake of the girls was above the TUBER recommendations (105%), while that of the boys did not meet the recommended level (56.8%) ($p<0.05$). The dietary iodine intake of girls also met the recommended level (73.4%), but that of the boys was below the recommended level (58.8%) ($p<0.05$).

Tablo 4. Comparison of energy and nutrient intakes between weekdays and weekends[1]

	Weekday (n=94)		Weekend (n=78)			
	Median (25^{th}-75^{th} percentile)	Mean rank	Median (25^{th}-75^{th} percentile)	Mean rank	Z	p
Energy (kcal)	1,379.1 (1,037.7-2,022.3)	31.06	1,539.1 (1,149.7-2,647.9)	44.35	-2734	**0.006***
Protein (g)	49.7 (37.4-71.2)	34.64	54.3 (40.1-85.7)	42.27	-1.820	0.069
Protein (%)	15.0 (13.0-18.0)	35.21	14.5 (11.7-17.0)	32.10	-1.908	0.056
Fat (g)	49.1 (32.0-66.9)	29.38	58.1 (36.9-99.3)	45.84	-2.851	**0.004***
Fat (%)	31.5 (26.7-38.0)	37.38	35.5 (28.0-39.0)	36.75	-1.466	0.143
Carbohydrate (g)	174.0 (120.4-253.4)	34.12	192.1 (146.3-278.4)	42.66	-1.907	0.057
Fiber (g)	11.1 (7.6-16.3)	37.47	11.9 (8.4-18.1)	40.27	-0.965	0.335
Vitamin A (mcg)	457.5 (300.3-690.3)	35.75	496.3 (267.0-931.8)	42.51	-0.363	0.717
Vitamin D (mcg)	0.9 (0.5-2.5)	32.58	1.7 (0.6-3.2)	42.81	-2.177	**0.029***
Vitamin E (mg)	6.6 (3.8-9.9)	33.43	7.7 (5.7-11.2)	42.72	-3.178	**0.001***
Vitamin K (mcg)	30.2 (18.7-71.7)	41.09	34.2 (20.7-81.9)	36.40	-0.342	0.733
Vitamin B_1 (mg)	0.5 (0.4-0.8)	35.43	0.6 (0.4-0.9)	41.98	-1.328	0.184
Vitamin B_2 (mg)	3.1 (2.0-5.1)	41.74	0.9 (0.6-1.6)	19.88	-6.881	**<0.001***
Vitamin B_3 (mg)	18.3 (13.6-25.5)	32.97	22.7 (13.9-34.2)	43.29	-2.267	**0.023***
Vitamin B_6 (mg)	0.8 (0.5-1.0900)	33.90	0.9 (0.5-1.5)	43.25	-1.348	0.178
Vitamin B_{12} (mcg)	3.0 (1.9-5.1200)	33.50	3.9 (2.0-7.2)	42.71	-2.351	**0.019***
Folate (mcg)	157.1 (111.5-228.9600)	34.89	171.1 (120-277.9)	42.43	-1.424	0.154
Vitamin C (mg)	50.3 (24.0-92.9550)	42.17	47.3 (20.8-76.2)	34.20	-1.377	0.168
Biotin (mcg)	23.8 (16.2–39.8)	32.68	29.6 (16.0-49.3)	44.85	-1.485	0.138
Pantothenic acid (mg)	3.0 (2.2–1562.0)	33.90	3.6 (2.4-5.2)	43.25	-1.599	0.110
Sodium (g)	2.3 (1.5–3.2)	32.05	2.5 (1.6-4.1)	45.43	-1.602	0.109
Potassium (g)	1.5 (1.0–2.1)	42.26	1.6 (1.1-2.6)	36.80	-0.972	0.331
Calcium (mg)	543.9 (401.8–765.9)	38.53	548.0 (317.3–852.0)	39.51	-0.201	0.841
Magnesium (mg)	170.6 (124.3-231.2)	35.19	180.4 (125.4-285.8)	42.53	-1.013	0.311
Phosphor (mg)	839.2 (571.4-0086.7)	34.79	850.8 (565.9-1358.8)	42.70	-1.264	0.206

Iron (mg)	6.9 (4.8-8.9)	30.16	7.6 (5.6-12.2)	46.37	-2.265	**0.024***
Zinc (mg)	6.8 (4.9-9.3)	36.67	8.1 (5.2-11.8)	40.19	-2.782	**0.005***
Copper (mg)	1.0 (0.6-1.4)	34.87	1.2 (0.8-2.0)	41.00	-1.978	**0.048***
Iodine (mcg)	71.9 (48.7-102.2)	33.95	73.0 (45.8-116.5)	44.75	-0.556	0.578
Fluorine (mcg)	446.1 (340.0-638.9)	34.85	522.6 (422.9-702.0)	41.12	-3.024	**0.002***
Manganese (mg)	2.3 (1.4-3.2)	36.48	2.6 (1.8-3.6)	40.70	-1.881	0.060
	Mean±SD		Mean±SD		T	p
Carbohydrate (%)	52.2±8.6		51.7±9.4		0.376	0.708

*[1]Z: Wilcoxon signed-rank test, T: Paired-samples t-test, SD: Standard deviation, *p<0.05*

Table 5. Comparison of daily nutrient intakes by gender with reference to TUBER recommendations[1]

	Boys (n=49)		Girls (n=49)			
	Median (25^{th}-75^{th} percentile)	Mean rank	Median (25^{th}-75^{th} percentile)	Mean rank	Z	p
Protein	131.9 (95.0-163.3)	47.18	123.6 (94.1-177.1)	47.84	-0.117	0.907
Carbohydrate	135.2 (98.9-225.4)	45.65	150.3 (119.1-185.5)	49.51	-0.685	0.493
Fiber	64.1 (42.3-97.1)	46.03	65.5 (49.5-88.6)	49.10	-0.545	0.586
Vitamin A	85.0 (53.5-127.7)	43.10	111.4 (69.7-152.5)	52.29	-1.631	0.103
Vitamin D	10.9 (4.7-20.7)	46.00	10.9 (5.5-24.4)	49.13	-0.556	0.578
Vitamin E	50.3 (33.9-76.2)	39.80	69.9 (52.0-102.4)	55.89	-2.857	**0.004***
Vitamin K	63.3 (35.5-124.5)	49.04	52.3 (34.1-108.1)	45.82	-0.571	0.568
Vitamin B_1	65.0 (43.6-90.8)	43.62	73.3 (56.1-105.8)	51.72	-1.438	0.150
Vitamin B_2	235.5 (155.9-381.3)	46.86	251.1 (159.7-415.8)	48.20	-0.238	0.812
Vitamin B_3	311.5 (203.3-426.9)	47.22	335.0 (224.4-388.4)	47.80	0.108	0.919
Vitamin B_6	72.5 (54.4-119.5)	42.86	99.0 (65.5-127.7)	52.56	-1.722	0.085
Vitamin B_{12}	97.5 (61.6-165.5)	44.74	114.6 (66.0-224.6)	50.50	-1.022	0.307
Folate	66.1 (46.8-101.4)	45.55	74.7 (54.5-106.8)	49.62	-0.723	0.470
Vitamin C	65.5 (38.2-115.1)	42.94	92.1 (53.0-132.2)	52.47	-1.692	0.091
Biotin	88.0 (50.1-123.5)	44.82	103.1 (53.2-144.8)	50.42	-0.995	0.320
Pantothenic acid	72.0 (52.7-98.7)	45.99	79.0 (50.5-96.2)	49.14	-0.650	0.575
Sodium	153.7 (120.3-239.9)	46.08	166.3 (124.2-237.5)	49.04	-0.526	0.599

Potassium	34.9 (24.1-47.5)	44.59	39.6 (24.6-49.4)	50.67	-1.079	0.281
Calcium	48.7 (31.7-66.9)	41.94	55.7 (41.7-87.4)	53.56	-2.062	**0.039***
Magnesium	56.8 (39.8-75.2)	38.82	105.0 (92.7-137.5)	56.96	-3.221	**0.001***
Phosphor	130.4 (94.5-182.1)	43.45	159.8 (118.5-209.8)	51.91	-1.502	0.133
Iron	66.9 (49.3-93.9)	47.44	69.9 (52.0-102.4)	47.57	-0.023	0.982
Zinc	72.8 (51.9-93.5)	44.31	77.9 (57.6-113.9)	50.98	-1.185	0.236
Copper	88.8 (69.4-119.8)	40.43	105.0 (92.7-137.5)	55.20	-2.623	**0.009***
Iodine	58.8 (37.3-79.3)	41.98	73.4 (51.9-105.6)	53.51	-2.047	**0.041***
Fluorine	29.1 (19.7-36.7)	47.27	27.7 (22.4-33.2)	47.76	-0.087	0.931
Manganese	134.6 (92.1-172.6)	45.93	137.0 (105.1-181.1)	49.21	-0.583	0.560

*[1]Z: Mann-Whitney U test, TUBER: Turkish Dietary Guidelines, *p<0.05*

There was no significant difference between the girls and boys in terms of the types of food consumed (p>0.05) (Table 6). When food consumption was compared between the weekdays and weekends, fruit consumption (p<0.05) was found to be higher on weekdays, while eggs (p<0.05), oilseed (p<0.05), and soft drinks (p<0.05) were consumed at statistically significantly higher levels at weekends.

Table 6. Comparison of daily consumption of food groups by gender (g/day)[1]

	Boys (n=49)		Girls (n=45)			
	Median (25^{th}-75^{th} percentile)	Mean rank	Median (25^{th}-75^{th} percentile)	Mean rank	Z	p*
Grains	12.5 (0.0-50.0)	44.59	25.0 (0.0-50.0)	50.67	-1.106	0.269
Bread	120.0 (57.5-231.2)	52.56	100.0 (50.0-137.5)	41.99	-1.879	0.060
Vegetables	15.0 (0.0-48.5)	46.81	12.5 (0.0-46.2)	48.26	-0.269	0.788
Fruit	10.5 (0.0-200.0)	44.70	100.0 (0.0-200.0)	50.54	-1.081	0.280
Meat	45.0 (20.0-95.0)	51.20	37.5 (0.0 -73.5)	43.47	-1.388	0.165
Eggs	25.0 (0.0-85.0)	49.51	25.0 (0.0-50.0)	45.31	-0.765	0.444
Legumes	0.0 (0.0-0.0)	45.45	0.0 (0.0-0.0)	49.73	-1.312	0.190
Milk and dairy products	60.0 (0.0-118.7)	42.69	90.0 (23.7-176.2)	52.73	-1.792	0.073
Oil	0.0 (0.0-2.2)	43.15	0.0 (0.0-7.7)	52.23	-1.891	0.059
Oil seeds	0.0 (0.0-11.2)	44.96	3.0 (0.0-15.0)	50.27	-1.034	0.301
Non-alcoholic beverages	760.0 (417.5-982.5)	44.24	845.0 (475.0-1307.5)	51.04	-1.207	0.227
Sweets/Desserts	0.0 (0.0-30.0)	44.00	15.0 (0.0-37.5)	51.31	-1.382	0.167

*[1]P: Mann-Whitney U test, *p<0.05*

4. DISCUSSION

The results of this study showed that the daily fat intake of the girls was higher than that of the boys ($p<0.05$). While the daily macronutrient intakes of all the participants met the TUBER recommendations, vitamin D (24.1%), potassium (39.1%), and calcium (62.5%) intakes did not meet these recommendations. According to the BMI-for-age z-score classification, 64.4% of the girls and 55.1% of the boys had BMI values within the normal range. When the relationship between BMI z-score and energy and macronutrient intakes was examined, a weak inverse relationship was found between carbohydrate and fiber intake and BMI. It was also determined that 52.1% of the children were underactive, and this was seen at a statistically significantly higher rate among the girls compared to the boys.

The Roma, defined as one of the cultural identities in Turkey, are a disadvantaged group in the society and reported to have a poor education [19] and low socio-economic levels [10]. In a study conducted in Izmir, 30% of the Roma participating in the study were illiterate, and 17.1% of these participants had dropped out of primary education, and none of the participants had received higher education [20]. In another study conducted in Izmir, almost all adults had a primary school education level or below [21]. In the current study, was determined that 95.7% of the children's mothers had an education level of primary school or below, and 87.2% of the fathers had an education level of middle school or below. Like other studies, none of the parents had a higher education degree.

It is known that the demographic and socioeconomic characteristics of families affect the nutritional status of children [22]. In a previous study, a positive relationship was found between children's height-for-age and BMI-for-age z-scores and parental education status [23]. In the current study, contrary to the literature, the frequency of tall children with literate fathers was found to be 37.5% higher compared to the other education groups. Considering that children acquire nutritional habits within the family, parents may have a great influence on their nutrition; therefore, the educational status of parents and the nutritional status of the child may be related.
When compared with the TBSA (Türkiye Beslenme ve Sağlık Araştırması) [24] data, the Roma children were found to have a lower energy intake (1,633±695.6 kcal), and energy provided by carbohydrates (52.2±7.9%), fat (20-35%), and protein (15.2%±3.6) was determined to be within the ranges recommended by TUBER. In addition, with reference to the TBSA data, the Roma children also had a lower fiber intake. The percentage of mean daily fiber intake meeting TUBER recommendations was found to be 71.3±33.2%.

The inadequacy of micronutrients is a major problem in child nutrition in developing countries. In recent years, it has been reported that especially zinc, iron, and iodine deficiencies are common in these countries [25]. When compared with the TBSA (2014) data, the Roma children had a similar mean daily intake of zinc (8.2±3.5 mg), lower mean intake of iron (8.1±3.3 mg), and lower mean intake of iodine (85.1±51.9 mcg). The calcium intake of the Roma children (642.7±347.7 mg) was determined to be higher than the country average, but it did not meet the TUBER recommendations (62.5±40.0%). When other mineral intakes were compared with the general population in Turkey [24], it was observed that the Roma children had lower magnesium and potassium intakes and a higher sodium intake.

It has been reported that vitamin A deficiency is common in childhood in developing countries [25]. Compared to the data on the general population in Turkey [24], the Roma children were found to have a higher intake of vitamin A (1220.2±3944.2 mcg). The inadequate intake of iron, vitamins B_6 and B_{12}, and folic acid during childhood and adolescence have been shown to be among the common causes of anemia during these periods [3,26]. When vitamin B group intakes were compared with the general Turkish data, it was observed that the Roma children had a higher vitamin B_{12} intake (5.8±7.5 mcg). This was considered to be related to the high consumption of meat and meat products in this population. However, they were determined to have lower folate (82.8±45.4 mcg) and vitamin B_6 (1.0±0.7 mg) intakes. The Roma children's intake of vitamin C (57.8±40.2 mg) was also lower compared to the country average [24]. This might be related to

their lower consumption of vegetables and fruits. Vitamin D deficiency is common across the world and results in the development of rickets, especially in children [27]. Although the vitamin D intake of the Roma children (3.6±6.1 mcg) was higher than the country average, it was found that their mean daily vitamin D intake did not meet the TUBER recommendations (24.1±41.0%). When the intakes of other vitamins were compared to the general population in Turkey [24], the Roma children were determined to have lower intakes of vitamins E, K, and B_1, and pantothenic acid, and higher intakes of vitamins B_3 and B_2.

The comparison of the energy and macronutrient and micronutrient intakes of the Roma children by gender revealed that the fat intake of the girls was statistically significantly higher than that of the boys. Other macronutrient and micronutrient intakes did not significantly differ according to gender. When the energy and macronutrient intakes were compared between weekdays and weekends, it was observed that the energy and fat intakes were statistically significantly higher at the weekend than during the week. This was attributed to the Roma children's high consumption of beverages and oilseeds, especially at weekends. Evaluating mineral intakes, we found that the zinc and iron intakes were significantly higher at the weekend than during the week. Concerning vitamins, the intakes of vitamins D, E, B_3, and B_{12} were significantly higher at the weekend than during the week, while the intake of vitamin was significantly higher on weekdays. It is considered that the iron, zinc, vitamin E, and vitamin B_{12} intakes being higher at the weekend may be related to the Roma children's higher consumption of meat products, eggs, and oilseeds during the weekend.

The prevalence of obesity varies by country [28]. In a study conducted in Hungary, it was reported that the prevalence of obesity was higher in children living Roma settlements in Hungary compared to those in the general population, with obesity being observed in 20% of the 11-year-old-children and 10% of the 13-year-old children [29]. In another study evaluating the nutritional status of Roma children in Macedonia, the non-Roma children were found to be at higher risk of obesity compared to their Roma peers [30]. According to the TBSA data, 6% of children aged 9-11 years and 9.8% of those aged 12-14 years are obese. It is observed that the rate of obesity is higher in boys than in girls [24]. In the current study, the obesity rate of the Roma children was found to be 13%. When compared to other studies conducted in Turkey and in the region, the prevalence of obesity among the Roma children was found to be higher.

It is known that the frequency of physical activity decreases during childhood and adolescence, being replaced by activities requiring low physical effort [31]. According to the general data from Turkey, the rate of children aged 9-11 years that engage in exercise is 47.3% [24]. In the current study, the rate of the Roma children that did not engage in physical activity was determined as 17.0%. When compared to the general data of Turkey, it was seen that the rate of physical activity of the Roma children was higher. Less physical activity causes health problems, such as obesity due to decreased energy consumption [32]. In a study by Sárváry et al. [29], nearly half of Roma children reported that they regularly engaged in intense physical activity. In our study, only 12.8% of the children performed physical activity five or six times a week. Compared to the study of Sárváry et al. [29], the Roma children that participated in our study had a lower physical activity frequency. In another study from Turkey, Aksoydan and Çakır [33] evaluated adolescents and reported that boys were more active than girls, and the frequency of obesity was statistically significantly lower among active children. Similarly, in our study, we determined that the boys were more active than the girls.

In recent years, growing accessibility to electronic media tools, such as computers, tablets, and phones among school-age children has increased the average time spent for sedentary activities [34]. Compared to previous studies [35,36], we determined that the Roma children had a lower sleep duration and higher screen time. In some studies, increased screen time was found to be positively associated with increased BMI [37,38]. However, in the current study, we detected no significant relationship between obesity and sleep duration and screen time.

5. CONCLUSION

In conclusion, the nutritional status, energy, and nutrient intakes of Roma children were evaluated, and factors affecting their nutrition were determined. While identifying the needs of the society, the data provided by this study will guide the determination of characteristics of and differences in the needs of disadvantaged or ethnic groups and establish improvement strategies specific to these populations. For the adoption of healthy eating habits that also continue through to the adulthood, it is necessary to determine the needs of the society and implement health promotion campaigns. Therefore, there is a need for further studies that will reveal the nutritional characteristics and needs of Roma children on a country basis.

Nutrition education should be planned to reduce the nutritional problems of the society in every period of life. In order to increase the efficacy of such education programs, they should be suitable for the characteristics and needs of target groups and provide behavioral changes. In order to respond to the various needs of the society, there is a need for a team of professionals from different fields of expertise working with a holistic approach. In particular, education programs should be planned in the school environment by experts and dietitians/nutritionists with a multidisciplinary approach, and they should include applied activities. Therefore, it is recommended to increase the number of school dietitians in order to determine the nutritional status of school-age children, provide nutrition education, and make the necessary arrangements to develop healthy eating behaviors in the school environment.

The presence of very serious problems, such as poor access to high-quality health and education services, migration, poverty, and deterioration of ecological balance has brought along the urgent need for studies that support sustainable development. School-based biopsychosocial support, which is provided without funding through international and inter-institutional interdisciplinary collaborations (class psychologists, nursing, nutrition, social work, etc.) and all structures within the system surrounding children/young people with the voluntary efforts of university staff. University-community cooperation not only makes a direct contribution to the society by offering an opportunity to address the needs of the people, conduct research, and resolve social problems through an interdisciplinary approach but also increases the quality of university education and information production in the field together with all stakeholders. The SOYAÇ model, in which higher education and community studies support each other, demonstrates the power of university-society cooperation in achieving sustainable education and sustainable development and presents a successful example of how universities assume responsibilities to contribute to society.

This study was conducted in a secondary school located in the Uskudar district of Istanbul, and its findings are not generalizable to the overall population of Roma children in Turkey. The study's limitations include a small sample size and the reliance on self-reported data for all variables except anthropometric measurements. However, given the scarcity of research on the nutritional status of Roma children in the existing literature, this study serves as a valuable reference for future initiatives aimed at promoting healthy dietary and lifestyle habits among Roma children, increasing awareness, and preventing chronic diseases in adulthood.

Ethics Committee Approval

Ethics committee approval (No. 210, dated 11.11.2019) was obtained from the Marmara University Institute of Health Sciences Ethics Committee.

Informed Consent

Written informed consent was obtained from patients who participated in this study.

Author Contributions

Müberra Çil: Study design, Literature research, Data collection, Data interpretation, Statistical analysis and Manuscript preparation; **Şule Aktaç:** Study design, Literature research, Data collection, Data interpretation and Manuscript preparation; **H. Özden Bademci:** Study design, Data collection and Manuscript preparation.

Conflict of Interest
The authors have no conflict of interest to declare.

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