J Nutr Diet 2023;51(2):45-54 DOI: 10.33076/2023.BDD.1757

RESEARCH ▪ ARAŞTIRMA

Nutritional Assessment of Kindergartens' Menus in Terms of Quantity: A Sample of Seven Regions in Türkiye

Anaokulu Menülerinin Miktar Yönünden Değerlendirmesi: Türkiye'de Yedi Bölge Örneği

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Received/Geliş tarihi: 15.05.2023 • Accepted/Kabul tarihi: 31.08.2023

ABSTRACT

Aim: This study was conducted to evaluate the menus of kindergartens in terms of quantity.

Material and Method: A total of 147 autumn menus containing breakfast-lunch or breakfast-lunch-afternoon were evaluated from kindergartens serving in seven geographic regions in Türkiye.

Results: In general, the amount of energy (95.7%), carbohydrate (98.9%) and micronutrients provided by menus was found sufficient, while the amount of calcium was found low (56.6%) and the amount of protein was high (217.4%) than recommendations. It was observed that the sodium (62.0%) and added sugar (8.2%) contents of the menus did not exceed the recommended amounts. In the comparison of the menus between regions, significant differences were observed in some regions in terms of some macro and micronutrients, which could be associated with cultural differences. It was determined that the protein (g) and fat (g) contents of the Mediterranean region menus were lower than the other regions ($p<0.008$). In the menus of Aegean, Marmara and Black Sea regions, carbohydrate (g) content was found to be higher than other regions ($p<0.008$). The vitamin C content of the Marmara region's menus was also higher than the East-Southeast and Central Anatolia regions ($p<0.008$). The calcium content of the Black Sea region's menus was higher than the East-Southeast, Central Anatolia, Mediterranean and Marmara regions ($p<0.008$). It was found that the iron content of the Aegean region's menus was higher than the East-Southeast, Central Anatolia, Mediterranean and Marmara regions ($p<0.008$).

Conclusion: Nutrition of children in this period, is effected especially with the effect of kindergartens. For this reason, it is thought that disseminating the National Menu Planning and Implementation Guide for Mass Nutrition Systems (Mass Consumption Places) prepared in accordance with the culture of the society and following the application with such studies will contribute to the solution of a big problem throughout the country.

Keywords: Kindergartens' menus, child nutrition, menu review, menu quantity, healthy menus

ÖZET

Amaç: Bu çalışma anaokulu menülerinin miktar yönünden değerlendirilmesi amacıyla yapılmıştır.

Gereç ve Yöntem: Türkiye'de yedi coğrafi bölgede hizmet veren anaokullarından kahvaltı-öğle veya kahvaltı-öğle-ikindi olmak üzere toplam 147 sonbahar menüsü değerlendirildi.

Bulgular: Genel olarak menülerin sağladığı enerji (%95.7), karbonhidrat (%98.9) ve mikro besin ögesi miktarları önerilere göre yeterli bulunurken, kalsiyum miktarı (%56.6) düşük, protein miktarı (%217.4) yüksek bulunmuştur. Menülerin sodyum

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(%62.0) ve ilave/eklenmiş şeker (%8.2) içeriklerinin önerilen miktarları aşmadığı görülmüştür. Menülerin bölgeler arasında karşılaştırılmasında, bazı bölgelerde kültürel farklılıklarla ilişkilendirilebilecek, makro ve mikro besin ögeleri açısından önemli farklılıklar gözlenmiştir. Akdeniz bölgesi menülerinin protein (g) ve yağ (g) içeriğinin diğer bölgelerden daha düşük olduğu saptanmıştır (p<0.008). Ege, Marmara ve Karadeniz bölgelerinin menülerinde ise karbonhidrat (g) içeriği diğer bölgelerden daha yüksek bulunmuştur (p<0.008). Marmara bölgesi menülerinin C vitamini içeriği de Doğu-Güneydoğu ve İç Anadolu bölgelerinden daha yüksek bulunmuştur (p<0.008). Karadeniz bölgesinin menülerin kalsiyum içeriği ise Doğu-Güneydoğu, İç Anadolu, Akdeniz ve Marmara bölgelerinden daha yüksek çıkmıştır (p<0.008). Ege bölgesinin menülerine bakıldığında da demir içeriğinin Doğu-Güneydoğu, İç Anadolu, Akdeniz ve Marmara bölgelerinden daha yüksek olduğu bulunmuştur (p<0.008).

Sonuç: Çocukların beslenmesi, bu dönemde özellikle anaokullarının etkisiyle önem taşır. Bu nedenle toplumun kültürüne uygun olarak hazırlanan Toplu Beslenme Sistemleri (Toplu Tüketim Yerleri) için Ulusal Menü Planlama ve Uygulama Rehberi'nin yaygınlaştırılmasının ve bu tarz çalışmalarla uygulamanın takip edilmesinin ülke genelinde büyük bir sorunun çözümüne katkı sağlayacağı düşünülmektedir.

Anahtar kelimeler: Anaokulu menüleri, çocuk beslenmesi, menü değerlendirmesi, menü yeterliliği, sağlıklı menüler

INTRODUCTION

Kindergartens, which are the first places where children start to spend a long time outside of the home with their peers, are environments where they can observe habits different from the habits' they have acquired at home for the first time. Considering that children spend at least nine months of the year, 4-8 hours a day in the kindergarten, the habits they will adopt here will significantly affect the child's future life (1-3). Menus offered to kindergartens' children, covering the 3-5 age group, where the foundations of healthy eating habits are laid, should be of high quality to meet the physiological needs of children and should be prepared by a professional person (4).

The irregular eating tendency is common in children in this age group, as the diet is not well established yet. Since the stomach capacities of the children is small, they usually need to be fed at frequent intervals. Consumption of three main meals is absolutely recommended to ensure regular metabolism. However, due to the irregular eating habits seen in children in this age group and the tendency to consume less food at meals, main meals should definitely be supported with snacks. Thus, it is recommended to have two main meals and at least one snack in kindergartens (5) to gain both meal and healthy eating habits for children.

In some countries, there are government policies and guidelines regarding the food quality and nutritional value of the menus to be given in school and kindergarten menus. This is of considerable importance in terms of standardizing the content of kindergartens menus (2,6). However, in different regions of Türkiye, it seems to be different levels of proficiency and quantity of applications and different approaches are applied in public and private kindergartens. Hence, National Menu Planning and Implementation Guide, which includes the menu principles to be applied in kindergartens, was published in 2020 by the Republic of Türkiye Ministry of Health (7).

There are few international studies investigating the foods offered in childcare services. These studies identified important areas where the menus did not comply with national nutrition guidelines; mostly by providing too much energy, too much salt/sodium, and not enough vegetables, protein-rich foods, and cereals particularly wholegrains (8-10). This study is the most comprehensive study in the literature examining kindergarten menus according to their nutritional values in Türkiye. In this study it is aimed to evaluate the menus of kindergartens in terms of quantity. It is expected that the results of this study,

which reveals the situation before the entry into force of the national guide, will once again reveal the need for information and supervision on this issue.

MATERIAL AND METHOD

Monthly autumn menus of private kindergartens served for weekdays in Türkiye's seven geographical regions were examined and totally 147 menus consisted of breakfast-lunch or breakfast-lunch-afternoon meals were included in the study. The study was carried out by considering the menu samples published by the schools on the internet. This study was not conducted on humans, but was a study conducted on menu lists. For this reason, ethics committee or ethical commission approval was not received for the article. As a result of the preliminary research on the internet, schools that publish their menus on the internet were determined. While all kindergartens that published their menus on the internet were included in the study, the kindergartens that did not publish them were not included in the study. The geographical regions where the detected schools are located were determined. A similar number of kindergarten menus from each region was tried to be included in the study. However, since there could not be enough menus from the East and Southeast Anatolian regions, these two regions were examined together. The selection of schools included in the study was carried out randomly. In the selection of the menus in the regions, a homogeneous distribution was not made according to the provinces. One-month menus obtained from a total of 147 schools were included in the study. Menus of kindergartens consisted of three or four dishes for both breakfast and lunch. The distribution of kindergartens by regions included in this study is as shown in Table 1.

In this study, the energy and nutrient contents of the menus were calculated using "*standard recipes for institutions*" in the Nutrition Information System (Beslenme Bilgi Sistemi-BeBiS) Program (8.0) Turkish Version for Windows. Each menu was evaluated on a meal basis. Dietary Reference Intakes (DRI) values according to the age shown in Türkiye Dietary Guidelines-2015 (Türkiye Beslenme Rehberi-TUBER-2015) were used in the calculation of nutrient adequacy status. The requirement reference values are based on 3-5 years of age specified in TUBER. In requirement calculations, the average of the nutrient value that the two sexes should take was taken (5). During the evaluation, the requirement to meet 3/5 of the daily needs was considered in full-time kindergartens. In the evaluation of meals, 1/5 of the daily needs were taken for breakfast and 2/5 for lunch (11). Snacks were not taken into account, as there was no recommended reference level of coverage in meal-based assessments. However, in cases where the whole day spent in kindergartens is evaluated, snacks are also included in the calculation.

Statistical Analysis

The data obtained was evaluated in SPSS 15.0 statistical package program. Kruskal Wallis Variance analysis was applied to investigate whether there was a difference in the amount of macro and micronutrients in the kindergartens depending on regions. In cases where significance was determined, the Mann-

Table 1. Distribution of schools included in the study by regions

Regions	Total number of schools	Number of schools included in the study	Number of schools serving breakfast-lunch	Number of schools serving breakfast-lunch-afternoon
Mediterranean		21	10	11
Aegean		24	15	9
East-Southeast Anatolia		24	14	10
Central Anatolia		27	20	7
Black Sea		33	15	18
Marmara		18	2	16

Whitney U test with Bonferroni correction was used to investigate the source of this significance. In determining the level of significance, 95% confidence was used limited. In the data where the Bonferroni Corrected Mann-Whitney U Test was applied, p <0.008 (0.05/6 = 0.0083) was used as there were six variables in determining the level of significance.

RESULTS

The energy and nutrient content of the menus according to meals are shown in Table 2. The energy content of the breakfast, lunch and snacks was 311.4±106.0 kcal, 377.8±111.5 kcal and 195.3±92.6 kcal, respectively. The average protein contents were found 10.3±4.3 g for breakfast, 13.4±5.2 g for lunch, and 4.1±2.9 g for the snack while the average percentage values of fat from energy was 44.4±11.9% for breakfast, 35.8±8.2% for lunch and 31.8±16.9% for afternoon snack.

It has been determined that some nutrients provided with breakfast are higher than the recommended levels like for protein (332.2%), folic acid (169.6%) and vitamin A (324.0%) while the levels of other nutrients were adequate. Especially fat intake and energy percentage coming from fat was found higher than the recommended levels (Table 2). Regarding the lunch meal, it was found that protein (215.8%), vitamin A (194.2%) and vitamin C (180.0%) was higher than the recommended levels while the amount of calcium (32.6%) was found inadequate (Table 2). For both meals, the total amount of calcium (56.6%) provided was inadequate, whereas protein (217.4%), folic acid (136.5%), vitamin A (237.4%) and vitamin C (163.3%) exceeded recommended levels (Table 3).

Table 2. Energy and nutrient contents of the menus (n:147)

Energy and Nutrients	Breakfast $\bar{X}$±SD	Lunch $\bar{X}$±SD	Snack $\bar{X}$±SD
Energy (kcal)	311.4±106.0	377.8±111.5	195.3±92.6
Protein (g)	10.3±4.3	13.4±5.2	4.1±2.9
Protein (%)	13.6±3.7	14.6±4.4	8.5±3.9
Fat (g)	15.9±7.3	15.2±5.7	7.3±5.2
Fat (%)	44.4±11.9	35.8±8.2	31.8±16.9
Saturated fat (g)	7.1±3.9	5.2±2.2	2.9±2.4
Saturated fat (E%)	19.7±7.2	12.5±3.9	12.6±7.9
Carbohydrate (g)	31.3±12.9	45.9±17.9	27.5±14.2
Carbohydrate (%)	41.9±12.6	49.6±8.9	59.7±18.1
Fiber (g)	1.9±0.9	4.7±2.2	1.7±1.4
Calcium(mg)	167.6±124.7	104.2±64.2	66.7±77.1
Iron (mg)	1.3±0.5	2.3±1.0	0.9±0.6
Folic acid (mcg)	47.5±17.9	67.2±32.1	16.2±12.9
Zinc (mg)	1.3±0.5	1.9±0.7	0.6±0.4
Vitamin A (mcg)	194.4±183.5	233.0±283.4	77.4±118.7
Vitamin C (mg)	7.8±10.8	21.6±21.1	10.2±13.9
Sodium (mg)	442.38±40.6	190.32±41.4	88.97±12.1
Added sugar (g)	3.8±5.1	3.3±6.3	8.3±8.3
Added sugar (E%)	4.7±6.4	3.2±5.6	16.0±13.6

The distribution of the amount of nutrients adequacy of breakfast, lunch and snacks according to regions were indicated in Table 4. The statistical differences between the regions based on nutrients are plotted on the Table 4.

DISCUSSION

The preschool period is the time when the foundation of eating habits is laid, as is the case with many other practices, and children's diets develop at this age in relation to the foods they offered (5). At this stage, kindergartens' menus are of considerable significance. It is the most important issue that the menus to be prepared in kindergartens meet the energy and nutrients need of children according to their ages, depending on the time spent in the kindergarten. This study is the most comprehensive study in the literature examining kindergarten menus according to their nutritional values in Türkiye. The findings obtained in this study show that there is no deficiency concerning energy and nutrients in the breakfast menus; however, the levels of the menus served for lunch is insufficient to meet the daily targeted calcium requirements. Similar results were found in other studies conducted in different countries and Türkiye (3,12-14). Micronutrients, especially calcium, are essential for children in this age group. Bone, tooth, muscle, brain and nervous system, circulatory system

Tablo 3. Percentage (%) distributions of main meals to meet the targeted needs (n:147)

Nutrients	Breakfast		Lunch		Total	
	Target Recommended Value	Adequency (%)	Target Recommended Value	Adequency (%)	Target Recommended Value	Adequency (%)
Energy (kcal)	240	129.7	480	78.7	720	95.7
Protein (%)	5-20	-	5-20	-	5-20	-
Protein (g)	2.58-3.63	332.2	5.16-7.26	215.8	7.74-10.9	217.4
Fat (%)	20-35	-	20-35	-	20-35	-
Saturated Fat (g)	As little as possible	-	As little as possible	-	As little as possible	-
Saturated fat (E%)	As little as possible	-	As little as possible	-	As little as possible	-
Carbohydrate (%)	45-60	-	45-60	-	45-60	-
Carbohydrate (g)	26	120.4	52	88.3	78	98.9
Fiber (g)	2.8	67.8	5.6	83.9	8.4	78.6
Calcium(mg)	160	104.7	320	32.6	480	56.6
Iron (mg)	1.4	92.8	2.8	82.1	4.2	85.7
Folic acid (mcg)	28	169.6	56	120.0	84	136.5
Zinc (mg)	1.1	118.2	2.2	86.4	3.3	96.9
Vitamin A (mcg)	60	324.0	120	194.2	180	237.4
Vitamin C (mg)	6	130.0	12	180.0	18	163.3
Sodium (mg)	300-380	130.1	600-760	27.9	900-1140	62,0
Added sugar (g)	<%10	4.9	<%10	3.5	<%10	8.2
Added sugar (E%)	Less than 10% of energy	-	Less than 10% of energy	-	Less than 10% of energy	-

** 1/5 of daily requirements for breakfast meal and 2/5 for lunch were taken. For the total, 3/5 of the daily requirement was taken, and snacks are not included in the calculations.*

and other organs need foods with high nutrient content to grow and develop (5). The richest sources concerning calcium intake with foods are mainly milk and dairy products. Thus, it is significant to include milk and dairy products in the menus of this age group every day concerning especially calcium, and also protein and vitamin B2 intakes.

One of the major public health problems in Türkiye is iron-deficiency anemia. Each age group in Türkiye, especially 0-5 age group children, school-age children and adolescents, pregnant and lactating women, are important risk groups (15). It is determined that the amount of iron provided by the menus was 35.7% of the recommended values for catering services. In one study investigating the dietary intake of children aged 3-6 years, it was observed that their iron intake was met at 74-84% by catering services (16). Similarly, in a study conducted on children aged 2-5 years, mean daily iron intake was 10 mg (8). Inadequate consumption of iron may cause iron-deficiency anemia, as well as major health problems ranging from weakness, exhaustion, and immune system disorders. Dietary iron sources are red meat and products, chicken, enriched grain products, dark green leafy vegetables, and dried fruits (5). Although plant-based foods are shown as a source of iron, their bioavailability in the body is lower than animal-based foods, and low consumption of animal-based foods may cause iron deficiency (5). Therefore, it is important to provide an adequate amount of animal foods in the diet of children for the prevention of iron deficiency.

High sodium intake mainly acts on blood pressure and forms the basis of cardiovascular problems and kidney diseases in adulthood. Reducing sodium intake

Table 4. Average (±SD) of the amount of nutrients adequacy of breakfast, lunch and snacks according to regions

Energy and Nutrients	Recommended*	Adequacy of Mediterranean (n: 21)		East-Southeast (n: 24)		Aegean (n: 24)		Central Anatolia (n: 27)		Black Sea (n: 33)		Marmara (n: 18)		Total (n: 147)	
		Value	%	Value	%	Value	%	Value	%	Value	%	Value	%	Value	%
Energy (kcal)	720	793.3±317.4^{a}	110.2	833.5±269.7^{a,c}	115.8	899.4±271.1^{b,d}	124.9	850.9±261.1^{c}	118.2	908.0±308.2^{b}	126.1	962.0±323.9^{d}	133.6	874.5±336.8	121.4
Protein (g)	7.74-10.9	24.2±10.5^{a}	222.0	27.2±11.9^{b}	249.5	28.5±12.1^{b}	261.5	27.9±11.2^{b}	255.9	28.8±12.2^{b}	264.2	28.9±13.0^{b}	265.1	27.6±13.8	253.2
Fat (g)	-	32.7±14.0^{a}	-	36.3±16.1^{b,d}	-	39.4±17.8^{c,e}	-	36.1±16.1^{b}	-	39.1±17.9^{d}	-	43.8±20.2^{e}	-	37.9±19.7	-
Saturated fat (g)	As little as possible	12.9±6.3^{a}	-	14.4±7.8^{a,c}	-	15.8±8.2^{b,d}	-	14.5±7.9^{a}	-	15.2±8.4^{c,b}	-	18.1±9.8^{d}	-	15.4±9.3	-
Carbohydrate (g)	78	98.6±52.7^{a}	126.4	92.7±37.4^{a}	118.8	105.9±37.5^{b}	135.8	101.8±38.1^{a}	130.5	108.2±43.8^{b}	138.7	111.0±44.9^{b}	142.3	103.9±48.6	133.2
Fiber (g)	8.4	8.1±5.4^{a}	96.4	7.7±3.9^{b}	91.7	8.6±4.5^{a}	102.4	8.1±4.6^{c}	96.4	8.5±4.6^{a}	101.2	8.9±4.4^{a}	105.9	8.8±5.2	104.8
Calcium(mg)	480	306.1±180.2^{a,b}	63.7	315.7±250.4^{b}	65.6	339.9±243.9^{c,d}	70.6	324.5±258.7^{a,b}	67.5	373.2±280.7^{d}	77.7	348.0±269.7^{c,b}	72.5	334.6±289.0	69.6
Iron (mg)	4.2	4.2±2.6^{a}	100.0	4.4±2.1^{a}	104.8	4.7±2.2^{b}	111.9	4.5±2.0^{a}	107.1	4.6±2.1^{a,b}	109.5	4.7±2.2^{a}	111.9	4.5±2.5	107.1
Folic acid (mcg)	84	118.9±49.6^{a,c}	141.5	117.5±54.1^{a}	139.3	137.3±62.7^{b}	163.1	131.7±61.1^{a,c}	155.9	135.1±66.7^{c,b}	160.7	136.3±61.4^{a,c}	161.9	129.5±68.3	153.6
Zinc (mg)	3.3	3.4±2.2^{a}	103.0	3.4±1.6^{b,c}	103.0	3.9±1.7^{c}	118.2	3.8±1.5^{a,b}	115.1	3.9±1.7^{b,c}	118.2	3.9±1.6^{b,c}	118.2	3.8±1.9	115.1
Vitamin A (mcg)	180	540.9±655.9^{a,b}	300.0	458.7±451.2^{a}	254.4	500.7±473.3^{b}	277.8	492.2±484.8^{a}	273.3	506.2±546.0^{a}	281.1	541.0±561.5^{b}	300.5	506.6±604.0	281.1
Vitamin C (mg)	18	39.6±34.0^{a}	216.6	35.0±39.5^{b}	194.4	41.0±45.4^{a}	227.7	35.2±39.3^{b}	194.4	39.9±51.1^{c,b}	216.6	43.9±47.3^{d,a,c}	238.8	39.3±49.5	216.6
Sodium (mg)	600-720	669.6±298.6	101.5	667.8±350.3	101.2	759.3±383.5	115.0	735.8±372.8	111.5	795.9±415.6	120.6	781.0±563.9	118.3	734.9±455.8	111.3
Added sugar (g)		16.3±19.7	8.2	14.3±17.6	6.8	14.2±17.9	6.3	13.8±18.2	6.5	15.7±20.4	6.9	18.0±22.8	7.5	15.4±22.8	7.0

** In the study, 2 main meals and 1 snack were examined and 3/5 of the daily requirements were taken.*

^{a,b,c,d,e} Different letters in the same line indicate the difference between groups. Since Bonferroni correction was applied, the significance level was taken into account as p <0.008 (0.05 / 6 = 0.0083

to the average by 42 mmol results in a 3.23 mmHg decrease in systolic blood pressure (17). It is stated that limiting salt intake to 5 g per day is an effective threshold value in preventing cardiovascular diseases (18). In this study, it is seen that sodium intake is normal in the distribution of the menus according to the meals. However, the amount of salt added to the menus was not calculated in this study. The amount of sodium indicated is the amount that comes from food. In fact, the most important source of sodium is salt. Therefore, controlling the amount of salt added to the food is of great importance. There are studies stating that salt intake is very high in school and kindergartens' menus (14,19). As in Türkiye the daily salt consumption per person is between 10.2 (15) - 15 grams (SALTURK) (20), especially in preschool and school age children, reducing the amount of salt in the standard recipes will be an important practice in reducing intake for this age group. In Türkiye, which is an upper-middle income country, cardiovascular risk is high and hypertension is prevalent. Unfortunately, the daily salt intake was found 14.8±5.4 g and the main source of salt intake was from bread (34%), followed by salt added during food preparation (30%) and salt intake from processed foods (21%) (20). Currently, the Republic of Türkiye Ministry of Health has announced the second term of the action plan covering the years 2017–2021. It is very clear that reducing the use of salt in food preparation via standard recipes is crucial to reduce the intake (21). This aim was also supported by the Salt Reduction Guide published by the Republic of Türkiye Ministry of Health. In this guide, salt reduction studies in bread, pastrami, red pepper, tomato paste, olives and cheese in Türkiye are explained and the food sector is encouraged to reduce salt in more products (22).

Another issue that is as important as meeting the nutritional needs of kindergarten children is the balanced intake of nutrients. In Türkiye, according to Türkiye Dietary Guidelines (5), for preschool children, 45-60% of daily energy intake should come from carbohydrates, 5-20% from proteins and 20-35% from fats. In a study conducted in three schools in Türkiye, the energy ratios from the fat (36.3%, 36.4%, 45.85%) presented in the menus were above the TUBER reference ranges and the energy levels from carbohydrates in the menus were below the desired range (40.2%) in one school (3). According to TBSA 2010 data, girls between the ages of 2 and 5 in Türkiye receive an average of 1190 kcal per day, and boys receive 1253 kcal per day. Girls get 51.4% of their energy and boys get 50.3% from carbohydrates. The rate of energy coming from protein is 13.0% in boys and 12.9% in girls. In the 2-5 age group, the rate of energy coming from fat is 36.6% in boys and 35.8% in girls (23). In a meta-analysis study in Poland, the energy intake of 2095 children in the preschool period was 47% higher than the recommended level and their carbohydrate intake was 24% above the recommended level (24). In this study, it is seen that the protein amounts of the menus are quite high. On the other hand, an important component of a balanced diet is the amount of fat consumed at meals. When the fat percentage of the menus is examined in the study, it is seen that it is over 30% in all meals. However, as the type of fat consumed, it is seen that the saturated fat is below the 10% limit (25). Since dietitians/nutritionists receive professional training in planning adequate and balanced menus for the protection of health and continuity of development specific to each age group, it is necessary to get support from a dietitian/nutritionist in the preparation of kindergarten menus with the desired balanced pattern (11).

One of the important nutritional problems in childhood is the consumption of added sugar and excess sugar consumption starts from early and kindergarten age (26,27). Considering this study, this may be the reason why the consumption of added sugar in meals and total is lower than 10% of the energy as suggested. However, most studies have shown high consumption of sweets and sugars in children of this age group (1,28). According to TBSA 2010 data, products such as jam are given to children at 9.1 months, honey at 10.1 months, chocolate and wafers at 11.7 months of age. It is stated that products such as chocolate and wafers are mostly consumed by children in

the Mediterranean Region and east of the Marmara Region (23). In a study where 778 kindergartens menus were examined, the findings showed that the sucrose content of the menus constituted 7-11.3% of the energy (29). In a study examining the 10-day menu average of 706 nursery students, 25.9-61.8% of the students included sugary compotes in their diets (30). Added sugar consumption is known to be related to many chronic diseases, especially cardiovascular diseases, obesity and diabetes (31). In addition, high sugar consumption has been associated with an increased blood pressure in both children and adults. At this point, it has been shown that reducing fructose, which is one of the most important sources of added sugar, can improve blood pressure by lowering uric acid (32). Another disease in which the effects of the relationship between uric acid and fructose are seen is diabetes. Fructose is metabolized in the liver and there is an increase in uric acid level at this time. An increase in the amount of uric acid is associated with increased oxidative stress, insulin resistance and inflammatory processes of liver cells. As a result, the risk of diabetes and fatty liver disease increases (33).

Türkiye is composed of seven zones with different dietary habits. Especially the climate and the variety of vegetables and fruits grown affect the eating habits of that region. Traditions, customs, habits, economic resources, food and cooking methods of the regions form the basis of these differences. Differences in food preferences seen locally in these regions are also reflected in the kindergarten and school menus. Southeastern Anatolia Region is a region known for its meat dishes and pitas. The intense use of spices in these dishes draws attention. The general dietary habits in the Mediterranean Region are based on cereals, olive oil, vegetables and fruits, seafood and dairy products. The food culture of the Aegean region is generally focused on olive oil dishes and fish and fruit consumption (34). In a study conducted across Türkiye, there is more fruit and vegetable consumption in the Mediterranean and the Aegean region (15). Fish, corn, meals made from corn flour, black cabbage, fresh and dried beans, potatoes, rice are the most consumed foods in the Black Sea Region. While intensive grain consumption is observed in the Central Anatolia Region, a rather mixed diet is observed in the Marmara Region (34). In the evaluation of the menus in this study according to the regions, this situation can be seen as the reason why the ratio of vitamin C, fiber and folic acid, which is the most important source of fruits and vegetables, are higher than other regions. The lowest meat consumption was seen in the Mediterranean Region, where the Mediterranean type of diet is most common. In this case, due to the current nutritional culture, the level of meeting the protein needs of the menus was the lowest in the Mediterranean Region.

Study Limitations

It is thought that this study is important for evaluating the current situation of the menus applied in kindergartens in Türkiye. Similar studies should be repeated at certain periods and the progress of the current situation should be followed. It is also thought that it would be beneficial to conduct such studies in parallel with the current nutritional status studies in the country. One of the limitations of the study is that it was conducted only on kindergartens that private and public their menus on the internet. At this point, changes may have been made at the last moment in the menus published on the internet. Another limitation is that the study is conducted according to geographical region distinctions. Nomenclature of Territorial Units for Statistics (NUTS) could also be used to examine the differences. The fact that the study was conducted only for the autumn semester can be cited as one of its limitations. In addition, the amount of salt added to the meals is not included in the calculation in the evaluation of the menus. Therefore, the salt and sodium contents of the menus could not be determined effectively. However, the most important limitation of this study is that it has not been compared with the examples in the world. In future studies, the current situation of Türkiye should be revealed by making comparisons with the kindergartens' menus in the world.

It is important to meet the requirements in evaluating menu competencies. However, it should be evaluated that menus offered above requirements may also have negative effects. In Türkiye, it is envisaged to prepare a guide to make school menus healthier in the fight against obesity within Healthy Nutrition and Active Life Action Plan. In October 2020, the National Menu Planning and Implementation Guide for Institutional Food Service (Mass Consumption Locations) was published (7). The menu planning guide defines the menu requirements separately for many groups, including this age group of children. It is thought that this study is very useful to determine the suitability of the menus within the limitations specified in the guide. In addition, conducting similar further studies will be beneficial for the applicability and effectiveness of the guideline.

Author contributions ▪ Yazarlık katkısı: *Study design: BA, SB; Data collection: BA; Data analysis: BA, SB; Draft preparation: BA, SB; Critical review for content: BA, SB; Final approval of the version to be published: BA, SB. ▪ Çalışmanın tasarımı: BA, SB; Çalışma verilerinin elde edilmesi: BA; Verilerin analiz edilmesi: BA, SB; Makale taslağının oluşturulması: BA, SB; İçerik için eleştirel gözden geçirme: BA, SB; Yayınlanacak versiyonun son onayı: BA, SB.*

Ethics approval ▪ Etik Kurul Onayı: *This study was not conducted on humans, but was a study conducted on menu lists. For this reason, ethics committee or ethical commission approval was not received for the article. ▪ Bu çalışma insanlar üzerinde yapılmamış olup menü listeleri üzerinde yürütülen bir çalışmadır. Bu nedenle makalede etik kurul veya etik komisyon onayı alınmamıştır.*

Conflict of interest ▪ Çıkar çatışması: *The authors declare that they have no conflict of interest. ▪ Yazarlar çıkar çatışması olmadığını beyan ederler.*

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