

Food Diversity and Compliance of Menus with Nutritional Recommendations of Kindergartens in Istanbul

İstanbul'da Bulunan Anaokulu Menülerinin Beslenme Önerilerine Uygunluğu ve Yemek Çeşitliliği

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ABSTRACT

This descriptive research was carried out in randomly selected 210 kindergartens in 7 districts sides of Istanbul. The study aimed to examine the characteristics of preschool menus and compare them to the nutritional requirements of children.

Meals served in breakfast, lunch, and snacks were determined in portions and nutritional and energy content is calculated. The nutrient content of the menus was compared to Dietary Guidelines for Turkey to meet the daily requirements.

21.4% of the kindergartens that provided food reported that dietitians planned the menu. The mean percentages of meeting the daily energy recommendations for breakfast, lunch, and afternoon meals were 26.18%, 29.54%, and 6.48% respectively. Of those kindergarten menus were most convenient for consumption (94.3%); they provided a variety in terms of consistency (85.2%) and pattern variety (68.1%). The dietary fiber content of the menus was insufficient compared to the daily recommendations. The menus offer sweetened fruit juices, and salads were less served than recommendations. Kindergarten menus should contain more whole grains and vegetables to provide requirements for dietary fiber.

Keywords: Foodservice, Kindergarten menus, Menu planning, Nutritional needs, Preschool children.

ÖZ

Tanımlayıcı türde olan bu araştırma, İstanbul'un 7 ilçesinde rastgele seçilen 210 anaokulunda yürütülmüştür. Çalışma, okul öncesi menülerin özelliklerini incelemeyi ve çocukların beslenme gereksinimleriyle karşılaştırmayı amaçlamıştır.

Kahvaltı, öğle yemeği ve ara öğünlerde verilen öğünlerin porsiyonları belirlenerek enerji ve besin ögesi içerikleri hesaplanmıştır. Menülerin besin içeriklerinin, günlük gereksinimlerinin karşılama durumu Türkiye Beslenme Rehberi' ile karşılaştırılmıştır.

Anaokullarının %21,4'ünde menünün diyetisyenler tarafından planlandığı görülmüştür. Kahvaltı, öğle yemeği ve ikinci öğünleri menülerinin günlük enerji tavsiyelerini karşılama yüzdelerinin ortalamaları sırasıyla %26,18, %29,54 ve %6,48'dir. Anaokulu menülerinin; %94,3'ü tüketim açısından ve %85,2'si kıvam açısından uygun olup, %68,1'i örüntü açısından çeşitlilik sağlamıştır. Menülerin posa içeriği günlük önerileri karşılamada yetersiz olduğu saptanmıştır. Menüler, yüksek sıklıkta ilave şeker içeren hazır meyve suları ve düşük sıklıkta salata içermektedir. Anaokulu menüleri, diyet lifi ihtiyacını karşılamak için daha fazla tam tahıl ve sebze içermelidir.

Anahtar kelimeler: Anaokulu menüleri, Beslenme ihtiyaçları, Menü planlama, Okul öncesi çocuklar, Yemek servisi.

The Ethics Committee approved the study of the Institute of Health Sciences, Marmara University (protocol number-266, dated 04.12.2017) and Istanbul Provincial Directorate of National Education

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INTRODUCTION

Healthy, adequate, and balanced nutrition is substantially essential due to the lifelong maintenance of nutritional habits and meeting their dietary requirements for rapid growth and development.¹ During the pre-school period from infancy to childhood, children transition from consuming single foods to consuming various foods. Health problems such as anemia, malnutrition, tooth decay, constipation, and obesity may occur in children who don't eat a balanced diet resulting in impaired growth and development.² Excessive or inadequate supply of nutrients in the diets of preschool children may cause permanent changes in metabolic pathways and increase the risk of diet-related diseases in adulthood.³

Kindergartens are preschool educational approaches where children aged 2-5 spend an average of 5 hours a day and support their

physical, mental, social, and emotional development and nutrition.^{4, 5} Due to the rapid growth of the child's physical, cognitive, and motor functions, it is recommended that the menus meet one-third of the nutritional needs.^{1, 6} In these respects, the contents of the kindergarten menus are of great importance in developing healthy eating habits and meeting their needs. In kindergarten, children's daily food consumption remarkably impacts public health nutritional status.⁷ However, studies have shown that the menus offered in kindergartens are not always following requirements and standards.⁸⁻¹² The study aimed to evaluate the energy and nutritional value of the menus offered in kindergartens on Istanbul's side and determine their compliance with the guidelines.

MATERIALS AND METHOD

Overview and Study Setting

This descriptive research was conducted in kindergartens from 7 randomly selected districts sides of Istanbul between November 2017 and May 2018.

The Ethics Committee approved the study of the Institute of Health Sciences, Marmara University (protocol number-266, dated 04.12.2017) and Istanbul Provincial Directorate of National Education.

Submitting the necessary permits to the responsible staff in kindergartens participating in the research; information was given about the study, and consents were obtained. Considering the list of the kindergartens in the National Education Directorates of the districts randomly selected 346 kindergartens from 577 kindergartens were interviewed based on the principle of homogeneity according to the districts. Due to the lack of regular food menus cooked or transported in the institution (n=10), not wanting to share the menus (n=15), not finding a suitable time for

an interview (n=38), absence of an authorized person in the institution (n=27), not given consent from the food company (n=5), safety precautions (n=2), and non-volunteerism (n=39), the study was conducted with 210 kindergartens. Of those 210 kindergartens in this study, 38 kindergartens that offer breakfast meals open buffet, four schools that offer open buffet lunch, and three kindergartens that offer an open buffet for afternoon snacks were excluded while calculating the percentages of meeting the daily nutritional recommendations of the menus however other questionnaires used in this study were applied.

Data Collection and Evaluation

Foodservice director and the kitchen staff were surveyed using the face-to-face interview method; the weekly delivery frequency of the foods in the menus was inquired in detail by obtaining information about the staff, kitchen, eating hall, and menus. While determining the frequency of feeding, all food and drinks given at meals,

including breakfast, lunch, and afternoon were considered. Detailed information about the ingredients of the food and beverages was obtained; their quantities were determined and recorded. The food atlas has been used to standardize the serving sizes of the food and beverages served in the menus for breakfast, lunch, and afternoon meals.¹³ The energy and nutrients contained in the determined servings were calculated with the Nutrition Information System (BeBis 7.2) program. To determine children's daily energy and nutrient requirements to meet the proportions in this age group, a meal of energy and nutrient content was compared with the Dietary Guidelines for Turkey recommendation. The frequency of the foods given at meals, the variety of foods, the foods recommended to increase, and decrease was examined, and the suitability of the menus according to the national guidelines National Menu Planning and Implementation Guidelines for Foodservice Systems, 2020; Nutrition Recommendations and Menu Programs for Preschool and School Children,

2013; Turkey Dietary Guidelines, 2015 was evaluated.

In questioning the foods and food groups that are recommended to be increased or decreased, the items in the Menu Quality Index (MQI) and the Menu Planning Booklet in Child Care Centers are used.^{14, 15}

Statistical Evaluation of Data

Statistical evaluation of the data was made using the SPSS (IBM SPSS Statistics Version 16.0) statistical package program. The data obtained were expressed as number (n) and percentage (%); arithmetic means (\bar{x}), standard deviation (\pm SD), lower and upper values were found.

Limitations of the study

In this study, the requirements of the food groups were evaluated based on the frequency of the dishes on the menus. Evaluation of the requirements in terms of food groups and portions will constitute a more comprehensive study.

RESULTS AND DISCUSSION

Of the 210 kindergartens conducted, 84.3% cooked the meals in the school kitchen, and 15.7% were delivered with a commissary food service. Evaluating the person in charge of food service at schools, it was found that 58% had a cook, 18% had service staff, 16% had an assistant cook, and 8% had a cleaning staff. Most of the kindergartens (82.4%) offered three meals. Evaluating food service, 94.3% of the schools served breakfast, 93.8% served lunch, and 86.7% served afternoon snacks. Just over 21.4% of the kindergarten menus were reported as planned by a dietitian, while 29.5% by the school principal and deputy principal, 16.7% by a chef, 14.0% by

business owner-business manager, and 5.2% by food engineers.

The macro and micronutrient contents of the foods and beverages in the breakfast, lunch, and afternoon snack menus and the percentages of meeting Turkey Dietary Guidelines recommendations for this age group are given in Table 1. The averages of the percentages of meeting the daily energy recommendations of the menus for breakfast, lunch, and afternoon meals were respectively 26.18 \pm 9.93; 29.54 \pm 42.77; 16.48 \pm 22.84. The average percentage of the daily protein recommendations of breakfast menus was between 56.33 \pm 41.29 - 83.36 \pm 56.92.

Table 1. Percentage of Menus Meeting Daily Nutritional Recommendations

Energy and nutrients	Recommendation*	Breakfast	Lunch	Afternoon snack
		$\bar{x}\pm SD$	$\bar{x}\pm SD$	$\bar{x}\pm SD$
Energy (kcal)	1500	26.18±9.93	29.54±42.77	16.48±22.84
Protein value, min (g/day)	17.4	83.36±56.92	96.62±24.31	30.19±31.99
Protein value, max (g/day)	24.8	56.33±41.29	146.86±319.70	47.26±112.51
n-3 fatty acid	0.9	39.83±23.20	42.13±41.88	24.95±40.69
n-6 fatty acid	10.0	23.65±13.56	51.99±22.66	22.44±45.52
Fiber (g)	25.0	8.58±6.09	21.37±6.39	7.81±8.21
Vitamin A (mcg)	400.0	78.25±58.09	73.89±40.28	21.83±21.21
Vitamin E (mg)	7.0	36.00±31.53	81.76±31.70	31.69±58.76
Vitamin C (mg)	60.0	13.54±11.76	36.64±70.16	21.03±56.95
Thiamine (mg)	0.6	23.65±13.01	28.50±11.50	14.35±20.15
Riboflavin (mg)	05	76.42±29.94	53.25±44.97	25.18±29.85
Niacin (mg)	8.0	18.60±20.19	38.36±1952	11.44±17.82
Vitamin B6 (mg)	0.6	31.09±15.10	48.08±13.36	20.86±42.67
Folate (mcg)	200.0	24.88±10.33	27.91±8.09	9.89±6.54
Vitamin B12 (mcg)	1.2	113.80±49.17	78.21±36.36	21.90±28.04
Pantothenic Acid (mg)	3.0	32.18±15.45	31.52±8.75	13.12±17.51
Calcium (mg)	800.0	35.58±14.21	20.02±5.44	9.87±10.92
Phosphorus (mg)	500.0	56.41±22.15	47.99±27.47	21.06±25.03
Iron (mg)	10.0	15.04±6.37	26.38±7.77	38.64±385.00
Zinc (mg)	5.0	36.72±14.46	51.78±46.75	14.28±19.05
Magnesium (mg)	130.0	32.12±14.63	50.75±14.47	18.24±27.71
Manganese (mg)	1.50	29.53±21.25	54.37±16.42	19.85±27.62
Copper (mcg)	440.0	0.05±0.02	0.07±0.02	0.03±0.07

* Dietary Guidelines for Turkey (2015) data
 $\bar{x}\pm SD$: mean plus minus standard deviation

Table 2 shows the weekly frequencies of foods served at a breakfast meal in kindergartens. The cheese was served every day in 69.8% of the kindergartens, olive was served 65.3% of the kindergartens, and milk was served two or 2-3 times per week in 53.5% of the kindergartens. Spreadable chocolate was served at certain frequencies

in almost half of the kindergartens (46.7%). Hardly any kindergarten menus (96.4%) did not offer processed meat products such as salami/sausage, 92.9% did not offer cake cookies, 92.4% did not offer dried nuts, and 91% of them did not offer sweetened cornflakes at all.

Table 2. Frequency of Drinks and Foods Served at Breakfast

Foods	6+ times per week		2-3 times per week		Once per week		1-3 times per month		Once per month		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
Milk	64	32.0	107	53.5	21	10.5	1	0.5	1	0.5	6	2.9
Herbal tea	7	3.5	99	49.7	27	13.6	5	2.5	1	0.5	60	30.2
Fruit juice	0	0	22	11.1	20	10.1	7	3.5	1	0.5	149	74.9
Ayran	0	0	2	1.0	6	3.0	2	1.0	2	1.0	187	94
Cheese	139	69.8	47	23.6	6	3.0	2	1.0	5	2.5	5	2.5
Olive	130	65.3	49	24.6	10	5.0	2	1.0	1	0.5	7	3.5

Table 2. (Continued)

Foods	6+ times per week		2-3 times per week		Once per week		1-3 times per month		Once per month		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
Jam-honey	54	27.1	65	32.7	41	20.6	15	7.5	7	3.5	17	8.5
Butter	30	15.1	32	16.1	27	13.6	14	7.0	12	6.0	84	42.2
Tahini-grape syrup	21	10.0	28	13.3	60	28.6	23	11.0	17	8.1	61	29.0
Tomato-cucumber	15	7.1	21	10.3	13	6.4	6	3.0	3	1.5	145	71.4
Boiled egg	12	6.0	81	40.7	77	38.7	11	5.5	3	1.5	15	7.5
Omelet	7	3.5	43	21.7	84	42.4	24	12.1	8	4.0	32	16.2
Fruit (Fresh-dried)	7	3.4	11	5.4	11	5.4	3	1.5	3	1.5	168	82.8
Flour products	4	2.0	36	18.1	47	23.6	32	16.1	15	7.5	65	32.7
Spreadable chocolate	3	1.5	10	5.0	40	20.1	16	8.0	24	12.1	106	53.3
Toast	2	1.0	3	1.5	43	21.6	36	18.1	26	13.1	89	44.7
Halva	2	1.0	2	1.0	18	8.9	7	3.4	7	3.4	167	82.3
Soup	2	1.0	1	0.5	11	5.6	4	2.0	0	0	179	90.9
Spreadable cheese	2	1.0	4	2.0	8	4.1	6	3.0	11	5.2	166	84.3
Nuts	0	0	6	3.0	5	2.5	3	1.5	1	0.5	182	92.4
Sweetened cornflakes	0	0	1	0.5	4	2.0	5	2.5	8	4.0	181	91.0
Potatoe	0	0	0	0	13	6.4	14	6.9	15	7.4	161	79.3
Cake-cookie	0	0	0	0	3	1.5	1	0.5	10	5.1	183	92.9
Salami- sausage-fermented meat	0	0	0	0	1	0.5	2	1.0	4	2.0	190	96.4

n: number %: percentage

The soup was served every day in about half of the kindergartens (48.2%) at lunch. While rice (85.3%), pasta (63.5%), yogurt (49.7%) was most frequently served 2-3 times per week, meatballs were found to be the most frequently served food once per week. While fruit is given every day in 8.1%

of the kindergartens, salad is served 2-3 days a week in 29.4% and once per week in 29.9% of the schools. Hamburgers (92.3%) and French fries (91.9%) were not offered in the menus of most kindergartens at lunch (Table 3).

Table 3. The Frequency of Meals Served at Lunch

Meal groups	Meals	≥6 times per week		2-3 times per week		Once per week		1-3 times per month		Once per month		Never	
		n	%	n	%	n	%	n	%	n	%	n	%
1 st group meals	Vegetable dish with meat	3	1.5	49	24.9	79	40.1	24	12.2	15	7.6	27	13.7
	Small piece of meat dish	2	1.0	23	11.7	52	26.4	20	10.2	12	6.1	88	44.7
	Legumes with meat	2	1.0	20	10.2	82	41.6	34	17.3	16	8.1	43	21.8
	Meat Ravioli	1	0.5	0	0	4	2.0	17	8.7	39	19.9	134	68.4
	Meatball	0	0	24	12.2	117	59.4	33	16.8	10	5.1	13	6.6
	Chicken meal	0	0	9	4.6	79	40.1	50	25.4	13	6.6	46	23.4
	A large piece of meat dish	0	0	5	2.5	11	5.6	11	5.6	14	7.1	156	79.2
	Stuffed vegetables with ground meat	0	0	2	1.0	15	7.6	39	19.8	39	19.8	102	51.8
	Pizza	0	0	0	0	1	0	0	0	25	12.8	166	84.7
	Hamburger	0	0	0	0	0	0	3	1.0	13	6.6	181	92.4
2 nd group meals	Sandwich	0	0	0	0	0	0	1	0.5	1	0.5	195	99.0
	Soup	95	48.2	76	38.6	18	9.1	3	1.5	0	0	5	2.5
	Rice	4	2.0	168	85.3	19	9.6	2	1.0	1	0.5	3	1.5
	Pasta	4	2.0	125	63.5	57	28.9	5	2.5	2	1.0	4	2.0
	Vegetable dish without meat	3	1.5	30	15.2	78	39.6	15	7.6	14	7.1	57	28.9
	Baked flaky pastry	1	0.5	3	1.5	38	19.3	66	33.5	41	20.8	48	24.4
	Fried flaky pastry	1	0.5	0	0	5	2.5	5	2.5	9	4.6	177	89.8
Stuffed vegetables	1	0.5	3	1.5	11	5.6	20	10.2	31	15.7	131	66.5	
Toast	0	0	0	0	0	0	3	1.6	2	1	190	97.4	

Table 3. (Continued)

Meal groups	Meals	≥6 times per week		2-3 times per week		Once per week		1-3 times per month		Once per month		Never	
		n	%	n	%	n	%	n	%	n	%	n	%
3rd group meals	Yogurt	24	12.2	98	49.7	53	26.9	13	6.6	1	0.5	8	4.1
	Salad	16	8.1	58	29.4	59	29.9	22	11.2	9	4.6	33	16.8
	Fruit	16	8.1	36	18.3	37	18.8	8	4.1	9	4.6	91	46.2
	Compote	3	1.5	24	12.2	39	19.8	25	12.7	17	8.6	89	42.4
	Pickle	1	0.5	1	0.5	16	8.1	14	7.1	14	7.1	151	76.6
	Fruit juice	0	0	1	0.5	0	0	5	1.5	7	3.6	180	91.8
	Ayran	0	0	64	32.5	79	40.1	30	15.2	7	3.6	17	8.6
	Milky dessert	0	0	17	8.6	15	7.6	23	11.7	13	6.6	129	65.5
	Sweetened pasty	0	0	3	1.5	9	4.6	18	9.1	16	8.1	151	76.6
	Biscuit cake	0	0	0	0	0	0	2	1.0	0	0	195	99.0

n: number %: percentage

The fruit was the most frequently served snack every day in 13% of the kindergartens and 2-3 times per week in 35.7%. Milk and dairy products were served every day in 4.3% of the kindergartens, 2-3 times per week in 27%, and once per week in 18.9%. Herbal tea was the second most frequently

served drink in the afternoon snack; it was served 2-3 times per week in 32.4% of the kindergartens. Milky desserts (42.2%), cake (61.6%), cookies (55.1%) were served once per week in the kindergartens. Chocolate bread was not served in 94.5% of the kindergartens at all (Table 4).

Table 4. The Frequency of Meals at Afternoon Snack

Foods	≥6 times per week		2-3 times per week		Once per week		1-3 times per month		Once per month		Never	
	n	%	n	%	n	%	n	%	n	%	n	%
Fruit	24	13.0	66	35.7	50	27.0	12	6.5	4	2.2	29	15.7
Herbal tea	10	5.4	60	32.4	28	15.1	8	4.3	1	0.5	78	42.2
Milk and dairy products	8	4.3	50	27.0	35	18.9	15	8.1	10	5.4	67	36.2
Nuts	5	2.7	21	11.4	39	21.1	22	11.9	7	3.8	91	49.2
Dried fruits	4	2.2	17	9.2	33	17.8	13	7.0	4	2.2	114	61.6
Flour products	1	0.6	21	11.6	56	30.9	19	10.5	9	5.0	75	41.4
Cookies	1	0.5	15	8.1	102	55.1	29	15.7	18	9.7	20	10.8
Salty crackers	1	0.5	4	2.2	18	9.7	19	10.3	7	3.8	136	73.5
Tomato-cucumber	1	0.5	4	2.2	3	1.6	4	2.2	4	2.2	169	9.14
Cake	0	0	33	17.8	114	61.6	23	12.4	7	3.8	8	4.3
Fruit juice	0	0	18	9.7	25	13.5	11	5.9	9	4.9	122	65.9
Milky dessert	0	0	11	5.9	78	42.2	39	21.1	17	9.2	40	21.7
Mosaic cake	0	0	0	0	5	3.3	12	7.8	19	12.4	117	76.5
Soup	0	0	0	0	4	2.2	1	0.6	0	0	176	97.2
Bread with chocolate	0	0	0	0	1	0.6	4	2.2	5	2.8	171	94.5
Popcorn	0	0	0	0	1	0.6	3	1.7	5	2.8	172	95.0
Halva with semolina	0	0	0	0	0	0	4	2.2	15	8.3	162	89.5
Lentil patties	0	0	0	0	0	0	4	2.2	5	2.8	172	95.0
Toast	0	0	0	0	0	0	2	1.1	6	3.3	173	95.6
Pasta salad	0	0	0	0	0	0	1	0.6	10	5.5	170	93.9

n: number %: percentage

The evaluation of menus according to recommendations is shown in Table 5. Of those kindergarten menus were most convenient for consumption (94.3%); they provided a variety in terms of consistency

(85.2%) and pattern variety (68.1%). Fruit juice was served in 40.2% of the kindergartens, 29.2% sugary drinks, and 27.3% French fries.

Table 5. Evaluation of Menus According to Recommendations

Characteristics of the menu	Provide		Not-provide	
	n	%	n	%
Variety in terms of color	165	78.6	45	21.4
Variety in terms of consistency	179	85.2	31	14.8
Harmony of taste	170	81.0	40	19.0
Pattern variety	143	68.1	67	31.9
Convenient for consumption	198	94.3	12	5.7

Foods	Offered		Not offered	
	n	%	n	%
Flavored milk*	2	1	207	99
Sweetened drinks*	61	29.2	148	70.8
Fruit juice (>once per week)*	84	40.2	125	59.8
Sweets*	35	16.7	174	83.3
French fries*	57	27.3	152	72.7
Sweetened cornflake*	42	20.1	167	79.9
Processed meat products (>once per week)*	37	17.7	172	82.3
Fried grain products high in solid fats and added sugars (>once per week)*	156	74.6	53	25.4
Vegetables (>3 per week)*	159	76.1	50	23.9
Dark leafy vegetables*	141	67.5	68	32.5
Red or orange vegetables (> 2 per week)*	96	45.9	113	54.1
Fish at least once per week **	34	16.3	175	83.7

n: number %: percentage

*Igoe B, 2012 Accessed: 2022

** Haldimand-Norfolk Health Unit. Menu Planning in Child Care Centres (2014) Accessed: 2022

This study examines the menus in 210 kindergartens in Istanbul, Turkey. Menus were evaluated according to adherence to guidelines for variable frequency, providing daily requirements, food groups, and limiting restricted foods of the food supplied in kindergartens. Some of the menus were determined inadequate.

Menus for preschool children should be based on age-appropriate healthy eating principles, food groups, and diet models.^{2, 16} A study about preschool teachers' views on preparing menus in Turkey stated that administrators, cooks, teachers prepared the menus of preschools and parents, and the knowledge of most teachers about nutrition is

limited.¹⁷ In a study conducted by Romaine et al. (2007) in 101 licensed childcare centers, it was reported that menu planners were center staff (80%), cooks (37%), nutritionists (34%), parents (20%) and directors (3%).¹⁸ In a study in Poland, only 17 (6.3%) of 270 examined preschools were dietitians employed.¹⁹ This study states that dietitians are involved in menu planning in 21.4% of kindergartens. This study stated that menus in kindergarten were planned mainly through non-specialists similar to the other studies.^{18, 19} Due to their growth and development, children are at a higher risk than other age groups. Therefore, menu planning for preschool children should be

done by a dietitian according to age-appropriate healthy nutrition principles, as they need to eat a variety of quality meals in sufficient quantities to meet their nutritional needs.¹ Ministry of Health's Nutrition Recommendations and Menu Planning Guideline for Preschool Children recommends dietitians plan menus in institutes providing food services.¹

Preschool menu planning should include various food groups such as milk, grains, vegetables, and fruits. Matić and Jureša (2015) reported that the serving of dairy products was overrepresented while eggs were underrepresented compared to the prescribed standards.²⁰ Another study evaluating four public kindergarten menus' in Istanbul/Turkey reported insufficient amounts of milk group. Similar to Matić and Jureša (2015)'s study, this study found that milk groups presented adequate milk and egg servings that met the daily requirements. Akyüz and Sezgin (2021) determined insufficient fruit and vegetables in kindergarten menus in their study.⁹ In a study conducted on the menus offered in public pre-schools in Spain, with a population of 420 children aged 2-6 years old, the supply of vegetables was adequate, with a daily presence of salad and vegetables.²¹ Our study have similar results with Akyüz and Sezgin's study, salad and vegetable dish were not sufficient (71.4% kindergartens did not serve salad and most of them serve the vegetable dish once a week). Some kindergartens in our study demonstrated less frequency servings when evaluating the monthly frequency of serving vegetable dishes according national guideline.² It was thought that this might be that the menus were prepared by considering children's likes and dislikes. Considering that vegetables are not preschool children's favorite foods, vegetables should be used in different shapes (such as chopped, grated, cubed and julien) and recipes to increase their vegetable intake and provide an easier way to eat.²

It is known that foods rich in polyunsaturated fatty acids (especially omega-3 fatty acids) in the diet are beneficial

to the neural and behavioral development of children aged 2-5 years.² It is offered to serve fish without bones twice per month (as weekly in winter) for this age group.² In a study conducted in Bosnia and Herzegovina, evaluating the samples of a kindergarten menu over 20 consecutive days, fish was not served in any kindergarten.²² In contrast, Seiquer et al. (2016) reported adequate servings of fish.²¹ In this study, the frequency of fish servings did not meet recommendations, with only 16.3% of the kindergartens providing at least one serving of fish over a month. Considering the difficulties in eating fish for this age group, fish dishes should be offered as baked fish fillets without bones, fish soup, fish meatballs, pasta with fish, fish sandwiches, or fish burgers.

Adequate energy and nutrient intake are vital for age-appropriate growth progression.²³ Myszkowska-Ryciak and Harton (2018) stated that the content of energy, protein, and fat generally exceeded 70% of Dietary Reference Intakes (DRI) in 92% of the kindergartens' in their study.¹⁹ In another study evaluating four public kindergartens' menus in the Uskudar district of Istanbul, it is stated that kindergarten menus met over 60% of the daily energy requirements.⁹ The total energy provided from breakfast, lunch, and afternoon snacks met 72.1% of the daily requirement similar to the other studies.^{9, 19} Whereas the percentage of meeting the daily requirement of protein was within the range of 175.7% to 210.1% in this study.

Providing the foods that meet the preschool children's nutritional requirements, such as vitamin C and minerals, calcium, iron, is crucial for their growth and development.² A study assessing diet quality in the kindergarten nutrition environment of Hong Kong children aged 2.5- 5 reported that the mean intakes of calcium and iron were significantly lower than the reference nutrient intake or adequate intake.²⁴ Myszkowska-Rybak and Horton (2018) determined that the calcium content of the menu was too low in 99% of the kindergartens. Yılmaz and

Karaağaoğlu (2017) showed that menus' vitamin C and iron content were inadequate in all three kindergartens compared to Dietary Guidelines for Turkey (2015) in their study.¹⁰ Frampton et al. (2014) compared with one-third of the DRIs, statewide menus were statistically inadequate in iron and calcium.²⁶ In this study, iron and vitamin C supply were adequate compared to the previous studies.^{10, 24, 26} But this calcium supply was below 70% of the recommendations in this study.

Dietary fiber reduces the risk of many health problems such as obesity, hyperlipidemia, and constipation. The recommended dietary fiber is 10-14 g/day for 2-5 age-year-old children.² Previous studies evaluating kindergarten' menus reported inadequate fiber supply.^{10, 18, 26, 27} Dietary fiber was lower than two-thirds of Dietary Guidelines for Turkey recommendations in this study similar to the other studies.^{10, 18, 26, 27} Failure to meet the dietary fiber supply may be due to the lack of recommended frequency of whole grains and vegetable servings.

Canned juices, carbonated drinks, sugar-sweetened iced teas, drink mixes are not recommended to serve in the kindergarten menus.² A study evaluating the nutritional quality of foods and beverages on 142 child-care center menus in Mexico determined that amounts of high-energy drinks, including full-fat milk, fruit juice, and sweetened drinks, were served.²⁸ In another study examining beverages in preschools in Poland among the 720 preschools, cocoa and milk coffee substitute were served in 86% of preschools added sugar to tea/cocoa/coffee substitute drinks, and 74% to compote.¹¹ In this study, flavored milk was served in 1% of the kindergartens; sweetened drinks were served in 29.2%. The ratio of the kindergartens who serve fruit juice more than one day per week (40.2%) was lower than the previous study.¹¹ However, the frequency of serving herbal tea (32.4%) was higher. Sugar, biscuits, chocolate, potato chips, cola drinks and sweets are foods giving high energy and

also related with tooth decay. Offering these foods which are children's favorite is a wrong behavior that can result in overeating and obesity. It should be noted that the nutrition of preschool children completely depends on others and which food to offered to them.²⁵ Fruit juices and other drinks with low nutritional value/high sugar content should not be offered to children.

In the menus for preschool children, processed foods high in saturated fat added sugar/salt are more likely to induce satiety and cause tooth decay; thus, their serving should not be offered to children.² Copeland et al. conducted a study on the nutritional quality of meals and snacks in child care determined that despite efforts to improve children's diets, meals and snacks still lack whole fruits and nonstarchy vegetables and contain added sugars and fats.²⁹ In this study, most of the kindergartens did not serve sugar (83.3%) and sweetened cereal (79.9%); however, chocolate spread was served in different frequencies in about half of the kindergartens (46.7%). Copeland et al. (2013) reported the ratio of child care centers that serve fried or pre-fried potatoes 1-2 times per week was 39%, while the percentage of child care centers that serve high-fat meats (sausage, bacon, hot dogs, bologna, ground beef) 1-2 times per week was 80%. In this study, the ratio of kindergartens who serve french fries (27.3%) was lower than previous study.²⁹ Salami, sausage, and sausage were not served in almost any of the kindergartens on the contrary to the previous study.²⁹ For snacks, fruits are recommended to serve instead of cookies, cakes, and pastry foods.² In Copeland et al. (2013) reported cookies, donuts, muffins, etc. were not served 80% of the child care centers at all while in our study, more than half of the kindergartens served cakes and cookies once a week for snacks, and the pastry was served 2-3 times a week in 18.1% of the kindergartens. When serving these foods, food that does not contain high amounts of fat and sugar should be offered.²

CONCLUSION AND RECOMMENDATIONS

In conclusion, vegetable servings of the kindergarten menus are imbalanced. It has been observed that the menus are insufficient in dietary fiber supply to meet the recommendations. Sweetened food/drinks and fried foods offered to children in kindergartens are alarming. Overall, our

results revealed menu planning needs optimizing. Our study emphasizes the importance of menu planning by daily recommendations for children in kindergartens. Accordingly, dietitians should be included in managing the food service in kindergartens.

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