

Assessment of Actual Food Consumption by Children in Preschool Educational Organisations with Five Meals a Day

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Abstract The study of the structure and quality of nutrition especially of children's organism, is an actual problem of preventive medicine. This article characterizes the actual consumption by preschool children of the assortment and quantity of food products depending on the season of the year. Materials and methods of research. The study was conducted in preschool educational institutions with 12-hour stay of children and 5 meals a day, located in Tashkent city. Eighty menu-sheets for children aged 3 to 6 years were studied. The analysis of average daily food sets of rations of preschool children of 3-6 years old according to the data of menu-sheets for 1 year showed that out of 24 food items included in the food set in different seasons of the year, only 19-20 items were actually consumed by children; cereals, pasta and eggs were consumed 1.5 times more frequently; there was a deficit of bread, vegetable oil, milk, sugar, potatoes, vegetables, confectionery and sausages, fruit, berries and juices; fish, dried fruit, starch, cocoa, cottage cheese, sour cream and cheese were practically absent from the diet. This suggests a stable monotonous diet in the surveyed preschool educational institutions.

Keywords Actual nutrition, Set of foodstuffs, Menu-sheets, Nutrition norms, Preschool children, Preschool educational institutions

1. Introduction

Many scientific studies in the field of nutrition of preschool children reveal a number of problems in the nutrition of the entire child population. While in preschool educational institutions (PEI), a child receives the main part of the daily diet in these institutions (at least 70%) [1,25,26, 28,33,36]. Therefore, the food sets recommended for PEI should provide children with the basic nutrients and energy. The basis for the organization of nutrition in PEI was a menu-sheets, compiled in compliance with the norms of attachment of recommended for children average daily food sets, which include the main groups of products (bread, bakery and pasta; butter and vegetable oils; meat, meat products and poultry; eggs; fish and fish products; vegetables and fruits; milk and dairy products; cereals and legumes; sugar and confectionery).

In consequence of the monotonous structure of the food set, there is a violation of the balance of nutritional substances, the level of macro- and microelements consumption does not correspond to physiological norms,

insufficient intake of vitamins. At the same time, there is an excessive content of saturated fatty acids and refined carbohydrates [2,4-9,11-14,16,21,24,29,30,34,35,37,39-42]. Other authors argue that a rationed food set allows to preserve the nutritional and energy value of consumed food due to the optimal construction of diets [10,15,17,19,22,31, 38].

Children's daily ration in PEI depends not only on their age but also on the time of their stay. There are PEI in Tashkent city with different lengths of stay of preschool children (3-4 hours, 9-10.5 hours, 12 and 24 hours) and different dietary regimes (1, 3, 4 or 5 meals a day).

Purpose of the research: to assess the actual consumption by preschool children of the range and quantity of food products depending on the season of the year.

2. Materials and Methods

The study was conducted at the bases of PEI with 12-hour stay of children and 5 meals a day, located in Tashkent city. The object of the study were 80 menu-sheets (40 for winter-spring and 40 for summer-autumn periods of the year) for children aged 3 to 6 years. Average daily actual food consumption was calculated based on weekly ration registration (for five weekdays, excluding Saturdays and Sundays).

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Menu-sheets were analyzed based on the permission of the City Department of Public Education and written informed voluntary consent of the heads of PEI.

The obtained data were subjected to statistical processing using Excel-2016 program.

3. Results and Discussion

A survey of the menu-sheets of the surveyed EPI showed that only 19-20 food products were used in the average daily food set out of 24 recommended items, regardless of the season of the year.

The results of the assessment of the menu-sheets for the winter-spring period of the year showed that fish, dried fruits, starch and cocoa were absent in the children's diet (table 1).

The average daily physiological norms for pasta and cereals (by 40.9%) and eggs (by 40%) were found to be 1.4 times higher than the average daily physiological norms in the winter-spring period of the year. There was also a

1.2-fold excess of the daily norm of wheat flour (by 20.4%).

At the same time, children were under-receiving such foodstuffs as milk (by 1.5 times or 34.4%) and wheat bread (by 1.6 times or 36.2%), sugar (1.7 times or by 42.7%), vegetable oil (1.8 times or by 44%)s potatoes (2.2 times or by 54.4%), vegetables (2.4 times or by 57.8%) were observed to be 1.7-2.4 times less in the set of foods in compared to the recommended norm. Cottage cheese and sour cream in the average daily diet contained 3 times less than the norm (on average by 66.7%), and cheese - 41.7 times less, which was lower than the recommended norm by 97.6%. Compared to the daily norms, children received 3.1 times less confectionery and sausages (by 67.7% on average) and 5.4 times less fruit, berries and juices (by 81.4%).

Sample analysis of menu-sheets for the summer-autumn season of the year of 5 meals in EPI with 5 meals showed that 5 food items or 20.8% (cottage cheese, sour cream, dried fruits, cocoa and potato flour) were missing from the recommended set (table 2).

Table 1. Actual food consumption by preschoolers in winter-spring period of the year, g/day

№	Foodstuffs	Physiological standard	Actual food consumption	Difference	
				g	%
1	Wheat bread, 1 grade	170	108.4	-61.6	36.2
2	Wheat flour, 1 grade	25	30.1	+5.1	20.4
3	Potato flour	3	0	-3	100
4	Pasta, cereals, incl.	45	63.4	+18.4	40.9
	- mung bean	2	2.3	+0.3	15.0
5	Sugar	60	34.4	-25.6	42.7
6	Confectionery products	15	4.9	-10.1	67.3
7	Butter	35	37.7	+2.7	7.7
8	Vegetable oil	15	8.4	-6.6	44.0
9	Milk	600	393.5	-206.5	34.4
10	Sour cream	25	8.3	-16.7	66.8
11	Cottage cheese	50	16.7	-33.3	66.6
12	Cheese	25	0.6	-24.4	97.6
13	Meat and poultry	160	154	-6	3.8
14	Sausages	10	3.2	-6.8	68.0
15	Fish	40	0	-40	100
16	Egg	0.5	0.7	+0.2	40.0
17	Potatoes	250	114	-136	54.4
18	Various vegetables, including tomato paste	300	126.5	-173.5	57.8
19	Fruits, berries and juices	350	65.2	-284.8	81.4
20	Dried fruits	15	0	-15	100
	- rosehip	5	0	-5	100
21	Brewed tea	0.3	0.3	0	0
22	Cocoa powder	1	0	-1	100
23	Iodised salt	8	7.9	-0.1	1.3
24	Yeast	1	1	0	0

Table 2. Actual food consumption by preschoolers in summer-autumn period of the year, g/day

№ n/n	Foodstuffs	Physiological standard	Actual food consumption	Difference	
				g	g
1	Wheat bread, 1 grade	170	150.9	-19.1	11.2
2	Wheat flour, 1 grade	25	13.7	-11.3	45.2
3	Potato flour	3	0	-3	100
4	Pasta, cereals, incl.	45	70	+25	55.6
	- mung bean	2	2.4	+0.4	20.0
5	Sugar	60	44	-16	26.7
6	Confectionery products	15	7	-8	53.3
7	Butter	35	38.4	+3.4	9.7
8	Vegetable oil	15	14	-1	6.7
9	Milk	600	445.1	-154.9	25.8
10	Sour cream	25	0	-25	100
11	Cottage cheese	50	0	-50	100
12	Cheese	25	2	-23	92.0
13	Meat and poultry	160	144.8	-15.2	9.5
14	Sausages	10	2.9	-7.1	71.0
15	Fish	40	3	-37	92.5
16	Egg	0.5	0.8	+0.3	60.0
17	Potatoes	250	163.3	-86.7	34.7
18	Various vegetables, including tomato paste	300	193.4	-106.6	35.5
19	Fruits, berries and juices	350	80.1	-269.9	77.1
20	Dried fruits	15	0	-15	100
	- rosehip	5	0	-5	100
21	Brewed tea	0.3	0.3	0	0
22	Cocoa powder	1	0	-1	100
23	Iodised salt	8	8	0	0
24	Yeast	1	1	0	0

In the daily diet of children in the summer-autumn season, among the main groups of recommended products, cereals, pasta and eggs were often given out, exceeding them on average 1.6 times or by 57.8%.

In the summer-autumn season, there was a 1.1-1.4-times decrease in the recommended norms for children's consumption of wheat bread (by 11.2%), milk (by 25.8%) and sugar (by 26.7%). Also below the norms were such products as potatoes (1.5 times or by 34.7%) and other vegetables (1.6 times or by 35.5%), wheat flour (1.8 times or by 45.2%), confectionery and sausages (on average by 2.8 times or by 62.2%). In the summer and autumn period of the year, the availability of fruits, berries and juices (4.4 times), cheese (12.5 times) and fish (13.3 times) in children's diets was significantly lower than the recommended norms (by 77.1, 92.0 and 92.5%, respectively).

Children in PEI with 5 meals a year had an average food supply of 87.5% (21 out of 24 food items were given to children). During the year, dried fruits, cocoa and potato flour (starch) were not included in the diet of surveyed children. Kefir and yoghurt were sometimes additionally included in the set of foodstuffs provided.

Studying an average annual set of foodstuffs intended for children in PEIs with 5 meals showed that, compared to the recommended norms, such foodstuffs as cereals, pasta and eggs were on average 1.5 times higher (by 49.1%) in children's diets. The content of other recommended products was lower than the norm: wheat flour (1.1 times or by 12.4%), wheat bread (1.3 times or by 23.7%), vegetable oil (1.3 times or by 25.3%), milk (1.4 times or by 30.1%), sugar (1.5 times or by 34.7%), potatoes (1.8 times or by 44.5%), vegetables (1.9 times or by 46.7%), confectionery (2.5 times or by 60.3%), sausages (3.3 times or by 69.5%), fruits, berries and juices (4.8 times or by 79.2%), cottage cheese and sour cream (6 times or by 83.3%), cheese (19.2 times or by 94.8%) and fish (26.7 times or by 96.3%).

According to the results of studies by some authors, from the food set including 24 items, preschool children, as well as in our case, consume cereals and pasta products 1.5 times above the norm, 5-6 times - sugar and sugar-containing confectionery products, but they do not receive fish and fish products, milk and dairy products, eggs, vegetables and fruits [3,18,20,23,27].

4. Conclusions

1. The surveyed ECE centres revealed the absence of differences in the number of products included in the set of food in different seasons of the year (19-20 items out of 24) and fish, dried fruits, starch, cocoa, cottage cheese, sour cream and cheese were practically absent in the menus. This is the reason for the stable monotonous ration and lack of opportunity to introduce additional dishes.
2. In the winter-spring period of the year, the average daily physiological norms for children's consumption of pasta, cereals and eggs (by 40%) and wheat flour (by 20%) were exceeded, whereas in the summer-autumn period, the excess of these products averaged 58%.
3. Compared to the recommended norms, there was a 4.5-fold decrease in children's consumption of the main food groups. Moreover, a more significant decrease was detected in the winter-spring season of the year, compared to the summer-autumn period, when children under consumed milk (by 34.4 vs. 25.8%), bread (by 36.2 vs. 11.2%), sugar (by 42.7 vs. 26.7%), vegetable oil (by 44.0 vs. 6.7%), potatoes and other vegetables (by 56.2 vs. 35.1%), confectionery (by 67.5 vs. 53.3%), sausages and sausage products (by 68.0 vs. 71%). fruits, berries and juices (by 81.4 vs. 77.1%).
4. The study of average daily food sets of rations of preschool children of 3-6 years old according to the data of menu-sheets for 1 year showed non-compliance with the recommended level: 1.5 times excess of cereals, pasta and eggs; deficit of bread, vegetable oil, milk, sugar, potatoes, vegetables, confectionery and sausage products, fruits, berries and juices; cottage cheese, sour cream, cheese and fish were practically absent in the diet.

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