HEALTHY LIFESTYLE. PREVENTION

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REGIONAL FEATURES OF NUTRITION OF CHILDREN OF MIDDLE SCHOOL AGE

The aim of the study was to study the nutritional habits of secondary school students living in the territory of the Republic of Bashkortostan. Analysis of the actual nutrition of the child population is an urgent task, since the preservation of the health and development of the child determines the health of the nation in the future. The paper examined the actual nutrition of children on school and weekend days. The survey involved students of grades 5-9, from 16 educational institutions of the city of Salavat (Republic of Bashkortostan), aged 11-16 years. By the method of daily reproduction of the diet, the intake of macro- and micronutrients with food was studied. To assess the chemical composition of the diets, the results were compared with the norms of physiological needs (NPN) for children and adolescents.

It was revealed that the nutrition of the respondents meets the standards for energy value, protein and fat intake. The amount of carbohydrates ingested with food is reduced relative to NPN by 28%, but the proportion of intake of mono- and disaccharides exceeds the norm. An increased consumption of added salt by 1.8 times was found. The daily diet of schoolchildren is adequately provided with vitamins. The content of calcium is deficient (68% of the norm), the intake of sodium is almost 5 times excessive. The analysis of the diet revealed a reduced share of the calorie content of breakfast and lunch both on school days and on weekends.

The main violations in the nutrition of middle school children are expressed in the increased consumption of SFA, simple carbohydrates and added salt. Combined with a calcium deficiency and an excess of sodium, this imbalance, in the future, can cause the risk of developing nutritional diseases.

Keywords: food; assessment of actual nutrition; macro - and micronutrients; middle school age.

Introduction. The organization of a balanced and rational nutrition of children and adolescents is an important social factor that allows maintaining health, harmonious growth, psychomotor development and high performance of schoolchildren in the learning process [3,4,10].

At the age of 12-17 years there is an intensive anatomical and physiological development; change in height (pubertal jump) and weight; secondary sexual characteristics appear; there are difficulties in the functioning of the body. All this leads to a rapid change in the physical health of a teenager, his moods and emotions [1,2,6]. Intensive growth and a high metabolic rate require a constant supply of the required amount of macro- and micronutrients with food. Studies conducted in recent years indicate a deficiency in the intake of calcium, iron, polyunsaturated fatty acids, fiber, vitamins A, C, B2 with food [5,11]. An imbalance of nutrients in the future may become a trigger for the development of chronic non-communicable diseases [14].

An important role in maintaining and strengthening the health of schoolchildren is played by the regimen and hygiene of food. Deterioration in the structure of nutrition of schoolchildren in educational institutions, combined with irrational and malnutrition at home, in the future may lead to the risk of developing alimentary-dependent diseases [12, 18].

The purpose of the work: to study the actual nutrition of schoolchildren, students in grades 5-9, living in the Republic of Bashkortostan, to assess and identify risk factors for the development of health disorders.

Materials and methods. The work studied the actual nutrition of children on a school day and a day off. Students in grades 5-9 were surveyed from 16 educational institutions in the city of Salavat (which is the largest industrial center of the Republic of Bashkortostan) aged 11-16 years. After the survey and the sampling, the questionnaires were divided into groups according to the days of filling: a day off and a school day. 159 questionnaires for the weekend and 166 questionnaires for the school day were available for analysis.

To determine the amount of actually consumed products and dishes, the method of 24-hour nutrition reproduction was used [15].The intake of macro- and micronutrients with food was compared with the norms that are presented in sanitary rules and regulations 2.3 / 2.4.3590-20 [13] and guidelines 2.3.1.0253-21 [8], and the added salt - with the value recommended by WHO [19].

The questionnaires were processed using the Nutri-prof computer program (developers: Federal Research Center for Nutrition and Biotechnology together with Samara State Medical University). The basis of the program is a reference book on the chemical composition of Russian food products and dishes prepared from them [17].

Statistical data processing was carried out in Microsoft Excel 2016 and SPSS Statistics 21 programs. Descriptive statistics methods were used to analyze the obtained data. For each indicator, mean values (M), standard deviation SD (M±SD), median (Me) were calculated.

Results and discussion. The use of the Nutri-prof software package allows, based on the questionnaire data entered into the database, to obtain a detailed picture of the respondent's daily diet and establish the types of foods consumed, their energy value, and the nutrient content in the diet in quantitative (in grams) and in percentage terms. In addition, the

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program allows you to analyze the energy distribution of meals during the day.

Table 1 presents the average values and medians of the energy value and chemical composition of the diet.

The disadvantage of the 24-hour playback method is that the actual supply of energy, food and biologically active substances in it is underestimated by 20%. Therefore, the optimal level of nutrient intake is when their content is more than 80% of the physiological requirement [6].

Based on the data obtained, it can be seen that the median values of the daily intake of calories, proteins and fats on a school day and a day off for the majority of respondents did not significantly deviate from the NPN. Violation of the principles of rational nutrition was revealed in the increased consumption of saturated fatty acids (13% of the caloric content of the daily diet, with a consumption rate of not more than 10%). Excessive intake of SFA leads to an increase in cholesterol levels, the likelihood of developing type 2 diabetes, obesity, diseases of the cardiovascular and digestive systems [7, 16].

A decrease in the intake of carbohydrates with food was also revealed, by 28% relative to the recommended value, while the intake of simple carbohydrates (mono- and disaccharides) with food exceeds the norm by 2 times. The analysis of the structure of food packages of respondents showed that sugar consumption on a school day is 55.1±28.1 g/day, on a day off - 51.1±29.3 g/day (with the recommended amount of 35 g/day) [9].

An assessment of the intake of dietary fibers involved in the processes of digestion, assimilation, microbiocinosis and excretion of food residues from the body showed their sufficient intake with the diet (24 g/day on a school day and 22 g/day on a day off). Thus, fruit consumption is 161.1±118.7 g/day on a school day and 101.6±70.8 g/day on a day off, which is 87% and 54.9%, respectively, of the recommended value. Bread consumption is 55.0% of the recommended amount.

Added salt intake is 1.8 times higher than recommended by the World Health Organization (9 g at a rate of 5 g/day).

Table 1

Daily consumption of energy and nutrients by school-age children in the city of Salavat in comparison with the norms of physiological needs

Indicators (per day)	NPN in energy and nutrients	The actual diet of the studied group of children aged 11-16 years					
		School day			Day off		
		M±SD	Me	% NPN	M±SD	Me	% NPN
Energy and macronutrients							
Energy value (kcal)**	2720	2383±703	2287	84	2354±734	2312	85
Proteins. g**	90	92±39	83	92	85±30	81	88
Proteins. % of kcal*	12-15	15±4	14	104	15±3	14	93
Fats. g**	92	96±35	93	101	101±41	93	101
Fats. % of kcal*	25-35	36±6	36	120	38±7	38	109
Percentage of saturated fatty acids % of kcal*	< 10	13±3	13	-	14±3	13	-
Cholesterol. mg*	< 300	273±140	255	-	305±179	258	-
Carbohydrates. g**	383	286±91	274	72	276±91	275	72
Carbohydrates % of kcal*	55-60	48±8	49	85	47±8	48	80
The proportion of simple carbohydrates. % of kcal	< 10	21±6	21	-	21±6	20	-
Added sugar. % of kcal*	< 10	10.3±5.2	9.9	-	9.8±5.4	9.9	-
Dietary fiber. g*	20	31±18	24	120	24±12	22	110
Added salt. g***	5	10±4	9	180	9±3	9	180
Vitamins							
Vitamin A. mcg ret. eq**	900	866±541	734	82	800±350	768	85
Vitamin B_1. mg**	1.4	1.3±0.5	1.2	86	1.2±0.5	1.1	79
Vitamin B_2. mg**	1.6	2.1±1.5	1.6	100	1.8±0.9	1.6	100
Vitamin C. mg**	70	106±77	84	120	99±55	87	124
Vitamin PP. mg**	18-20	22±15	17	85	19±11	17	85
Minerals							
Calcium. mg**	1200	1117±742	888	74	920±407	829	69
Magnesium. mg**	300	377±146	362	121	446±297	352	117
Phosphorus. mg**	1200	1847±1187	1461	122	1591±728	1429	119
Kalium. mg**	1200	3699±1973	3182	265	3793±1833	3381	282
Natrium. mg*	1000	4820±1583	4656	466	4627±1385	4634	463
Ferrum. mg*	18	16±7	15	83	16±6	15	83

Note: * - NPN according to guidelines 2.3.1.0253-21; ** - NPN according to sanitary rules and regulations 2.3/2.4.3590-20; *** - NPN according to WHO recommendations

Table 2

Daily diet of children from the city of Salavat

Product group	school day			day off		
	M	SD	Me	M	SD	Me
Dairy products, g	376.8	253.2	350.0	379.2	276.3	330.0
Fruits, berries, fruit and berry drinks, g	261.2	192.6	230.0	299.7	208.8	280.0
Porridge, cereals, pasta, g	196.0	160.0	180.0	147.9	141.2	150.0
Bread, bakery products, pastries, g	185.2	121.3	155.0	187.5	137.4	155.0
Meat, meat products, ready meat dishes, g	184.6	134.9	170.0	192.5	134.2	180.0
Vegetables, vegetable dishes, g	94.5	95.4	100.0	100.4	94.1	100.0
Potatoes, potato dishes, g	70.5	95.5	0.0	74.5	97.7	0.0
Egg products, g	19.7	50.1	0.0	29.9	57.3	0.0
Fish, seafood, ready-to-eat fish dishes, g	15.3	41.6	0.0	25.6	54.6	0.0
Candies, chocolate, jams, g	10.9	27.5	0.0	10.6	21.8	0.0
Fats and oils, g	2.8	4.6	0.0	2.4	6.1	0.0
Nuts, legumes, g	1.5	11.1	0.0	3.2	15.0	0.0
Tea, coffee, soft drinks, g	519.4	337.1	500.0	484.9	292.8	450.0

This leads to excessive consumption of processed meat products and snacks.

Analysis of the average daily intake of vitamins (A, C, B1, B2 and PP) with food corresponds to the optimal level for children aged 11-16 years. According to the results of the survey, it was found that 52.5% of the respondents take additional vitamins and microelements.

An analysis of the intake of minerals in the body revealed a calcium deficiency (68% of the norm) and an excess intake of sodium (4.7 times). The ratio of Ca:Mg and Ca:P is broken. The level of phosphorus exceeds the content of calcium by more than 1.6 times. Taken together, such an imbalance of macronutrients can lead to pathological changes in the functioning of the cardiovascular system and the risk of developing arterial hypertension.

Table 2 reflects the results of the quantitative consumption of various food products by school-age children (presented by reduction in consumption).

Most of all, in quantitative terms, dairy products are in the diet of the respondents. Despite the fact that dairy products are consumed the most, this amount is 1.5 times lower than the norm (the norm is 562 g/day). This explains the existing calcium deficiency (see Table 1).

he consumption of vegetable dishes and potato dishes does not exceed 100 grams per day. The consumption of fish, seafood, eggs and nuts is sporadic, as indicated by the median value (0 g).

Qualitatively important in rational nutrition is not only the quality and quantity of food taken, but also its distribution throughout the day. Table 3 shows the contribution of individual meals to the daily caloric intake of children in the city of Salavat.

When evaluating the average values for schoolchildren in grades 5-9, it was noted that the share of breakfast calories in the diet was reduced both on the school day and on the day off (19.3% and 19.7% instead of 25%). The contribution of the second breakfast is 8.0% on the school day and 9.1% on the day off (the norm is 10-15%). At lunchtime, only 27.6% of food comes on a school day and 24.8% on a day off, with the recommendation for energy consumption of 35-40% of daily calories. The contribution of afternoon tea and dinner are optimally distributed and amount to 13% and 25%, respectively.

Conclusion. Today, the study and analysis of the actual nutrition of adolescents is an important task, as it reflects the current socio-economic situation in a particular region, taking into account all its features (traditions, climate).

Analysis of the nutrition of middle school children on weekdays and weekends in terms of caloric content, nutrient and food composition does not have significant differences.

The main violations of the principles of rational nutrition are expressed in the deficiency of carbohydrate intake with excessive consumption of simple carbohydrates, in the increased intake of saturated fatty acids and added salt. In combination with calcium deficiency and excess sodium, such disorders in the future can become risk factors for the development of alimentary-dependent diseases.

Violations in the structure of nutrition of schoolchildren are expressed in insufficient consumption of vegetables, potatoes, eggs and fish, with an excess in the diet of foods with a high sugar content.

An important strategy in reducing the prevalence of alimentary-dependent diseases and their prevention is the creation of a permanent information and propaganda system to explain to schoolchil-

Table 3

Contribution of individual meals to the daily caloric intake of urban children, % (Salavat)

meal	Contribution of meals to daily calorie intake, %	
	School day	Day off
Breakfast	19.3±9.3	19.7±8.3
Lunch	8.0±10.3	9.1±7.6
Dinner	27.6±10.0	24.8±10.4
Afternoon tea	12.8±11.0	13.4±9.2
Dinner	25.5±10.1	25.3±9.9
Late dinner	6.7±6.8	7.6±6.1

dren the basic principles of healthy nutrition, as well as improving the hygiene education of the younger generation, and promoting a healthy lifestyle in educational institutions.

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