



Hygienic Analysis of Micronutrients Consumption Degree in Daily Diet of the Pupils that Live in Rural Conditions of Fergana Valley

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ABSTRACT: The research involves 481 (61,3%) male and 303 (38,7%) female pupils in the hygienic assessment of daily consumption of micronutrients by the children and teenagers that live in rural areas of the Fergana region. The research assesses the conformity of the diet of pupils with the San NandR 0007-2020 requirements of “The average daily diet norms for providing a healthy diet for age, gender and professional groups of the population of the Republic of Uzbekistan”. During winter-spring and summer-autumn seasons, pupil’s consumption degree of bakery products tends to be 133,7-115,6%, their consumption of mung bean, phaseolus, and cicer of legume products is 2,3 times less in the winter-spring season and 2,1 times less in the summer-autumn season, and their consumption of rice and porridge is 56,6-43,3% in relation with the norm. Moreover, there are not enough fish, dairy, and meat products in their diet. However, sugar, confectionery, and margarine exceed the norm 1,7 times in the winter-spring season and 1,3 times in the summer-autumn season. In the consumption of micronutrients, retinol reaches 79,8-93,8% and 81,1-91,8%, tocopherol reaches 63,8-73,5%, and other vitamins also don’t conform with the physiologic norm and hypovitaminosis causes difficulties in pupils’ growth and development.

KEYWORDS: Daily Diet, Hygienic Analysis, Hypovitaminosis, Micronutrients, Pupils, Rural Conditions, Vitamins.

THE RELEVANCE OF THE ISSUE

Several scientists point out that the growth and development of children and teenagers, and the formation of their organs and systems are connected to the daily diet, diet behavior, and the quality and safety of products. Macronutrient and micronutrients of the daily food products actively participate in controlling the organism and metabolism processes [1,7,8]. They include protein, fat, carbohydrate, vitamin, and minerals [1,7,8]. Micronutrients include vitamins, vitamin-like, and mineral substances, among which vitamins are inseparable parts of the normal metabolic processes of the organism. Most vitamins enter the organism with food and cannot be synthesized in the organism [4]. Vitamins are important parts of an organism’s enzymatic systems that function as a catalyst and also have functions of controlling and giving a signal [5, 6]. Vitamins that are dissolved in water and oil have functions of controlling chromatin’s formation and transcriptional activity of genes, sending signals to cells and tissues [7]. Vitamins affect the growth and formation of malignant tumors by controlling growth, division of cells, and their decrease and increase in the diet as well as by damage to embryonic development, and formation of endocrine, nervous, immune, and other systems [9,10,11,12]. A decrease of micronutrients in the daily diet and less dynamic activity of the population cause a sharp increase in diseases. The above information shows that, currently, the assessment of the role and importance of vitamins in pupils’ daily diet is one of the most important issues.

THE RESEARCH OBJECTIVE

To carry out hygienic analysis of micronutrient provision state of pupils that live in rural conditions of Fergana valley.

THE RESEARCH MATERIAL AND METHODS

The research involves 481 (61,3%) male and 303 (38,7%) female pupils in the hygienic assessment of the daily diet of children and teenagers that live in rural areas of the Fergana region in Fergana valley during the winter-spring and summer-autumn seasons. The conformity of the daily diet of pupils with the San NandR 0007-2020 requirements of “The average daily diet norms for providing

a healthy diet for age, gender and professional groups of the population of the Republic of Uzbekistan” [2] was evaluated. The chemical composition of products in pupils’ daily ration was evaluated due to “The chemical composition of food products” [3].

The application package of the personal computer “Statistica for Windows 7,0” was used to statistically process the results of the research.

THE DISCUSSION OF THE RESULTS

Among micronutrients of food products in pupils’ daily diet, vitamins play an active role in transporting proteins and the genes from them, absorption of the iron in the organism, metabolism of fats and carbohydrates, and the synthesis of ferments as well as in the formation of a number of systems.

The research analyses the connection between pupils’ diet and consumed food products and vitamins contained in them during the season of the year.

The food consumption degree of pupils under observation during the winter-spring season is presented in table 1, whereas their food consumption degree during the summer-autumn season is presented in table 2.

Table 1. The provision degree of pupils’ consumed products in the winter-spring season

№	The product name	ph/n*	consumption degree	provision degree, %	l/m, %	l/m, g
1	Bakery products	275	367,75	+133,7	+33,7	+92,7
2	Diary products	550	280,5	51,0	-49,0	-269,5
3	Meat products	175	89	50,9	-49,1	-86
4	Fish products	80	25,5	31,9	-68,1	-54,5
5	Potato	250	153,5	61,4	-38,6	-96,5
6	Fruits	240	97,5	40,6	-59,3	-142,5
7	Vegetables	350	167	47,7	-52,2	-183
8	Egg, piece	1	0,75	75,0	-25,0	-0,25
9	Vegetable oils	15	14	93,3	-6,6	-1
10	Margarine	5	8,5	-170	+70	+3,5
11	Legumes	15	7	46,7	-53,3	-8
12	Porridge	15	8,5	56,7	-43,3	-6,5
13	Dried fruits	15	7	46,7	-53,3	-8
14	Sugar	30	39	+130,0	+30,0	+9
15	Confectionery	15	37,5	+250,0	+150,0	+22,5

*ph/n- physiological norm; l/m,%-ratio of less/or more in percentage; l/m,g-ratio of less/or more in grams

Table 2. The provision degree of pupils’ consumed products in the summer-autumn season

№	The product name	ph/n*	consumption degree	provision degree, %	l/m, %	l/m, g
1	Bakery products	275	318	115,6	+15,6	+43
2	Diary products	550	315	57,2	-42,7	-235
3	Meat products	175	73	41,71	-58,2	-102
4	Fish products	80	30	37,5	-62,5	-50
5	Potato	250	169	67,6	-32,4	-81
6	Fruits	240	138	57,5	-42,5	-102
7	Vegetables	350	218,0	62,2	-37,7	-132,0
8	Egg, piece	1	0,75	75	-25	-0,25



9	Vegetable oils	15,0	12,50	83,3	-16,6	-2,50
10	Margarine	5	7,3	146	+46	+2,3
11	Legumes	15	6,5	43,3	-56,6	-8,5
12	Porridge	15	6,5	43,3	-56,6	-8,5
13	Dried fruits	15	5	33,3	-66,6	-10
14	Sugar	30	34,5	+115,0	+15,0	+4,5
15	Confectionery	15	32	213,3	113,3	17

*ph/n- physiological norm; l/m,%-ratio of less/or more in percentage; l/m,g-ratio of less/or more in grams

The obtained information on the hygienic analysis of pupils' diet in winter-spring and summer-autumn seasons shows that the consumption degree of bakery products made of the grain products, flour, rice, pasta, high grade, and rye flour constitute 133,7-115,6%, exceeding the physiological norm from 15,6 to 33,7%.

The analysis aims to separately analyze cicer, Phaseolus, and mung bean among legume products and porridges, for legume products are distinguished based on their features and composition from other grain products by the richness of high and vegetable proteins.

The consumption degree of legume products in winter-spring and summer-autumn seasons in a daily diet is similarly provided for 2,3 and 2,1 times less. It negatively affects the provision of the organism with vegetable proteins and causes a shortage of microelements that enter the organism through them.

Porridge improves organism's gastrointestinal tract functioning and serves as a source of B group vitamins, its provision degree constituting 56,6-43,3%.

Proteins and fats contained in dairy products are absorbed easily into the organism. Calcium contained in them controls the body formation and the functioning of the musculoskeletal system whereas vitamins transport genes and function as a regulator. The provision degree of dairy products in the winter-spring season is 51,0% whereas it reaches 57,2% in the summer-autumn season. It is evident that their shortage in the daily diet constitutes from 49,0 to 43,8%.

As several references reveal, meat products' provision among different groups of population in the country's established institutions is 35%-45% less [7,8], it being 2,1-2,3 times less than the physiological norm.

Fish products provide irreplaceable amino acids to the growing organism. Their consumption is similarly 62,5-68,1% less.

The next group of determined products consists of potato, cabbage, cucumber, tomato, beet, carrot, pumpkin, eggplant, and other vegetables.

The consumption degree of potatoes similarly reaches 67,6-68,1%.

It is noteworthy that the analysis of vegetable consumption degree during the seasons of the year shows that they were consumed 1,6 times less in the winter-spring season, whereas their consumption for the summer-autumn season is 2,0 times less. It is evident that it causes the consumption decrease of vitamins that are obtained from vegetables.

Vitamins contained in fruits mainly serve as the source of vitamins that are dissolved in water.

The research shows the total consumption of fruits decreased by 1,7 times in summer and 2,5 times in autumn.

Among the main food products, eggs are the main source of proteins, phosphorus, calcium, selenium, zinc, and a number of vitamin groups like A, B, PP, D, E, and K. In addition, lutein and zeaxanthin antioxidants improve the eyesight.

Nowadays a number of researchers and experts of WHO pay high attention to the consumption degree of sugar, confectionery with a high degree of sugar, vegetable oils, and pickled products and their role in the ration.

In the daily diet of pupils under observation, the provision of sugar, confectionery, and vegetable oils account for 115-130%, 213,3-250%, and 83,3-93,3% respectively. Though there is a shortage in the provision of vegetable oils, the amount of margarine is very high, exceeding the physiological norm 1,7 times in the winter-spring season and 1,3 times in the summer-autumn season. The presented analysis reveals that pupils' diet does not conform to hygienic requirements.

The next phase of the research is aimed to evaluate vitamins contained in micronutrients in the diet. The analysis result of vitamins is presented in table 3.



Table 3. The provision degree of seasonally consumed vitamins of pupils

Vitamins	ph/n	Seasonal consumption degree			
		winter	spring	summer	autumn
Retinol	700	656,9±21,8	558,9±18,6**	568,2±19,1**	643,1±21,6^^&
Thiamine, mg	1,2	1,14±0,04	0,96±0,03**	0,93±0,03***	1,0±0,03*
Pyridoxine	1,6	1,4±0,05	1,4±0,05	1,2±0,04***^^	1,4±0,05&&
Cyanocobalamin, mcg	2,0	1,3±0,04	1,2±0,04	1,3±0,05	1,4±0,05^^
Calciferol, mcg	2,5	2,1±0,07	2,0±0,06	2,4±0,08***^^	2,3±0,07***^^
Tocopherol, mg	10	7,76±0,26	6,95±0,23*	5,91±0,19***^^	6,86±0,22*&&
Ascorbic acid	70	49,6±1,7	46,3±1,6	54,9±1,9^	51,4±1,8*&&

Note: *- differentiation is reliable in comparison to the winter consumption degree (*-P<0,05; **-P<0,01; ***-P<0,001). ^- differentiation is reliable in comparison to the spring consumption degree (^-P<0,05; ^^P<0,01; ^^P<0,001). &- differentiation is reliable in comparison to the spring consumption degree (&-P<0,05; &&-P<0,01; &&&-P<0,001)

The analysis of vitamin consumption reveals that the low amount of the main products in the diet causes hypovitaminosis, vitamins being less than the fixed norm.

Belonging to the vitamin group that is dissolved in water, retinol facilitates the improvement of pupils' eyesight, its daily consumption degree being 79,8-93,8% in the winter-spring season and 81,1-91,8% in the summer-autumn season.

B₁ or thiamine is mainly contained in grain products, walnuts, and rice, its daily consumption degree being 87,5% in the winter-spring season and 80,4% in the summer-autumn season.

In the comparison with the physiological norm, the amount of riboflavin B₂ in the daily diet was 1,1 times less in the winter-spring season and 1,2 times less in the summer-autumn season.

Pyridoxine (B₆) is contained in seafood, dairy products, eggs, legumes, nuts fruits, and mushrooms.

Its daily consumption degree in males amounts to 80,0% in summer and 86,6% in autumn, whereas in females, it is similarly 26,7% less in summer and 20,0% less in autumn.

Cyanocobalamin (B₁₂) amount in the daily diet constitutes 62,5% in the winter-spring season and 67,5% in the summer-autumn season. Taking into account that the main consumption products are fried, the decomposition of vitamins, spicy and salty products all lead to the diseases of the gastrointestinal tract and the development of anemia.

Vitamin K leads to the damage of coagulate ability of blood, the control of kidney functioning, and bone mineralization. The performed researches show that Filloxinone consumption is 1,1 times less in summer, 1,3 times less in autumn, 1,4 times less in winter, and 1,2 times less in spring.

The provision of Vitamin E similarly amounts to 63,8-73,5% in different seasons.

Folic acid (B₉) and biotin have almost the same sources. Their main sources are mung bean, Phaseolus, cicer, greens, green onion, beet, nut, banana, meat products being rich with them. They participate in blood formation and their shortage causes changes of the skin, slow hair growth, anemia, appetite disorder, and whitening of the tongue in children. Its daily consumption degree amounts to 48,2% in the winter-spring season and 50,4% in the summer-autumn season.

Ascorbic acid's consumption degree constitutes 79,9% in the winter-spring season and 88,5% in the summer-autumn season. The analysis of the results reveals that the shortage of ascorbic acid and Vitamin D mainly causes the decline of children's immune systems.

CONCLUSION

1. The diet behavior and norms of pupils that live in rural conditions in the Fergana region in Fergana valley were not complied with. Their consumption of bakery products in the winter-spring and summer-autumn seasons amounts to 133,7-115,6%, which is 15,6-33,7% more than the fixed physiological norm and does not conform with its requirements.

2. The consumption degree of legumes is 2,3 times less in winter-spring season and 2,1 times less in the summer-autumn season. The total consumption of rice and porridges is 43,4-56,7% less compared to the physiological norm.



3. In the daily diet of pupils under observation, sugar and confectionery amount to 115-130% and 213,3-250% respectively. Margarine has a very high consumption degree, being 1,7 times more in the winter-spring season and 1,3 times more in the summer-autumn season compared to the physiological norm.

4. The daily consumption of retinol constitutes 79,8-93,8% in the winter-spring season and 81,1-91,8% in the summer-autumn season, whereas tocopherol's provision degree similarly amounts to 63,8-73,5%.

5. Among the vitamins that get dissolved in water, thiamine amounts to 87,5% in the winter-spring season and 80,4% in the summer-autumn season, whereas pyridoxine's consumption degree constitutes 81,2%-87,5%, cyanocobalamin amounts to 62,5%-67,5% and ascorbic acid constitutes 79,9-88,5%.

6. All vitamins that are contained in micronutrients observed in the daily diet of pupils do not conform with the requirements of the physiological norm. This state of hypovitaminosis causes disorder in pupils' growth and development.

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