

# PHYSIOLOGICAL REQUIREMENTS AND THEIR FULLFILMENT FOR MACRO AND MICRONUTRIENS OF ACADEMIC LYCEUM AND HIGH SCHOOL STUDENTS IN SOUTHERN PART OF UZBEKISTAN

Umedova.Sh.N

Karshi State University Uzbekistan

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**Abstract.** *The article analyzes the content of macro- (proteins, fats, carbohydrates) and micronutrients (vitamins, minerals) in the daily diet of students of academic lyceums and high schools in Karshi and Termez on the basis of special tables. According to the results of the analysis, the proteins, fats and vitamins in almost all nutrients in the daily diet of students are significantly lower than the norm, and the amount of carbohydrates and minerals in most foods is higher than the norm.*

**Keywords:** *healthy eating, nutrition, macronutrient, micronutrient, plastic material, fast food, atherosclerosis.*

**Actuality of the topic:** According to the World Health Organization, in recent years, a number of shortcomings in the current diet of adolescents and their associated nutritional disorders are noted. Significant deficiency of macronutrients in the diet leads to alimentary dystrophy, while protein deficiency leads to kwashiorkor, marasmus, protein deficiency, protein energy deficiency, physical and mental weakness, low intake of micronutrients in diarrhea, rickets, hyperferritinemia, anemia, endemic, causing the development of epilepsy, Prasad's syndrome and other diseases.

In the prevention of these conditions, it is important to meet the physiological requirements of the body for nutrients in a normal and timely manner [6; 9; 10].

Research is being conducted into the fact that the increase in the number of various food diseases in the world is caused by unhealthy diet, mental and physical impairment, weight gain or loss of general intelligence, and a decrease in the body's ability to cope with stress.

In this regard, including in recent years, this situation is observed not only among adults but also among children and adolescents. [8; 9; 10].

In the context of Uzbekistan, the actual nutrition of students in urban and rural areas differs significantly due to a number of socio-economic and other factors, as well as local traditions [7; 8; 10].

Adolescents, unlike adults, are very sensitive to how much, how much, and when to consume basic and complementary foods, such as proteins, fats, carbohydrates, and vitamins and minerals. This is due to the fact that plant products in their diets are being replaced by high-quality flour, sausages, hot dogs and fast food products (hot-dog, hamburger, cheeseburger, lavash, donar, shawarma, etc.). This adversely affects the normal functioning of the digestive system, often leading to impaired intestinal motility and constipation.

Most adolescents develop digestive system disorders as a result of not following a diet during school. More or less of the mentioned basic and additional nutrients than the corresponding norm also has a negative impact on the normal growth and development of adolescents. [7; 8; 9].

It should be noted that the current diet of adolescents living in urban and rural areas differs in the following aspects:

1. The level of food security
2. Food stocks
3. Ecological conditions and local traditions.

All vital processes that take place in the body of the adolescent, regardless of the physiological needs for food in any situation, are normal [3; 5; 6; 7; 8; 9].

**Object and subject of research:** Observations were made in the winter and spring of 2019. In our research, we studied in secondary schools No. 5, 29 and 34 in Karshi, Kashkadarya region, and in the academic lyceum of Karshi State University and Karshi Institute of Engineering Economics, 8-14 secondary schools in Termez, Surkhandarya region, and the academic lyceum of Termez State University. Macro- (proteins, fats, carbohydrates) and micronutrients (vitamins and minerals) in the daily diet of students studying in the academic lyceums of the Termez branch of the Tashkent State Technical University named after Islam Karimov were studied.

The obtained results and their analysis The chemical composition of 18 types of local foods (6 types of fruits and melons and 12 types of food) that are most consumed in the areas where students live was studied using modern equipment.

The amount of macronutrients in the daily diet of students was calculated on the basis of special tables given the chemical composition of food [1,2,3].

It should be noted that the norms given in the table below were generalized during the former Soviet era and do not clearly indicate the composition and quantity of many national and local dishes. This, in turn, leads to some errors in the study of the current nutrition of different groups of the population.

With this in mind, the students studied the amount of essential nutrients in their daily diet, ie proteins, fats and carbohydrates, on the basis of special tables in the food department of the Sanitary Hygiene Laboratory of the Sanitary Epidemiological Surveillance and Public Health Service of Kashkadarya region. carbohydrates and water-soluble vitamins Academy of Sciences of Uzbekistan Academician O.S. In the laboratory of the Institute of Bioorganic Chemistry named after Sodikov, chromatographic analysis, and minerals at the Center for Advanced Technologies under the Ministry of Innovative Development, macro- and micronutrients were determined by plasma inductively coupled mass spectrometry [4].

In the process of analyzing the types of food items in the daily diet of students, the indicators of the amount of basic and additional nutrients determined in the above methods were compared with the values given in special tables.

Taking samples of food from the students' diets and examining them in the laboratory, it was found that the chemical composition of the food published in 1987 differed significantly from the data in the given special tables.

The following tables show the amount of essential nutrients recorded in the foods that students consume.

**Table 1**

**The amount of protein in the diet of students aged 17-18 in the spring (g)**

№	Name of food	Standard norm*	Result
1	Bread	8,7	9,3± 0,85
2	Egg	12,7	12,3±0,45

3	Manti	7,7	8,8± 0,85
4	Plov	13,9	11,7± 0,38
5	Somsa	8,9	7,8± 0,21
6	Patties	11,8	10,6± 0,25
7	Sweet Rice	6,1	4,9± 0,56
8	Soup made with rice and mung bean	13,1	11,7± 0,26
9	Buckwheat	10,8	7,1± 0,17
10	Pasta	7,7	2,1± 0,1
11	Dumpling	9,5	5,0± 0,42
12	Soup	2,8	3,7± 0,33

Note: In compiling the table, I.M. Skurixin., M.N. Special tables given the chemical composition of foods recommended by Volgarev (M.1987) were taken into account.

Table 1 shows the protein content of consumer foods. As you can see, there is a significant difference between the norm and the results we obtained, that is, the amount of protein in pilaf, somsa, patties, soup made with rice and mung beans, buckwheat, pasta and dumplings compared to the established norm (16,12,10,20,11,34,32, 36%), while the protein content of bread, manti and soup was higher than the norm (7, 14 and 32%, respectively).

**Table 2**

**The amount of fat in the diet of students aged 17-18 in the spring (g)**

№	Name of food	Standard Norm*	Result
1	Bread	1,1	1,4± 0,45
2	Egg	11,5	10,8± 0,73
3	Manti	13,2	15± 1,14
4	Somsa	8,9	7,9± 0,37
5	Plov	10,6	12,4± 0,99
6	Patties	19,6	11,2± 1,68
7	Sweet rice	12,1	10,9± 1,26
8	Soup made with rice and mung bean	7,7	5,3± 0,45
9	Buckwheat	3,2	4,6±0,05
10	Pasta	4,7	2,7±1,62
11	Dumpling	5,2	4,4±0,42
12	Soup	8,1	7,3±0,12

Note: In compiling the table, I.M. Skurixin., M.N. Special tables given the chemical composition of foods recommended by Volgarev (M.1987) were taken into account.

As can be seen from the table, the fat content of most products consumed by school and high school students is significantly lower than the established norm, while the fat content of bread, manti and rice is 27, 14 and 17% higher than the norm, respectively. From the macronutrients we analyzed in the table, only the amount of protein and fat in the egg can be calculated to be around the set norm.

**Table 3**

**The amount of carbohydrates in the diet of students aged 17-18 in the spring (g)**

№	Name of food	Standard Norm*	Result
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1	Bread	52,8	53,1± 0,13
2	Egg	0,7	0,9± 0,45
3	Manti	36,9	38,4± 0,44
4	Somsa	29,7	30,9±0,35
5	Plov	13,5	14,3±0,03
6	Patties	54,3	58,7±0,07
7	Sweet rice	52,8	55,5±0,45
8	Soup made with rice and mung bean	13,5	14,6± 1,41
9	Buckwheat	54,4	57,1±0,79
10	Macaroni	22,2	25,1± 1,12
11	Dumpling	22,5	18,1±0,07
12	Soup	10,3	8,6±0,28

Note: In compiling the table, I.M. Skurixin., M.N. Special tables given the chemical composition of foods recommended by Volgarev (M.1987) were taken into account.

Table 3 found that the amount of carbohydrates in almost all nutrients in the daily diet of adolescents was significantly higher than the norm, while the amount of fat in dumplings and soups was -20 and 17% lower than the norm, respectively.

The amount of carbohydrates in bread and whole fruit samples in the diets of academic lyceum and high school students was found to be slightly higher than normal when analyzed in the laboratory using the chromatographic method (see Table 4).

**Table 4**

**The amount of carbohydrates in the diet of students aged 17-18 years (mg)**

Mono- and disaccharides	Name of the food						
	Bread	Tomato	Cucumber	Apple	Mealon	Orange	Banana
Fructose	0	1,3±0,05	0,56±0,008	3,7±0,1	4,3±0,11	6,8±0,005	9,3±0,08
Glucose	0	1,5±0,1	0,94±0,005	5,38±0,008	6,32±0,01	2,69±0,01	6,5±0,09
Sucrose	0,6±0,1	0,3±0,05	0,81±0,009	0,8±0,15	0,6±0,1	0,45±0,005	1,23±0,12
Maltose	1,0±0,08	1,2±0,1	0	0,55±0,01	0,8±0,05	1,30±0,1	2,5±0,06
Total	1,6±0,1	4,3±0,3	2,31±0,02	10,5±0,2	12,1±0,3	11,2±0,16	19,7±0,35
Satandard norm*	1,1	3,5	1,8	9	9	8,1	19

Note: \* Chemical composition of food products. Reference tables of the content of basic nutrients and the energy value of food products (edited by I.M.Skurikhin and M.N. Volgaryov). - M., Kn: 1, 1987.224 p.

The amount of mono- and disaccharides in the diet of students was determined using appropriate methods, and the corresponding differences were observed when compared with the norm.

The amount of some water-soluble vitamins in food was also determined.

When the results were compared with the norm, a vitamin deficiency was observed in the majority of samples. Cucumbers were found to contain 47 and 40% more niacin (vitamin PP) than tomatoes, while mandarins were found to have normal levels of vitamin B<sub>2</sub> (see Table 5).

**Table 5**

**Amount of vitamins in the diet of students aged 17-18 (mg)**

Vitamin	Name of food						
	Bread	Tomato	Cucumber	Apple	Melon	Orange	Banana
B <sub>1</sub>	0,005	0	0,006	0,003	0,00122	0,00484	0,00223
Standard norm*	0,16	0,04	0,02	0,03	0,04	0,06	0,04
B <sub>2</sub>	0,00243	0	0,12364	0,03095	0,01662	0,03154	0,01116
Standard norm	0,06	0,03	0,02	0,02	0,04	0,03	0,05
B <sub>6</sub>	0,00152	0,00201	0,00151	0,00086	0,00046	0,00132	0,0007
Standard norm	0,15	0,1	0,04	0,08	0,06	0	0,38
C		0,11684	0,02223	0,00781	0,00572	0,00971	0,00703
Standard norm	0	10	5	16	20	38	10
PP		0,44216	0,13976	0,14171	0,07025	0,06924	0,22218
Standard norm	1,61	0,3	0,1	0,3	0,04	0,2	0,6

Note: \* Chemical composition of food products. Reference tables of the content of basic nutrients and the energy value of food products (edited by I.M.Skurikhin and M.N. Volgaryov). - M., Kn: 1, 1987.224 p.

In contrast to vitamins, the amount of minerals in bread and fruit cakes was slightly different from the norm when analyzed in the laboratory macro- and micronutrients by plasma inductively coupled mass spectrometry.

For example, bread, tomatoes, cucumbers and melons contain a lot of all the elements we have studied, while bananas contain a lot of most of the elements and 32% more magnesium. Approximately the same results can be said for the minerals in apples and mandarins. Of the elements we studied in mandarin composition, only the amount of iron was found to be no different from the norm (see Table 6).

**Table 6**

**Amount of minerals in the diet of students aged 17-18 (mg)**

Minerals	Name of food
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and substances	Bread	Tomato	Cucumber	Apple	Melon	Orange	Banana
Calcium	26,6±0,5	16,3±0,5	24,2±0,6	19,1±0,5	20,6±0,5	39,7±0,6	4,6±0,6
Standard norm*	23	14	23	16	16	35	8
Phosphorus	96,7±0,1	32,6±0,05	28,5±0,08	4,8±0,1	16,5±0,05	22,6±0,08	13,3±0,1
Standard norm	87	26	24	11	12	17	28
Magnium	46,8±0,5	25,4±0,6	21,2±0,5	12,3±0,05	17,6±0,08	24,8±0,05	55,6±0,4
Standard norm	33	20	14	9	13	11	42
Iron	3,6±0,2	1,7±0,08	1,1±0,1	4,2±0,08	1,6±0,1	0,1±0,01	0,005±1,2
Standard norm	2	0,9	0,6	3	1	0,1	0,6

Note: \* Chemical composition of food products. Reference tables of the content of basic nutrients and the energy value of food products (edited by I.M.Skurikhin and M.N. Volgaryov). - M., Kn: 1, 1987.224 p.

**Conclusion** Thus, it is important to determine the amount of basic and additional nutrients in the products consumed by students in the laboratory, to study, evaluate and draw appropriate conclusions about the physiological supply of these nutrients to the growing organism.

Deficiencies of macro- and micronutrients in the daily diet of the subjects, as noted above, naturally have a negative impact on their growth, development, health and mastery of science. To prevent this, it is advisable to first form in students the promotion of healthy eating skills, and food prepared in the kitchens of educational institutions should be inspected by special commissions that control the quality of products.

At the same time, roundtables should be held among students to further develop knowledge and skills in the field of healthy eating by relevant professionals, biologists and parents. If, as noted above, we pay special attention to the principle of healthy eating in the formation of a healthy lifestyle in children, we will contribute to the worthy work of our independent Uzbekistan to bring up a physically strong, mentally fit generation that will serve our country.

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