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MACRONUTRIENT DEFICIENCY AND ITS EFFECT ON BLOOD BIOCHEMICAL COMPOSITION AND ANTHROPOMETRIC INDICATORS

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Abstract:

In the article problems related to healthy eating of a group of four-year-old children are mentioned. The deficiency of macronutrients in children's food is reflected in their blood biomarkers. The reason for deviations from the norm determined in the biochemical analysis of blood, in turn, was assessed as a lack of macronutrients in the food. The reduction of macronutrients and proteins in the blood caused a decrease in the height and weight of children is evaluated through correlational relationships.

Keywords: Protein, fat, carbohydrate, macronutrient, anthropometry, blood analysis, biochemical indicator

INTRODUCTION. A child's body, unlike an adult's body, has the characteristic of rapid growth and development. Age-related physiological changes are known to affect every function of the body. Such changes also actively affect the eating process. Therefore, the diet of a young growing body and the elderly are completely different. Physiological standards of children's nutrition vary depending on their age.

Currently, children are divided into 8 age groups, and their nutrition is regulated by energy value and 25 nutrients. Fulfilling the physiological standards of children's nutrition is a necessary condition for ensuring its rationality, harmonious growth and development of the child and increases his immunity and the ability to adapt to the harmful factors of the living environment [2].

Healthy nutrition is important for the normal functioning of vital processes in all tissues and cells of the body. This is especially important in the life of a growing young organism. Because a child's organism differs from an adult's organism with its characteristics, speed of growth and development processes, activity and other aspects. Therefore, sufficient satisfaction of their daily physiological requirements for macronutrients - proteins, fats and carbohydrates is important for the formation of a physically and mentally healthy generation in the future. Our government is paying special attention to this issue [4].

Proper nutrition of preschool children has a great impact on their growth and development. It is also necessary to take into account their age-related physiological indicators when organizing proper nutrition

MATERIAL AND METHODOLOGY. Our research was conducted in the Kashkadarya Regional Children's Multidisciplinary Medical Center, during 2021-2022, by observing children of preschool age. A total of 20 4-year-old children were selected by random sampling. 10 of them are girls and 10 are boys.

The research process was conducted in accordance with Article 22 of the Law of the Republic of Uzbekistan "On Guarantees of Children's Rights". During the study, no actions were taken that harmed the life, health and normal development of children. Consent was obtained from the parents of the children who participated in this study. The identity of the children was kept secret [5].

THE OBTAINED RESULTS AND THEIR ANALYSIS. The most active and fast-paced period of development of children of preschool age is the age of 4 years. The reason is that by this period children's brain activity begins to develop systematically. It improves physiologically and psychologically.

Brain cognitive activity accelerates. The child processes the information received from the external environment and begins to respond by thinking. The period of very rapid development of children's mental development is also included in the category of 4-year-old children. Now they try to approach a certain task with responsibility. He perceives existence not by himself, but with a different interest. Children of this age have the initial knowledge to round up an object and make their own conclusions about it [2].

During our observations, when we studied the actual nutrition of 4-year-old children, we saw that the amount of macronutrients in their daily food intake was as follows [3] (Table 1).

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Table 1
Amount of macronutrients in actual food of a group of 4-year-old children

The amount of macronutrients in the food of 4-year-old children (in g)	A group of 4-year-old children n=20	p value	Recommended daily food intake (in g)
Protein	49,9±3,63	p<0,001	68
Carbohydrate	254,5±9,7	p<0,001	272
Fat	53,2±1,97	p<0,001	68

It was found that the amount of protein, fat and carbohydrates in the actual food of the group of 4-year-old children decreased by 26.6%, 21.7% and 6.6% compared to the norm.

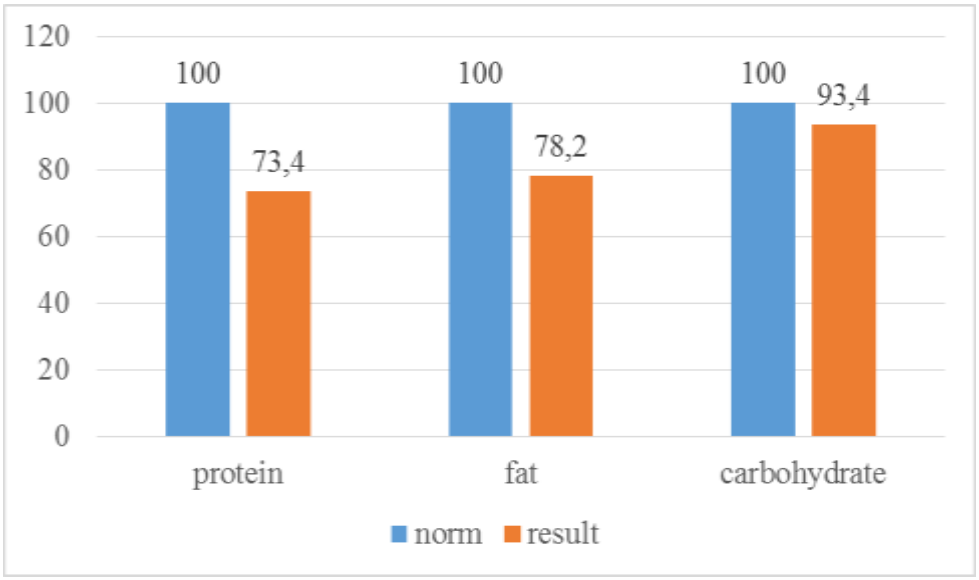

Figure 1: Food intake of 4-year-old children with macronutrients (in % of the norm)

The blood analysis of children of this group showed the following results (Table 2).

Table 2
Biochemical indicators in blood analyzes of 4-year-old children

Biochemical parameters of the blood of 4-year-old children n=20		p	Biochemical indicators in blood normal limits*
Total protein	54,8±0,23	p<0,001	66-85 g/l
Albumin	32,8±2,22	p<0,001	35-55 g/l
Hemoglobin	112,1±6,8	p<0,05	120-160 g/l
Glucose	4,30 ±0,67	p<0,001	3,2-6,1 mmol/l

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Cholesterol	4,7±0,54	p<0,001	<5,2 mmol/l

* The indicators are obtained according to SSV order No. 363 (Appendix 1)

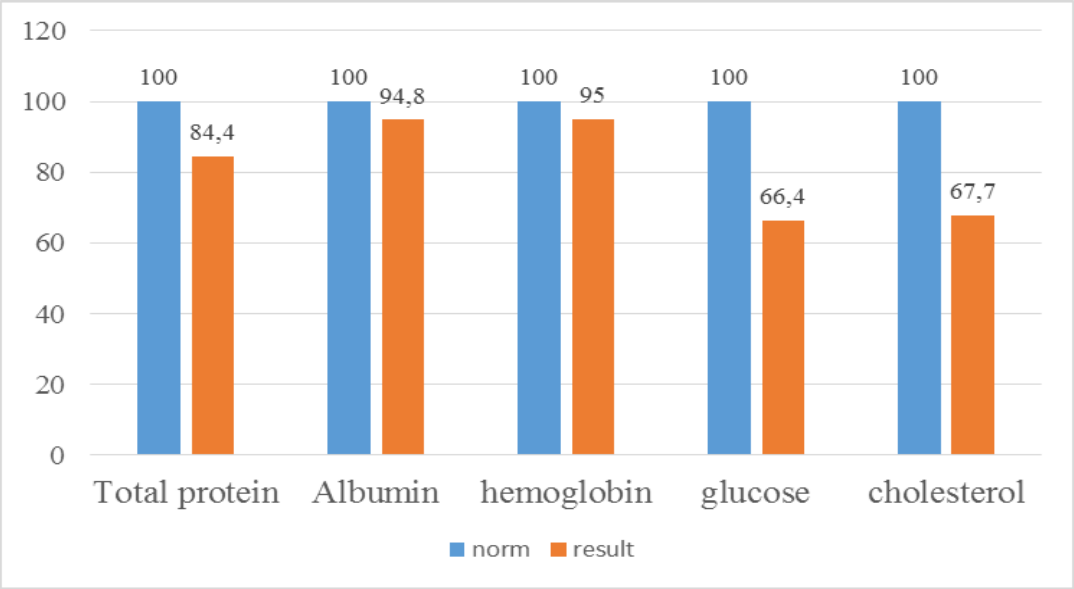

Figure 2: Distribution of biochemical indicators in the blood of a group of 4-year-old children compared to the norm (in %).

The following results were obtained when calculating the correlation between biochemical indicators in blood and the amount of macronutrients in food (Table 3)

Table 3
Correlation of macronutrients in food and biochemical indicators in blood

Amount of macronutrients in food of 4-year-old children	**Biochemical parameters of blood**				
	Total protein	**Albumin**	**Hemoglobin**	**Glucose**	**Cholesterol**
Protein	**r = 0,74**	**r = 0,68**	**r = 0,38**	r = -0,51	r = -0,14
Carbohydrate	r = -0,38	r = -0,49	r = 0,11	**r = 0,84**	r = 0,12
Fat	r = -0,09	r = -0,10	r = 0,035	r = 0,21	**r = 0,79**
p=0,05					

Blood biochemical indicators, in particular, total protein decreased by 17%, albumin by 6.28%, hemoglobin protein by 6.58%. The protein content of the used food was reduced by 26.6%.

The amount of glucose and cholesterol in the blood is normal. However, it was noted above that there is a deficit of fat and carbohydrates in the 1-day diet. Although the amount of glucose and cholesterol in the blood is normal, however, when we studied its effect on physiological indicators, the following results were obtained (Table 4).

4 - Table
Anthropometric indicators of a group of 4-year-old children

Age and gender of children	**Height (cm)**	**p**	**Weight (kg)**	**p**
4-year-old girls n=10	92,7± 2,51	<0,001	15,1± 0,64	<0,001
4-year-old boys n=10	97,3 ± 3,03	<0,001	15,0 ± 0,56	<0,001

According to the World Health Organization standards for 4-year-old children, the height of 4-year-old girls is 102.7 ± 4.3; weight 16.01 ± 0.13; height for boys is 103.3 ± 4.2 cm; and its weight should be

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16.3 ± 0.12 kg [6]. In our research, the group of 4-year-old children had low indicators compared to this norm. In particular, the height of girls decreased by 9.7%, and their weight decreased by 5.7%. In boys, height decreased by 5.8%, and weight decreased by 7.97%.

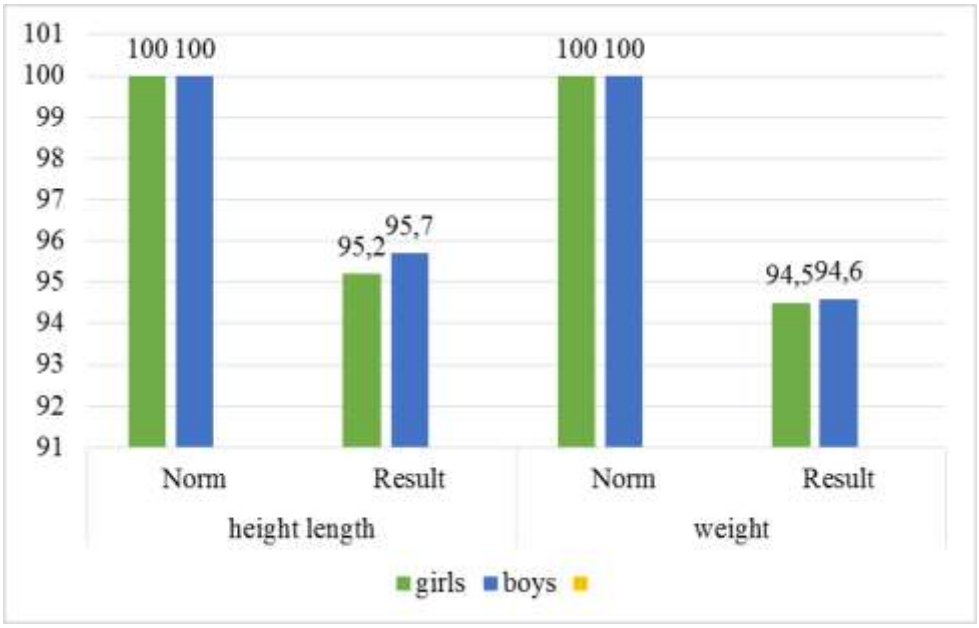

Figure 3: 4-year-old children's height, weight results and their normative indicators (in %).

CONCLUSION. In the blood analysis of 4-year-old children, it was found that proteins are less than the norm. Protein deficiency can be shown as the first criterion of anthropometric retardation in the body. Although blood cholesterol and glucose are within normal limits, the daily intake of carbohydrates and fats in food is low. Carbohydrates and fat in the body are mainly used as a source of energy. For this reason, the lack of fat and carbohydrate reserves in the body can be considered as one of the reasons for underweight in children.

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