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VALUE OF RESEARCH OF MACRO- AND MICRO-ELEMENTAL COMPOSITION OF THE DIET FOR THE PURPOSE OF NUTRITIONAL SUPPORT OF IRON DEFICIENCY IN HIGH-RISK GROUPS IN THE "MOTHER-CHILD" SYSTEM

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ABSTRACT

The purpose of the work is to study the iron content in plant and animal products and the phytochemicals included in the traditional diet of the population of the Zarafshan Valley to improve the nutritional support for iron deficiency in high-risk groups in the "mother-child" system. To improve primary and secondary prevention of iron deficiency in the mother-child system, we studied the iron content in 60 types of food products, mainly fruits, vegetables and foods of animal origin, as well as the phytochemical content of foods widely used in the region. The highest iron content was found in grape hurob (3 i66 mcg/g), decoction from vine of the vineyard (366 mcg/g), dried apricots (13 i mcg/g), dried figs (114 mcg/g), black and white raisins (106 and 80 mcg/g, respectively), and shinny (78 mcg/g). Moderate amounts of iron (from i0 to 86 mcg/g) were found in almonds, apple, blackcurrant, hawthorn, dried mulberry, mulberry shinny, peas, basch, whole wheat bread (tegirmon noni), sumalak, cookies, peas, beans, and tomato. Of the animal products, the richest iron sources were as follows: chalice (70 mg/kg), egg yolk (6 i mg/g), beef (i6 mg/g) kidney and liver (46-6 i mg/g) and honey (4 i mg/d). Egg protein and dairy products contain up to 10 μg/g iron. To provide nutritional support, assess the dietary balance and identify groups at risk for micronutrient deficiencies among children older than a year, we developed a table for calculating nutrient contents.

Keywords: macro- and microelements, food products, nutritional support, iron deficiency, "mother-child"

l Introduction

In 1999, in Geneva, under the auspices of the WHO and UNICEF, an international working group of countries in Eastern and Central Europe, the CIS and the Baltic States on the prevention of iron deficiency disorders (IDDs) in women and children was held, in which leading scientists and experts from these countries participated (UNICEF/WHO, Geneva, 1999). The developed strategy to combat and prevent iron deficiency among women and children of Central Asia and Kazakhstan, based on the recommendations of the WHO and UNICEF (1998), has been implemented.

In accordance with the decisions made, all the countries of Central Asia and Kazakhstan agreed to implement the recommendations of the WHO and UNICEF together, and UNICEF donated iron preparations (iron sulfate with folic acid) to pilot areas in these countries. In Uzbekistan, R. Karakalpakstan was identified as a pilot region. Based on the above, a program was developed to provide methodological assistance to general practitioners for the implementation of the above projects in the Zarafshan Valley region.

In 2003, according to the decision of the Committee of Ministers of the Council of Europe "Food and nutritional care in hospitals", nutritional support was recognized as an obligatory component of the treatment of all patients without exception [5]. Clinical nutrition for mothers and clinical nutrition for children were recognized as two new medical specialties [6].

Nutritional support for iron deficiency is carried out by the following methods: non-pharmacological methods (use of food products to improve health) and the prescription of medications to improve iron status for children at risk for iron deficiency (it must be remembered that in order to prevent iron deficiency in children at risk, the iron content in the diet should be at least 20 mg/day).

To provide nutritional support and treat micronutrient deficiencies, the determination of trace elements in the traditional diet of a population in a given region is an extremely important task (J.C. Leblanc et al., 2005). In this aspect, the iron content in the national food products consumed by children in the Zarafshan Valley of Uzbekistan has not been sufficiently explored.

Purpose of the study

The purpose of the work is to study the iron content in plant and animal products and the phytochemicals included in the traditional dietary patterns of the population of the Zarafshan Valley to improve the nutritional support for iron deficiency in high-risk groups in the "mother-child" system.

Materials and research methods. With the aim of improving primary and secondary prophylaxis of iron deficiency in the mother-child system, we used neutron-activation analysis in the activation laboratory of the INP AN RUz to study the iron content in 60 types of food products, mainly fruit, foods of plant and animal origin, and foods widely used in the region as herbal remedies. In the Zarafshan Valley region, we studied the iron content of the foods most commonly consumed by children and adults: 48 types of fruit and vegetable foods (Tables 1, 2). We first studied the

contents of essential trace elements in national dishes (chalice and chakka) and products of animal origin widely used in the traditional diet of the Central Asian population (milk, honey, egg yolk, kidneys, and liver) .

Results

Hakka is a strained kefir with a sour taste prepared in most areas of the Samarkand region (the method of obtaining chakka: kefir - katik is passed through a bag of permeable cotton material; after draining the milk whey, the remaining thick residue is chakka). Chakka is often consumed by adults and children of the local population in pure form and as a part of various dishes (chalop, rice soup, dried chakka - kurut, etc.). Currently, chakka is being prepared in many regions of the republic.

Halisa (Halim) is a porridge made from wheat and meat. This dish is mainly prepared on the eve of the Navruz holiday. Recently, it became common to cook halisa in private dining rooms throughout the year.

Table 1
Iron Content in Fruit and Fruit Foods

№	Product	Iron
1	Grape hurob	3566
2	Vineyard broth	366
3	Dried apricots (dried apricots) (n-3)	135
4	Dried figs (n-2)	114
5	Black raisins (n-2)	106
6	Yellow raisins (n-4)	80
7	Shinny (molasses) grape (n-3)	78
8	Almonds: bitter, sweet (n-3)	50, 86
9	Apple (n-3)	66
10	Blackcurrant (dried) (n-2)	85
11	Dried hawthorn	74
12	Dried mulberry	66
13	Mulberry shinny	53
14	Peanuts (n-2)	38
15	Peaches (dried) (n-3)	31
16	Dogrose	41
17	Walnut	25
18	Apricot kernels	32
19	Ladies' grapes fell	25
20	Grape raisins	18
21	Dried plum(n-3)	29
22	Apricot juice	18
23	Pear	17
24	Dried melon	5
25	Goof	5
26	Pistachio	5

A study on the amount of trace elements in 20 types of plant-based food products showed that moderate iron concentrations (50-120 mcg/g) were found in whole-wheat bread ("tegirmon noni"), 1st grade tortilla and other types of bread, as well as traditional national dishes - sumalak, cookies, peas, mache, beans, and tomatoes (Table 2). Low (15-50 mcg/g) content was found in daily food, corn, red carrots, potatoes, and other national dishes - halvitar, cookies, onions, beets, rice, barley, semolina, and other varieties of legumes and vegetables.

Table 2
Iron Content in Foods of Vegetable Origin (mcg/g)

№	Product	Iron
1	Homemade whole-grain cakes	98
2	Tortillas Samarkand and 1st grade cakes	85
3	Sumalak	63
4.	Biscuit	40
5	Peas	58
6	Tomato	53
7	Beans	55
8	Маш	49
9	Daily food	45

10.	Corn	42
11.	Red carrot	42
12	Potatoes	25
13	Holvaytar	27
14	Bulb onions	26
15	Beet	22
16	Rise	20
17	Semolina	20
18	Крупаманная	14
19.	Pumpkin	15
20.	Turnip	15
21	Garlic	12

To inform efforts to provide children with iron, in the Zarafshan Valley region, we studied the iron composition of 9 types of animal food most commonly consumed by children and adults (Table 3).

Table 3
Iron Content in Animal Food (mcg/g)

№	Product	Iron
1.	Halisa	70
2.	Egg yolk (n=3)	65
3	Beef meat (n=12)	56
4	Beef liver (n=5)	65
5.	Kidney (n=5)	46
6	Honey	45
7	Milk	10
8	Egg (n=2)	6
9.	Chacca (n=9)	2

The results showed that of the products of animal origin, those richest in iron were the national dish of chalice (70 mg/kg), egg yolk (65 μg/g), beef meat (56 μg/g), kidneys and liver (46-65 mg/g) and honey (45 mg/g). Egg protein and dairy products were found to contain up to 10 mg/g iron.

The typical physiological requirement of iron for adults is 10 mg/day (for men) and 18 mg/day (for women), and the iron requirement for children, depending on age, is from 4 to 18 mg/day. In animal meat, half of the iron is in the form of heme iron, 40% of which is absorbed. In plant products, all iron belongs to the nonheme type, and it is absorbed at a rate of no more than 10%. Vitamin C helps with the absorption of nonheme iron.

A child's dietary intake should meet the needs of a growing organism, be as diverse as possible, and include all major food groups. The completeness of a child's diet is evaluated not only by calorie content and food composition (balance of proteins, fats, carbohydrates) but also by the microelement composition.

To provide nutritional support, assess a dietary balance and identify a high-risk group for micronutrient deficiencies among children older than one year, we developed a table for calculating dietary scores (Table 4).

Table 4
Food serving scoring table for children

№	Daily serving	Composition of the product	Answers	Points
1	4-5 servings of bread and cereals, potatoes (300-350 g)	1 piece of coarse bread, sumalak or bun (30-40 g); ½ cup boiled corn, barley, semolina or buckwheat porridge; ½ cup boiled pasta; 1 beet; 1-2 potatoes.		2
2	4-5 servings of fruits and vegetables	150 ml of fruit or vegetable juice; approximately 100 g of boiled or fresh vegetables; 1 cup of green vegetables - salad, beets, markov, cabbage, tomato; fruits - vineyard products, apple, pear, peaches; 1-2 cups of fresh or dried apricots; peanuts; canned or boiled fruit - shinny, gurob.		2
3	2-3 servings of milk and dairy products	1 cup of milk, 1 cup of kefir or chakka, 40 g of cheese, 50 g of sour cream.		1

4	2 servings of meat or substitutes	60-70 g of cooked chalice, meat or fish; 2 eggs; 1 cup of boiled beans; approximately 100 g of nuts		2
5	2 servings of fat and sweets	1 teaspoon butter or margarine, 1 tsp vegetable oil, 1 tablespoon mayonnaise, 3 tsp shinny, 1 tsp honey or jam, 1 bar dried black raisins or fruits, 1-2 pieces of cake		0,5
6	1-2 servings of a variety of foods from each food group	Bakery, legumes, vegetables, fruits, animal products, sweets		0,5
7	At least 2 servings of fresh vegetables			0,5
8	At least 1 serving of fresh fruit			0,5
9	Mostly nutritious snacks			0,5
10	Mostly low-fat foods			0,5

According to the table, the daily diet is assigned points for each answer of "Yes". The total possible points of the daily diet is 10, and based on the score, the diets of mothers and children are categorized as follows: 10 - excellent; 8-9 - good; 4-7 - satisfactory; and 3 or less - risky. Those who received scores of 5 or less belong to the group at high risk for a deficiency of trace elements and vitamins, and they are subject to further examination, as well as targeted prevention and treatment.

Nutritional support for iron deficiency is carried out in the following ways: non-pharmacological (use of food products) and through the prescription of medications to improve iron status in children at risk for iron deficiency (it must be remembered that in order to prevent iron deficiency in children at risk, iron content in the diet should be at least 20 mg/day).

Based on the data obtained, we have developed the following principles of nutritional support for iron deficiency in high-risk groups:

a) Periodic monitoring of the iron content in the bodies of the mothers and children in high-risk groups;

b) Nutritional support for mothers and children through the encouragement of the consumption of diets that include natural local products containing sufficient amounts of iron and other micronutrients;

c) In case of a deficiency or a high risk of iron deficiency in mothers and children, the use of a combination of medications containing vitamins and macro- and microelements;

d) The inclusion of an educational element of the prevention system, including explanations of the prevention of deficiencies of iron and other trace elements.

CONCLUSION

Primary prevention of iron deficiency consists of the early detection of risk factors, as well as states of latent iron deficiency and their treatment. If there are risk factors and biochemical signs of iron deficiency, it is necessary to diagnose the condition of "latent iron deficiency" and conduct nutritional support and ferrotherapy without waiting for a decrease in haemoglobin.

Secondary prevention of iron deficiency disease is composed of measures aimed at preventing a possible relapse of iron deficiency. Secondary prophylaxis for iron deficiency disease at the population level can be conducted through a whole range of measures:

- nutritional support using traditional national dishes consumed by the child population to increase the quantity and bioavailability of edible iron;
- implementation of programs for fortification of foods with iron (flour or other common foods);
- purposeful administration of iron-containing preparations, as well as preparations of other trace elements and vitamins with an established deficiency, among all school-age children, especially pubescent girls;
- sanitary-educational work to facilitate the formation of the nutritional skills in the paediatric population.

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