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Nutritional Support in the Prevention of Micronutrient Deficiency with Fruit and Fruit Products in Children

[1]Rasulov S.K.*, [2]Turamkulov Sh.N., [3]Rajabov A.E., and [4]Aminjonov Sh.A.

Author's Affiliation:
[1,2,3,4]Samarkand State University, 15, University Avenue, Samarkand city, Uzbekistan

***Corresponding author:**
Rasulov S.K.,
Samarkand State University, 15, University Avenue, Samarkand city, Uzbekistan
E-mail: rasulovsaydullo@mail.ru

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ABSTRACT:
The aim is to study the macro- and microelement composition of food products of fruit and fruit origin, often consumed by the local population of the Zarafshan Valley for the purpose of nutritional and micronutrient support in the prevention of micronutrient deficiency in children. Fruit and vegetable food products grown in the Samarkand region are characterized by a high content of essential, low content of brain, an abiogenic, aggressive and toxic element, which indicates high biological activity and safety for the child. Nutritional and micronutrient support using fruit and fruit foods containing high concentrations of pharmaco micronutrients should be recommended in order to optimize the growth and development of children and the micronutrient status of the body and its functions, accelerate the recovery processes and improve the quality of life.

Keywords: Micronutrients, Children, Deficiency, Fruit And Fruit Products, Correction, Prevention.

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INTRODUCTION

In 2003, by 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. Clinical nutrition of mothers and clinical nutrition of children were recognized as two new medical specialties (WHO, 2003).

Clinical nutrition is an applied medical discipline dealing with the prevention, diagnosis and treatment of nutritional disorders in patients with various diseases and other conditions (for example, during pregnancy and child feeding) caused by a deficiency and excess of nutrients and energy entering the body.

Clinical nutrition is a broader concept than nutritional support. It includes basic and special therapeutic diets, functional foods, dietary supplements, fortified foods, enteral and parenteral nutrition. Nutritional support is a complex of diagnostic and therapeutic measures aimed at preventing, diagnosing and correcting malnutrition using methods of enteral and parenteral nutrition (I.E. Khoroshilov, 2018).

The issues of clinical nutrition of children include the problems of micronutrient insufficiency in children - protein and energy deficiency, rickets, anemia, food allergies and

intolerance, often sick children, functional digestive disorders, etc.

The nutrition of young children should meet the needs of a growing organism, be as diverse as possible and include all the main groups of foods. Rational baby food is evaluated not only by calorie content, food composition (proteins, fats, carbohydrates), but also by trace element composition. (Lashina E.L. et al., 2019)

Today there is no doubt that the leading degree of negative impact on the child's body is a chronic lack of micronutrients – vitamins, macro- and microelements and other biologically active compounds. These substances are not sources of energy, but participation in the assimilation of food, regulation of functions, implementation of the processes of growth, adaptation and development of the body make them extremely important and vital. (Igamberdieva P.K. et al., 2015)

The most vulnerable categories for the development of trace element deficiency are children in critical periods of growth (up to 3 years, 5-7 years, during puberty – 11-15 years), children during socio-biological adaptation (first graders, schoolchildren during the transition to subject learning and during exams). A special risk group is long-term and often bleaching children. This is due to the increased physiological needs of the body against the background of immaturity of the mechanisms that ensure the protection of the child and his adaptation to the environment.

Taking into account the extremely adverse consequences of micronutrient deficiency and other nutritional substances for the health of children and adults in Uzbekistan over the past decades, as well as in developed and developing countries, the fight against micronutrient deficiency is conducted at the level of national policy. Evidence of such a policy in the Republic of Uzbekistan is the adoption in 2010 of the Law of the Republic of Uzbekistan "On the prevention of micronutrient insufficiency among the population". In accordance with this Law, the priority task in the field of nutrition is to eliminate the deficiency of proteins, micronutrients, vitamins, macro- and microelements (iron, calcium, iodine, zinc, selenium, etc.), which causes serious damage to the health of the population and especially children and adolescents.

THE PURPOSE OF THE STUDY

To study the macro- and microelement composition of food products of fruit and fruit origin, often consumed by the local population of the Zarafshan Valley of the Republic of Uzbekistan for the purpose of nutritional and micronutrient support in the prevention of micronutrient deficiency in children.

The products of traditional nutrition of the population of Uzbekistan, widely used in the Republic, differ not only in caloric content, but also in the content of pharmaconutrients, however, the physiological role of which has not been sufficiently studied.

MATERIAL AND METHODS

The determination of micronutrients was carried out in the laboratory of the Institute of Nuclear Physics of ANRUz by the instrumental neutron activation method. Macronutrients (calcium, potassium, sodium, magnesium, chlorine) in food products of fruit and fruit origin included in the structure of traditional nutrition of the population (including young children and mothers) of Uzbekistan and in the range of widely used herbal remedies in the Republic were studied. In addition to the above macro- and microelements, only 23 different chemical elements included in the Bogatov A. classification were studied in the group of biogenic essential (iron, copper, zinc, manganese, chromium, selenium, molybdenum, iodine, cobalt), conditionally essential trace elements (arsenic, bromine, lithium, nickel, vanadium, cadmium, lead), brain elements (gold, tin, thallium, tellurium, germanium, gallium) and abiogenic neutral (aluminum, titanium, rubidium), abiogenic competitive (barium, strontium, caesium), abiogenic toxic or aggressive (mercury, beryllium, osmium, bismuth) as part of fruit and fruit food products of plant origin. Other abiogenic trace elements: lanthasium, uranium, lutetium, ubertium, samarium, thorium, hafrium and

folfram as additional studies have been identified in some foods. (Kodentsova V.M. et al., 2015)

For the purpose of nutritional support and correction of the deficiency of macronutrients – calcium, sodium, potassium and magnesium, we studied 26 types of food products of fruit and fruit origin, often consumed by the local population (Table 1).

RESULTS AND DISCUSSION

Table 1: The content of trace elements in fruit and fruit foods (mcg/g)

No.	Product	Ca	Na	K	Mg	Cl
1	Drytablewine	17.62	146.37	2408		145.33
2	Grapegurob	2600-21120	44-11445	31000-662770 (0.31%-6.6%)	100-152570	5500-12540
3	Decoction from the vine of the vineyard	250	4230	15630		13040
4	Blackkishmish (n-2)	290-2820	43-110	5700- 8500	100	130-620
5	Yellowkishmish (n-4)	240	61-180	9000-0.59%	100	130-140
6	Shinny (molasses) grape(n-3)	350-620	150	5800	100	150
7	Dried apricots (dried apricots) (n-3)	220-250	70-178	14000-7.2%	100	50-250
8	Dried figs(n-2)	1200-3740	91-100	0.97%-11000	2300	560-720
9	Sweetalmonds(n-3)	2700	42	6300	100	89
10	Apple(n-3)	900	53	0.8%	-	5
11.	Driedhawthornsl.	7800	56	1%	-	86
12	MulberryShinny	970	114	0.78%	-	250
13	Driedmulberry	2330	38	0.91%	-	133
14	MulberryShinny	970	114	0.78%	-	250
15	Peanuts(n-2)	660-1100	84-235	7100-8270	100	160-177
16	Driedpeaches (n-3)	1110	48	1.8%	-	127
17	Walnut	2300-3700	31,8-32	0.4%-7580	-	240-382
18	Apricotkernels	550	10	0.65%	-	120
19	Grapesareladies' fingers.	2280	82	10110	-	630
20	Kishmishgrapes	677	72	6637	-	265
21	Driedplum (n-3)	9.24-520-885	29-64-240	1.2%-1.8%-18500-	9300	46-50-93
22	Apricotjuice	190	570	13500	2500	160
23	Pear	820-1160	41-49	11656	9405	56.7-160
24	Driedmelon	250	1200	2.40%	-	3500
25	Goof	500	90	1%	-	199
26	Pistachio	8560	1170	8606	1320	1800
	Standard content in plants	12000	1500	15000	1200	2000

Table 1 shows that the content of organic calcium salt of moderate concentration is contained in the following fruit foods (mcg/ g): grape gurob – up to 21120 (2.1%); pistachio – 8560; hawthorn – 7800, medium concentration: dried figs - 3740; walnut – 3700; black kishmish - 2820; almonds sweet - 2700; lady's sticks grapes – 2280; dried mulberry – 2330; pear – 1160; dried peaches – 1110; peanuts -1100. Other fruit and fruit products contain up to 100 mcg/g of calcium. The above-listed foods are recommended as prevention and correction of calcium deficiency for nursing women and children over 1 year old in the form of complementary foods. With established hypocalcemia, calcium preparations are prescribed along with food products.

The content of organic sodium and chlorine in fruit and fruit products in high concentrations were revealed (mcg/g): grape gurob – 11445 and decoction from the vine of the vineyard – 4250; below the standard sodium samples - dried melon -1200 and pistachio – 1170. Below the standard samples, the concentration of sodium (up to 1000 mcg/g) is available in mulberry shinni products. plum and apricot juice. These products are recommended for the prevention of sodium and chlorine deficiency from the risk group and with established signs of hyponatremia with sodium and chlorine preparations or ordinary table salt in the form of hypertonic solutions.

Potassium in the form of organic salt of high concentration is contained in the following products: grape gurob - 662770 (6.6%), dried apricots – 7.2%; moderate potassium concentration: black kishmish – 5.7%. The low concentration of potassium contains: dried melon – 2.4%; peaches – 1.8%; grapes – 1110 mcg /g and hawthorn -1%. Other food products contain less than 0.5% potassium. Products with high potassium content can be recommended to nursing women and children with established signs of hypokalemia for correction (with potassium preparations) and nutritional support for preventive purposes.

Magnesium in an increased concentration contains: grape gurob – from 100 to 152570 mcg / g. pear – 9400, dried plum – 9300; apricot juice – 2500; dried figs -2300; pistachio - 1320.. In other products below the standard samples of magnesium - less than 100 mcg / g.. Products with high magnesium content are recommended for children older than 1 year and nursing women at risk of magnesium deficiency for prevention, with established hypomagnesemia correction with the inclusion of magnesium preparations.

Chlorine in high concentration is present in the products of the vineyard – decoction from the vine of the vineyard and grape gurob (up to 12000mcg / g), dried melon, moderate concentration - pistachio and fig. Products with a high content of organic chlorine should be recommended to children and lactating women at risk of chlorine deficiency (especially after repeated vomiting) and with established hypochloremia.

We from the group of essential trace elements studied the content of cobalt, manganese, chromium, selenium, molybdenum and iodine. In order to provide children with trace elements – cobalt, manganese, selenium and other abiogenic elements in the Zarafshan Valley region, the trace element composition of fruit and fruit foods was studied (Table 2).

Table 2: Amount of trace elements in plant-derived fruits and fruit-based food products (mg/kg)

No.	Product	Co	Mn	Se	I	Cr	Mo	Br	Ni	Au	Ag	Hg	Sc	Rb	Sb	La	U	Lu	Yb	Th	Hf	Ba	W
1	Drytablewine	0.92	125.7			10.5		34.3		0.056	0.1		0.12	53.7	0.9	1.2							
2	Grapegurob	0.12-21.6	1000-1210	0.01-0.1	0.1	2.6-10.4	0.54-55.6	1-21.7	4?0	0.048-0.057	0.01-0.17	0.42-0.07	0.004-0.05	5.3-46	0.13-1.06	0.1-0.005	0.77	0.01		0.0034	0.014	3.6-364	0.1
3	Decoction from the vine of the vineyard	0.75	1.2	9.3				42			15	0.12	0.17	74	1.4								
4	Blackkishmish (n-2)	0.42	3.9-30	0.01		0.22-0.84	0.1	0.24-2.3		0.012-0.047	0.05	0.001	0.04		0.004-0.3	0.02				0.097	0.054	0.5	0.1
5	Yellowkishmish (n-4)	0.11-0.03	1.9-3.2	0.01		0.18-0.36	0.18	0.23-0.40	0.5	0.004	0.001	0.02-0.07	0.008-0.01	1.3-3.3	0.001-0.16	0.005-0.055				0.011	0.005	0.5	
6	Shinny (molasses) grape(n-3)	0.07	3.4	0.01		0.21	0.26	0.47	0.5	0.002-0.005	0.078	0.05	0.03	44	0.05	0.005				0.001	0.004	0.5	0.1
7	Dried apricots (dried apricots) (n-3)	0.11-0.75	2.6-2.8-11	0.01	0.1	0.28-0.33-1.9	0.14-0.48	0.26-0.5-0.91	0.5-0.83	0.005-0.012	0.001-0.06	0.02-0.069	0.09-0.15	4.4-9.3	0.08-0.58	0.005-0.32				0.001-0.011	0.007-0.0078	0.5	0.1
8	Dried figs(n-2)	0.01-0.13	3.6-6.2	0.01	0.1	0.36-0.44	0.18	0.67-1.1	0.49	0.003-0.004	0.001	0.02-0.14	0.02-0.05	1.6-2.7	0.02-0.022	0.005-0.07				0.067	0.028	3.0	0.1
9	Sweetalmonds(n-3)	0.04	14	0.01		0.28	0.93	0.18	0.52	0.004	0.28	0.04	0.001	1.7	0.01	0.005				0.001	0.012	0.89	0.1
10	Apple(n-3)	0.07	3.4			0.43		0.3		0.002		0.11	0.04	0.5	0.14	0.25							
11	Driedhawthornsl.	0.3	6.2			0.4		0.46		0.005		0.12	0.03	2.6	0.12	0.15							

12	MulberryShinny	0.46	7.1			0.7		0.54		0.005		0.16	0.0089	0.5	0.15	0.07							
13	Driedmulberry	0.15	7.7			0.18		0.54		0.002		0.05	0.02	4.9	0.07	0.11							
14	MulberryShinny	0.04-0.043	11.2-12	0.01-0.1	0.1	-0.160.18	7.7-10	0.28-0.29	0.3	0.004-0.006	0.001-0.1	0.02-0.04	0.005-0.006	0.82-5.8	0.001-0.02	0.01-0.02				0.001	0.071	0.5	0.1
15	Peanuts(n-2)	0.072	4.5			0.1		0.17		0.002		0.07	0.02	8	0.12	0.07							
16	Driedpeaches (n-3)	0.058-0.096	17-18.9	0.1-0.02	0.1	0.37-0.78	0.05	0.14-1.2		0.002-0.003	0.1	0.13	0.004--0.005	1	0.05-0.02	0.02-0.05							
17	Walnut	0.047	2.9			0.1		0.26		0.001	-	-	0.038		0.063								
18	Apricotkernels	0.01	12			0.2		0.45		0.001	-	-	0.01	9.1	0.08	0.01							
19	Grapesareladies' fingers.	0.01	5.9			0.1		0.42		0.008	-	-	0.005	6	0.03	0.01							
20	Kishmishgrapes	0.01-0.03-0.26	2.6-2.9-14	0.01		0.1-0.140.99	0.39	0.17-0.26-1.3	10	0.001-0.005	0.001	0.05-0.07	0.008-0.12	0.5-5.2-13	0.01-0.06	0.07-0.080.36				0.14	0.110	8.6	0.95
21	Driedplum (n-3)	0.11	2.3	0.01		0.18	0.15	0.53	0.99	0.0015	0.07	0.03	0.0046	1.4	0.2	0.005				0.001	0.001	0.5	
22	Apricotjuice	0.07-0.19	5.4-9.8	0.1	0.1	0.01-0.31	0.05	0.12-0.17		0.001-0.006	0.1	0.02	0.06-0.1	1.4-3.8	0.01-0.04	0.01-0.05	0.1						
23	Pear	0.01	5.5			0.18		0.64		0.003		0.06	0.007	0.5	0.05	0.06							
24	Driedmelon	0.04	3.8			0.22		0.52		0.003		0.07	0.006	4.2	0.03	0.05							
25	Pistachio	0.08	19.4	0.19	0.1	0.1	0.1	0.3		0.003		0.03	0.001	6.39	0.04	0.04	0.04						

It follows from Table 2 that cobalt exists in vineyard products in the highest concentration: in the composition of grape gurob up to 21 mcg /g (mg/l), decoction from the vine of the vineyard – 0.7 mcg/ g, black kishmish – 0.7 mcg/g, as well as in the composition of mulberry shinni – 0.45 mcg/g and hawthorn – 0.3 mcg/g. Nutritional support in case of its deficiency from the products of the local flora is an important part of prevention in the "Mother—child" system from the risk group for cobalt deficiency. With an established cobalt deficiency, preparations containing cobalt (vitamin B12) and its combined preparations (kobavit, pikovit, complivit, duovit, oligovit, etc.) are recommended.

Manganese in the highest concentration is available in grape gurobe - from 1000 mcg / g to 1210 mcg / g and in the composition of grape table dry wine – 125.7 mcg / g. Black kishmish, dried apricots, almonds, peanuts, walnuts, grapes, and pistachio contain from 10 mcg / g to 30 mcg / g of manganese. Dried fruits contain from 1 to 10 micrograms / g of manganese. The above products should be recommended for deficiency of manganese and iron because manganese is a synergist of iron, and promote its absorption from the intestine.

Selenium, as an essential trace element, is contained in the highest concentration in phytonaste – decoction from the vine of the vineyard (9.3 mcg / g), in other food products – less than 0.1 mcg / g.

Iodine in some foods is available in a low concentration – 0.1 mcg / g, in many products there is no iodine. All this suggests that the Zarafshan Valley is considered a biogeochemical zone for iodine deficiency, which should be taken into account when carrying out preventive measures.

Chromium from 2.0 mcg/g to 10 mcg / g is contained in vineyard products: table dry wine and decoction from the vine of the vineyard. from 0.5 to 1.0 mcg/g - dried plum, walnut, mulberry shinny and dried apricots,

Molybdenum in high concentrations were detected in grape gurobe and peanuts - from 7 mcg/g to 56 mcg/g, moderate – below 1.0 mcg/g, in almonds and dried apricots and grape shinny.

From conditionally essential trace elements, we studied bromine and nickel in the composition of fruit and fruit foods. Bromine from 1.0 mcg/g to 42 mcg/g were detected in vineyard products – dry table wine, decoction from the vine of the vineyard, black kishmish, as well as in figs, walnuts and dried plum. The data in the literature on the functional role in the mother and child's body are insufficiently covered, in this regard, nutritional support for deficient conditions requires further development.

Brain elements in the body are presumably involved in the conduction of mammalian brain impulses, the functional role of these elements in the body of children remains unexplored, perhaps they are involved in metabolic processes in the body. Of the brain elements in the composition of food products, we have studied gold and silver. In all products, gold and silver are contained in very low concentrations - from 0.001 mcg/g to 0.005 mcg/g.

Abiogenic elements took their place in animal metabolism due to their weak reactivity, despite their widespread occurrence in the lithosphere, participated in the metabolism of marine forms of organisms, which determined their further competition in the metabolism of land species (leading to pathology). We have studied rubidium, scandium and barium from abiogenic elements. Thus, rubidium in high concentrations from 10 mcg/g to 74 mcg / g is contained in vineyard products – dry table wine, decoction from the vine of the vineyard, grape gurob and grape shinny. A moderate amount of rubidium was found in grapes, dried apricots, peanuts, dried plum, pistachio, dried mulberry, peach, Since rubidium of the highest concentration is contained in healthy foods, it can be considered closer to essential trace elements. Barium from 3.0 mcg / g to 35 mcg / g is available in grape gurob, figs and dried plum, which means it can be useful for the body. Scandium exists in very

low amounts in food products – from 0.001 mcg/g to 0.01 mcg/g, obviously it does not play a significant role.

Of the aggressive toxic elements in the composition of food products, we have studied mercury. In all food products, the mercury content ranges from 0.001 mcg/g to 0.2 mcg/g. This indicates the harmlessness of food products of the local flora for the body of the mother and child. Products such as hawthorn, walnut, decoction from the vine of the vineyard contain about 1.0 mcg / g of mercury, in this regard, these products are undesirable for young children.

Consequently, the analysis of abiogenic and toxic elements in the composition of food products of fruit and fruit origin grown in the Zarafshan Valley region revealed very low levels of these elements in the composition of all listed foods, which indicates a guarantee of safety for mother and child.

Thus, fruit and vegetable food products grown in the Samarkand region are characterized by a high content of essential, low content of brain, abiogenic, aggressive and toxic elements, which indicates high biological activity and safety for the child.

CONCLUSIONS

Nutritional and micronutrient support using fruit and vegetable foods containing high concentrations of micronutrients should be recommended in order to optimize the growth and development of children and the micronutrient status of the body and its functions, accelerate the recovery processes and improve the quality of life.

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