DIET IN THE NORTH

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SOURCES OF VITAMINS B_1 AND B_2 IN FOOD

This article presents the content of vitamins B1 and B2 in the most used foods: cereals, legumes, meat and lactic acid. The aim of the work was to determine the level of vitamins in the most consumed products, taking into account the heat treatment. The level of vitamins was determined by fluorimetric methods on a fluorimeter.

The results of the study showed that heat treatment affects the content of these vitamins. Moreover, the greatest losses of thiamine in the preparation of products are from 20% to 71.5%, and riboflavin from 16.3% to 71.5%. The results of our studies indicate that the intake of vitamins B1 and B2 with food does not fully satisfy the daily requirement of the body.

Keywords: thiamine, riboflavin, food, heat treatment, vitamins, Yakutia, human health.

Introduction. Human health is closely linked to good nutrition. Nutrition provides the most important function of the human body, supplying it with the energy necessary to cover the costs of vital processes. Cell and tissue renewal also occurs due to the ingestion of “plastic” substances – proteins, fats, carbohydrates, vitamins and mineral salts – into the body with food.

As is known, a feature of vitamins is that they are either not synthesized at all in the human body, or are synthesized in the human body in very small quantities that do not satisfy the human need. Therefore, the body's supply of vitamins is directly dependent on their content in food and the degree of digestibility of these vitamins in the gastrointestinal tract. Pathological disorders can be caused by both vitamin deficiency and hypervitaminosis. Long-term deficiency of certain vitamins can cause severe pathologies leading to disability, and long-term vitamin deficiency can be life-threatening [1, 10].

It is known that the need for vitamins of the inhabitants of the Far North is increased in comparison with those who live in the European part of Russia - in more favorable climatic conditions. Studies on the provision of vitamins to the inhabitants of Yakutia are insufficient. There are only a few publications regarding ascorbic acid, retinoids and tocopherol. It should be noted that the actual content of vitamins in food products of residents of the Far North (Yakutia) has not been studied.

The aim of this work is to determine the level of vitamins B1 and B2 in the most used products, taking into account the heat treatment.

Materials and methods. The research materials were food products: cereals - buckwheat kernel and barley; legumes - peas and beans; meat products - beef fillet, boiled liver and sausage, lactic acid product - hard cheese and chicken egg. Food products were analyzed before and after heat treatment. Heat treatment of cereals and legumes by boiling in water until crumbly.

The level of vitamins was determined by fluorimetric methods on a fluorate "Fluorate 02- ABLF" at the wavelengths of thiamine -320-390 nm, riboflavin - 360-480 nm [8,9]. Statistical data processing was performed using standard methods of mathematical statistics using the STATISTICA program.

Results and discussion. Since vitamins are destroyed during the heat treatment of second courses, we determined the content of thiamine and riboflavin before and after heat treatment. The data we obtained are presented in tables 1 and 2.

An analysis of our data showed that before heat treatment, most of all vitamin B1 is contained in buckwheat, from legumes - peas, and from products of animal origin - beef liver. The smallest thiamine content was found in chicken eggs and cheese (Table 1).

The highest level of vitamin B2 before heat treatment was noted in buckwheat. The content of riboflavin in beans and peas is virtually the same: 0,18 μg / 100 g and 0,19 μg / 100 g, respectively. In chicken eggs and in beef liver, the level of riboflavin was also kept in the same range. The smallest B2 content was noted in barley groats (Table 2).

According to the results of our research, buckwheat, beef liver and legumes are the most valuable food products for the content of thiamine and riboflavin before heat treatment. Our data do not contradict the literary information. So, according to the data presented in the tables of the content of basic chemicals in food products of the Institute of Nutrition RAMS in buckwheat groats, the thiamine content ranges from 0,40 – 0,45 mg / 100 g. However, in beef meat and, especially, in beef liver according to our data, thiamine contains more. Probably, this fact can be explained by a richer content of biologically active substances in pasture plants [12]. As for riboflavin, its actual content in the products we studied does not differ from the literature [1, 2, 3].

The daily requirement of the human body for thiamine is 1.5-2.0 mg, and in riboflavin 2,0-2,5 mg. In [4, 5, 7, 10], there is evidence that the daily diet of the inhabitants of Yakutia does not provide a daily need for water-soluble vitamins.

Thiamine is found in animal and plant cells in a free, esterified and bound form. The main form of thiamine in living cells is its coenzyme form - thiamine diphosphate (TDP). The thiamine content in food is relatively small (from 0.2-0.5 mg per 100 g). Thiamine is not deposited in the human body, and the renewal of existing stocks in most organs and tissues is characterized by high speed. The biochemical mechanism of thiamine utilization is due to the fact that it, in the form of a coenzyme of thiamine diphosphate, is involved in the decarboxylation of pyruvate. Decarboxylation of pyruvate is associated with the complete oxidation of glucose, which provides a high level of functional activity of muscles and the heart. In addition, vitamin B1 normalizes the nervous and emotional state, since it is involved in the synthesis of the neurotransmitter acetylcholine, a deficiency of which leads to the formation of polyneuropathy [5, 6, 14].

Riboflavin is widely distributed in nature and occurs in three forms: free riboflavin, flavin mononucleotide (FMN) and flavin adenine dinucleotide (FAD). Riboflavin is found in almost all foods.

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Vitamin B1 in foods before and after heat treatment

Food	Thiamin. mcg/100 g		Riboflavin. mcg/100 g	
	Before heat treatment	After heat treatment	Before heat treatment	After heat treatment
Buckwheat	0.42±0.02	0.12±0.04	0.21±0.06	0.06±0.01
Barley groats	0.27±0.01	0.21±0.06	0.08±0.02	0.03±0.01
Beans	0.50±0.10	0.40±0.10	0.18±0.05	0.11±0.07
Peas	0.80±0.30	0.30±0.10	0.19±0.05	0.15±0.04
Beef meat	0.11±0.01	0.06±0.01	0.15±0.04	0.09±0.05
Beef liver	0.90±0.50	0.30±0.10	2.11±0.70	1.19±0.11
Chicken egg	0.07±0.03	0.04±0.02	0.43±0.03	0.36±0.15
Hard cheese	0.04±0.01	-	0.44±0.04	-
Cooked sausage	0.12±0.04	-	0.15±0.04	-

The human body does not synthesize riboflavin unlike plants, a number of bacteria, molds and yeasts. Therefore, riboflavin enters the body only with food. Riboflavin is a precursor to the coenzymes of flavin adenine dinucleotide (FAD) and flavin mononucleotide (FMN), which are involved in redox reactions of the respiratory chain, in the Krebs cycle, in the oxidation of fatty acids, in detoxification and detoxification of carcinogens in the liver [1,13].

As you know, the technology of cooking affects the content of vitamins. During heat treatment, the level of vitamins decreases as a result of the destruction of their chemical structure. The data presented in tables 1 and 2 indicate that heat treatment several times reduces the level of vitamins in food. In the process of heat treatment of cereals and legumes, a number of physico-chemical changes occur in the substances contained in these products. During cooking, the water level in them increases significantly as a result of its absorption by gelatinizing starch.

According to our data, the content of vitamin B1 in buckwheat as a result of heat treatment decreased 3,5 times, which corresponds to a loss of this vitamin by 71,5%. And in barley groats the thiamine level decreased by 22% (1.2 times) (Fig. 1).

The level of vitamin B2 in buckwheat and barley groats after heat treatment decreased by 71.5% (3.5 times) and by 62.5% (2.6 times) (Fig. 2).

The same pattern was observed for legumes - peas and beans. Thus, heat treatment reduced the content of vitamin B1 in peas by 62.5% (2,6 times) and in beans by 20% (1.2 times) (Fig. 3).

The level of vitamin B2 in peas after heat treatment decreased by 21, 1% (1,2 times), and in bean 38,9% (1,6 times) (Fig. 4).

The loss of vitamin B1 during heat treatment of a chicken egg (6 minutes) decreased by 42,9% (1,7 times), and vitamin B2 by 16,3% (1,1 times) (Tables 1 and 2).

In the literature, there is evidence that when cooking buckwheat, 22,4% of vitamin B1 is destroyed. Loss of thiamine up to 60% (Table. 1) is probably due to a longer heat treatment time.

We analyzed the change in the level of these vitamins in beef and beef liver before and after heat treatment.

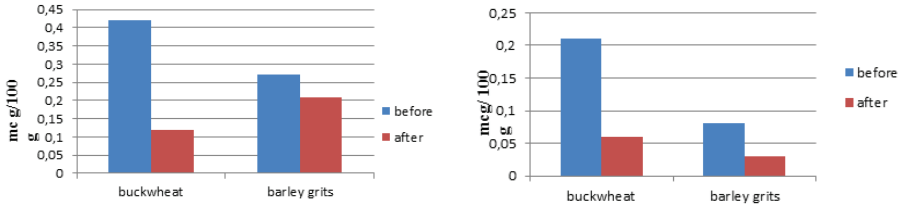

Fig 1. The content of vitamin B1 and B2 in buckwheat and barley groats before and after heat treatment

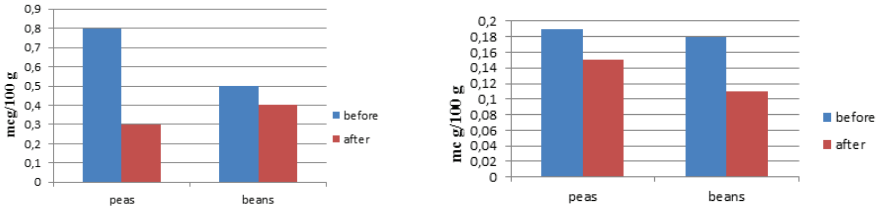

Fig 3. The content of vitamin B1 and B2 in peas and beans before and after heat treatment

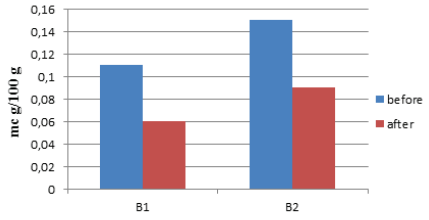

Fig 5. The content of vitamins B1 and B2 in beef meat before and after heat treatment

The level of vitamin B1 of boiled beef decreased by 45,5% (1,8 times), and in boiled beef liver – 66,7% (3 times) (Fig. 5).

The content of vitamin B2 after heat treatment decreased in beef meat by 40% (1,6 times), and beef liver by 43,7% (1,7 times). During the heat treatment of meat products, a significant loss of vitamins occurs, both due to the transition to a solution, and due to thermal decomposition. According to published data, heat treat-ment leads to the loss of thiamine by 25-45%, and riboflavin by 8-40%. It should be noted that when cooking vitamins more is lost than when frying.

Conclusion. Vitamins B1 and B2 are involved in the synthesis of the main energy substrates in the human body, which is very important for people living in the extreme conditions of the Far North. Therefore, adequate intake of vitamins with foodstuffs most frequently consumed by residents is of great importance in maintaining health.

The richest vitamin B1 of the foodstuffs we have studied is buckwheat, beef liver, beans and peas, the least is found in cheese and chicken eggs. Vitamin B2 was most found in beef liver, chicken egg and cheese, least in barley, cooked sausage and beef. Their entry into the human body depends on heat treatment. Thermal processing of food products on the one hand promotes assimilation, and on the other hand leads to significant loss of vitamins.

The results of our studies indicate that the intake of vitamins B1 and B2 with food does not completely satisfy the daily requirement of the body. Further study of the intake of vitamins with food into the body, as well as the technology of their preparation are of great importance in maintaining human health.

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DIETARY HABITS OF SCHOOL CHILDREN IN RURAL AREAS OF THE REPUBLIC SAKHA (YAKUTIA)

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The results of dietary habits and preference of certain products in school children of Kysyl-Syr, Namsky region of the Republic of Sakha (Yakutia) are represented in the article. We have assessed nutrition and health status of 64 adolescents, aged from 12 to 16.

The result of data analysis shows that children in Namsky region consume more meat rather than fish, unlike the children in the Arctic regions of the Republic of Sakha (Yakutia). Fish is consumed rarely, only several times a month – 48.4%, or even less than once a month – 37.5%. Beef is more consumed out of the other meat products. In the Arctic regions poultry and game products are eaten more. It is revealed that dairy products are daily consumed by a less than a half of the survey group – 39%, the rest 37.5% consume several times a week. A lack of vegetables and fruit in the diet results in significant drawback. Only 15.6% ate vegetables daily, and 12.5% ate fruit. Children prefer bakery and confectionary products. Food preferences of most of them are sweets, fizzy drinks and excessive amount of salt.

We have examined and revealed the structure of morbidity in children of the Namsky region.

Dental pathology was most commonly revealed (53.1%). In Namsky region people use water from the river Lena, where the fluoride level is low. The diseases of the respiratory system were present in 37.5%, mostly ENT disorders, which were possibly associated with unfavourable environmental conditions, chronic infections, incorrect dietary habits and stress. Muscular skeletal system diseases were present in 26.6%. Commonly it was associated with the deficiency of vitamin D, lack of exposure to sunlight, as there are few sunny days, and insufficient amount of vitamin D in the diet (fish, eggs, milk).

The obtained results revealed food habits in school children of the Central regions of the Republic of Sakha (Yakutia).

The results of the survey require improved organization of the children dietary habits.

Keywords: dietary habits, school children, the Republic Sakha (Yakutia).

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Introduction. The epidemiological surveys, performed in different regions of Russia, show considerable disturbances in dietary habits and health in school children. These disturbances result from misbalance of main food substances, insufficient amount of polyunsaturated fatty acids, vitamins, macro and microelements (calcium, iron, iodine etc.), and dietary fibers. Excessive amount of bakery, confectionary products, salt and additional sugar is common for all surveys all over. This dietary misbalance results in decreased health index in children and adolescents.

Dietary habits of children and teenagers of the Republic of Sakha (Yakutia) have their regional peculiarities, characterized by low energy value, deficiency of main food components, unbalanced nutritive density, and poor formation of traditional value and food culture. Diet is restricted it is characterized by insufficient amount of dairy products, meat, fish, veg-