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THE ANALYSIS OF ACTUAL NUTRITION OF ELDERLY POPULATION OF YAKUTSK

The study carried out on elderly and senile aged population of Yakutsk city, including long-livers, testifies to imbalanced diet on fatty and carbohydrate components, as well as energy value in different ethnic and sex age-groups.

Keywords: actual food, chronic non-infectious, elderly, senile age, long-livers, geriatrics, gerontology, epidemiology.

Introduction. For the last decades a higher amount of the aged all over the world has been noted. The ageing is considered to be a natural biological process. It is possible to slow down this process by keeping regular lifestyle and labour activity, arranging mode and character of work and rest, controlled physical activity, giving up bad habits and having healthy nutrition. The nutrition of older people should be of full value and balanced with the account of age features of their organism [3]. It has been established that indigenous population of the Far North sustains to fiber - lipid food causing the formation of a "polar metabolic type» [1, 2, 5]. Now in the north the population keeps various types of nutrition and the change of traditional food with climatic - geographical and business factors can lead to development of alimentary - dependent pathology. According to data of the epidemiological researches conducted, any nutrients affect on population's health, including occurrence of chronic non-infectious diseases (CND). Earlier conducted researches in Yakutia have revealed that food deficiency is subject to combined insufficiency of macro- and micronutrients [1, 2, 5] and more expressed at the elderly [2]. At the same time, the nutrition features of the elderly and senile aged people, including long-livers, have not been studied well in Yakutia. Considering the importance of nutrition factors in preserving health and active longevity, it is necessary to use certain methods of preventing and correcting nutrition factors in the development CND.

Aim: to study the structure of actual nutrition of elderly and senile aged urban population of Yakutia, including long-livers.

Materials and methods. In this work the results of epidemiological studies of CND risk factors have been presented. Inhabitants of Yakutsk city of both sexes at the age of 60 years and

more were the objects of the research. 575 people have been included in database for the analysis of actual nutrition (244 men and 331 women), 45,9 % of them referring to the Yakuts.

The research was conducted on the basis of SIH RS (Y) «Republican Hospital №3». Standardized questionnaires were used in the survey. This research has been approved by ethical committee at YSC CMS SD RAMS. The informed consent was obtained from all the surveyed for participation in the research for biochemical and molecular - genetic analyses of blood included.

The state of actual nutrition was studied by a frequency method [17]. A specially constructed mathematical model developed by SI SRI of Therapy SD RAMS (Verevkin E.G., Cand. Biol. Sciences, 2000) and tables of chemical compound of food substances [4] showed the content of following nutrients in daily ration such as: general fibers, fats, including sated fatty acids (SFA), mono-non-saturated (MNSFA) and poly-non-saturated fatty acids (PNSFA), general, complex and simple carbohydrates, as well as daily energy value. The ration energy value was calculated by means of standard calorie factors in kcal per 1 gram: 4 kcal for fibers and carbohydrates, 7 kcal for alcohol and 9 kcal for fats. A portion of consumption of the basic substances was determined in % of the daily general caloric content.

The statistical processing and data analysis were carried out by means of software package SPSS (11,5 version). Values $p < 0,05$ were considered authentic.

Results and discussion. The data obtained by us shows that the average energy value of daily ration in the surveyed elderly population sample was equal to 1824,8 kcal a day. Thus, the energy value among men was slightly higher than at women (Tab. 1). The energy value in the Yakut ethnic group was significantly lower than among the European ethnic group (Tab. 1) at the expense of simple carbohydrates at the latters.

The average fiber content has amounted to 62,1g in absolute values, this parameter corresponding to 13,8 % of ration energy. The fiber content in men's daily ration in absolute values was authentically higher as compared with women's, however, distinctions were not the same in relative value. The fiber daily consumption at indigenous population also in absolute values was essentially lower than at arrived ones, though in relative values these indicators did not differ in both ethnic groups (WHO recommendations in 10-15 %) (Tab. 1). The analysis of food ration in the sample detected the basic fiber sources estimated in 24,4 % of bakeries, flour and grain meals, 24,0 % of meat products, 18,3 % of dairy products.

The content of general fat in food ration was higher both in absolute (82,4) and in relative values (40,2 % of energy) (no more than 30 % of energy by WHO). Higher general fat content was noted among men, this parameter being higher than similar indicator among women. The general fat in daily consumption of the Yakut group was lower in comparison with the European

group. The portion of SFA energy was 15,4 % in food allowance of the surveyed, it being higher than recommended ones (WHO recommends less than 10 % of energy). In man's population the SFA content is higher than among women (Tab. 1). The SFA content was higher at Yakuts than at Europeans. Within the recommended values in the food ration of the surveyed there was 13,7 % of MNSFA energy (10-15 % of energy by WHO) (Tab.1). The MNSFA content was higher at men than at women, however authentic distinctions between ethnic groups have not been revealed. The portion of PSFA energy in ration of the surveyed has not shown authentic distinctions in sex and ethnicity (6-10 % is the level recommended by WHO) (Tab. 1). The ratio of PNSFA/SFA was 0,5, it being lower than the recommended values. This indicator testifies to the higher content of animal fats. The basic sources of fat in food ration of the surveyed consisted of meat products estimated at 36,2 %, dairy products - 15,4 % as well as oil and fats - 13,8 %.

The content of general carbohydrates in food ration of the surveyed was lower and has made 206,7 g per day, it corresponding to 45,6 % of energy of the ration (WHO recommends 55-75 %). The average daily consumption of general carbohydrates was higher at women and newcomers (Tab. 1). In case of the low consumption of general carbohydrates, the content of refined sugar has been increased in daily ration and has amounted to 15,8 % of daily caloric content. The rations of both men and women surveyed were also characterized by the high content of refined sugar. Besides, the consumption of refined sugar among the Yakuts was authentically lower in comparison with the similar indicator of the Europeans. The fiber content in food ration of the surveyed was 16,7g at average (WHO recommended level is 16-24g a day). The receipt of food fibers was higher at men and lower at indigenous population (14,6g) (Tab. 1). The starch content in food ration of the surveyed has made 27,4 % of energy value, it being relatively higher at men in comparison with women. The rations of the surveyed Yakut group contained less cellulose, lactose, however the starch receipt was higher in comparison with the European group (Tab. 1). In structure of carbohydrates the greatest contribution was provided by such foodstuffs as farinaceous foods and groats rated at 42,8 %, then sugar, chocolate and confectionery products - 23,9 % and dairy products - 7,9 %.

In comparing the actual nutrition by age criteria, there has been essential decrease in the content of some nutrients and energy values with the years (Tab. 2). The daily average content of fiber, general fat in relative values did not differ at the range of 60-89 years and higher in the group of 90 years and over. The SFA content in the group of 70-79 years has made 15,6 %, this parameter being higher than the similar indicator among the age group of 60-69 years estimated at 15,1 % of energy ($p < 0,05$), at the age of 80-89 years - 15,3 % of energy, and among long-livers this indicator was equal to 15,4 % of power value. The MNSFA content in food ration of

all the groups authentically differed only at long-livers rated at 15,0 % of energy ($p < 0,001$). The higher rate of PNSFA content was estimated in the senior age groups (Tab. 2). The content of general carbohydrates was lowered with the years. The highest consumption was noted in the groups of 60-79 years - 46,2 % and 46,8 % of energy accordingly, while authentic distinctions were noted among long-livers of 80-89 years - 40,8 % and 45,7 % of energy accordingly ($p < 0,001$). The rations of the surveyed were characterized by the high content of refined sugar which also decreased with the years. The starch content in food ration of the surveyed differed in the group of 70-79 years and among long-livers and has made 27,0% in the group of 60-69 years, 28,2 % at 70-79 years ($p < 0,05$), 27,4 % at 80-89 years, 26,1% in group of 90 years and over ($p < 0,01$). The consumption of food fibers has been lowered with the years, thus the minimum content was marked in the group aged 90 years and over.

«The pyramid of healthy food» was offered by WHO experts for practical implementation of the study, where the prior qualitative and quantitative ration content is presented. «The food pyramid» has also revealed disparity of basic products in the daily food ration (Fig. 1).

Conclusion.

- 26 The nutrition content of the surveyed sample aged 60 years and over has unbalanced character concerning to fatty and carbohydrate components: the high portion of general fat, including sated fat, the high content of refined sugar due to low consumption of complex carbohydrates both at men and at women of the Yakut and European ethnic groups. The consumption of food fibers is noted to be lower at the Yakut group. The general energy value of food ration is higher among the Europeans as compared with the Yakut ethnic group.
- 27 The gradual decrease of general power value in food ration, general carbohydrates with the content of refined sugar and low food fibers has been detected with the increase of general fat consumption, including MNSFA and PNSFA with the years.
- 28 «The food pyramid» does not correspond to the qualitative and quantitative structure of the ration.

Table 1

Characteristics of basic food substances and energy at men and women
of Yakutsk city aged 60 years and over, M $\pm$ SD

Nutrients	Total population (n=575)	Men (n=244)	Women (n=331)	The Yakut ethnic group (n=264)	The European ethnic group (n=298)
General protein, g/a day	62,1 $\pm$ 0,9	68,4 $\pm$ 1,5	57,4 $\pm$ 1,1***	59,6 $\pm$ 1,2	64,0 $\pm$ 1,4*
General fat, g/a day	82,4 $\pm$ 1,5	92,4 $\pm$ 2,4	74,9 $\pm$ 1,7***	79,7 $\pm$ 2,0	84,2 $\pm$ 2,2
SFA, g/a day	31,8 $\pm$ 0,6	35,9 $\pm$ 1,0	28,8 $\pm$ 0,7***	31,2 $\pm$ 0,8	32,1 $\pm$ 0,9
MNSFA, g/ a day	28,1 $\pm$ 0,5	31,9 $\pm$ 0,9	25,3 $\pm$ 0,6***	27,0 $\pm$ 0,7	29,0 $\pm$ 0,8
PNSFA, g/ a day	16,0 $\pm$ 0,3	17,3 $\pm$ 0,5	15,0 $\pm$ 0,5***	15,5 $\pm$ 0,5	16,3 $\pm$ 0,4
PNSFA:SFA	0,5 $\pm$ 0,01	0,5 $\pm$ 0,01	0,6 $\pm$ 0,01***	0,5 $\pm$ 0,01	0,5 $\pm$ 0,01
General carbohydrates , g/a day	206,7 $\pm$ 3,4	223,2 $\pm$ 5,3	194,5 $\pm$ 4,3***	194,3 $\pm$ 4,7	217,4 $\pm$ 4,9**
Sugar, g/a day	74,1 $\pm$ 1,9	74,7 $\pm$ 3,2	73,7 $\pm$ 2,4	62,4 $\pm$ 2,5	84,2 $\pm$ 2,8***
Starch, g/a day	121,5 $\pm$ 1,9	136,9 $\pm$ 2,7	110,1 $\pm$ 2,4***	121,8 $\pm$ 2,8	121,2 $\pm$ 2,5
Lactose, g/ a day	9,2 $\pm$ 0,3	9,6 $\pm$ 0,6	9,0 $\pm$ 0,4	8,2 $\pm$ 0,4	10,1 $\pm$ 0,5**
Cellulose, g/a day	6,2 $\pm$ 0,1	6,2 $\pm$ 0,2	6,1 $\pm$ 0,2	5,4 $\pm$ 0,2	6,8 $\pm$ 0,2***
Food fibers, g/a day	16,7 $\pm$ 0,3	17,4 $\pm$ 0,4	16,1 $\pm$ 0,4*	14,6 $\pm$ 0,3	18,5 $\pm$ 0,4***
Energy value, kcal	1824,8 $\pm$ 28, 2	2016,9 $\pm$ 45, 1	1683,2 $\pm$ 33,9***	1747,1 $\pm$ 38,2	1888,3 $\pm$ 41,5**
% protein energy	13,8 $\pm$ 0,1	13,7 $\pm$ 0,1	13,8 $\pm$ 0,1	13,8 $\pm$ 0,1	13,7 $\pm$ 0,1
% fat energy	40,2 $\pm$ 0,3	40,8 $\pm$ 0,4	39,8 $\pm$ 0,3*	40,8 $\pm$ 0,4	39,6 $\pm$ 0,4*
% SFA energy	15,4 $\pm$ 0,1	15,7 $\pm$ 0,2	15,2 $\pm$ 0,2*	15,8 $\pm$ 0,2	15,0 $\pm$ 0,2***
% MNSFA energy	13,7 $\pm$ 0,1	14,1 $\pm$ 0,2	13,4 $\pm$ 0,1**	13,8 $\pm$ 0,2	13,6 $\pm$ 0,2
% PNSFA energy	7,9 $\pm$ 0,1	7,8 $\pm$ 0,2	8,0 $\pm$ 0,1	8,0 $\pm$ 0,2	7,8 $\pm$ 0,1
% carbohydrate energy	45,6 $\pm$ 0,2	44,6 $\pm$ 0,4	46,3 $\pm$ 0,4**	44,7 $\pm$ 0,4	46,5 $\pm$ 0,4**
% sugar	15,8 $\pm$ 0,3	14,3 $\pm$ 0,4	17,0 $\pm$ 0,3***	13,9 $\pm$ 0,3	17,5 $\pm$ 0,3***

energy					
% starch	27,4±0,3	28,1±0,4	26,9±0,4*	28,5±0,4	26,5±0,4***
energy					
% lactose	2,0±0,1	1,8±0,1	2,1±0,1*	1,9±0,1	2,1±0,1
energy					
% cellulose	1,4±0,02	1,2±0,03	1,5±0,03***	1,3±0,02	1,5±0,03***
energy					
% food fiber	3,7±0,04	3,5±0,1	3,9±0,1***	3,4±0,1	4,0±0,1***
energy					

Note: M – average arithmetical parameter, SD – standard deviation. * p<0,05; ** p<0,01; *** p<0,001.

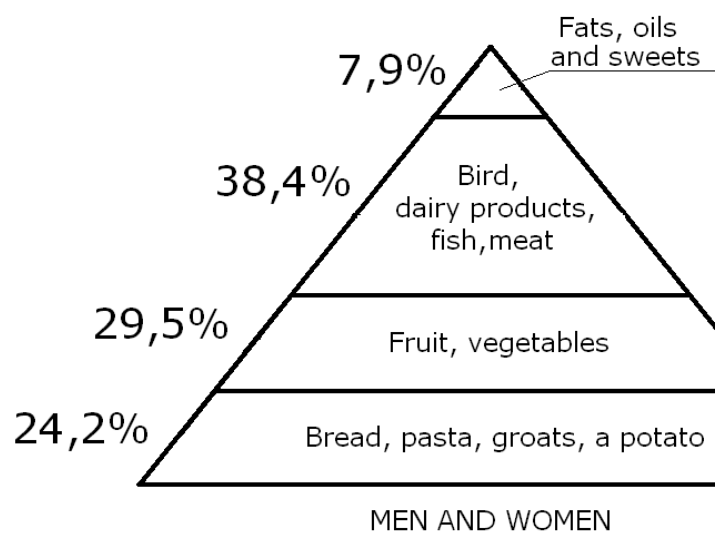
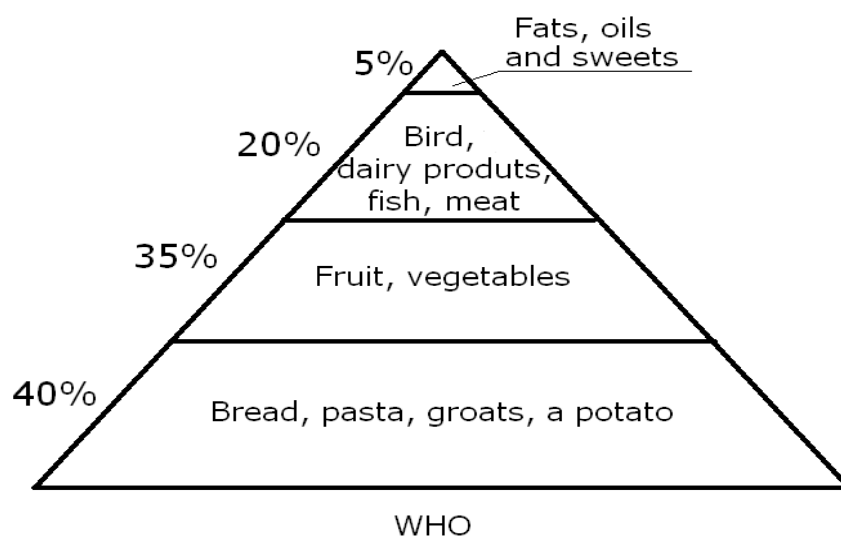
Table 2

Age-referred characteristics of basic food substances and energy in food ration of men and women
of Yakutsk city

Age	60-69 years (I) (n=179)	70-79 years (II) (n=192)	80-89 years(III) (n=132)	90 years and over (IV) (n=72)	p
Nutrients	M±SD, g/ a day				
General protein	68,3±1,7	63,1±1,5	55,4±1,7	56,1±2,8	I- II*, I- III **, I-IV***, II- III***, II-IV***
General fat	89,5±2,6	82,7±2,2	75,2±2,9	76,8±5,3	I- III **, I-IV***, II-III**, II-IV**
SFA	34,3±1,1	33,1±0,9	29,0±1,3	27,1±2,2	I- III **, I-IV***, II-III**, II-IV***
MNSFA	30,8±1,0	28,1±0,8	28,1±0,8	26,2±1,8	I- II***, I- III **, I-IV***, II- III*, II-IV*
PNSFA	17,3±0,67	14,7±0,5	14,9±0,7	17,7±1,1	I- II*, I- III **, II-IV*, III- IV*
PNSFA:S FA	0,5±0,02	0,5±0,01	0,6±0,02	0,7±0,02	I- II***, I-IV***, II-III***, II-IV***, III-IV***
General carbohydr ates	230,9±6,4	217,7±4,9	186,9±6,8	153,0±8,8	I- III **, I-IV***, II-III**, II-IV***, III-IV***
Sugar	85,3±3,4	76,7±2,9	68,6±4,2	49,8±5,6	I- III **, I-IV***, II-III**, II-IV***, III-IV***
Starch	133,5±3,9	129,2±2,9	108,4±3,1	95,1±3,8	I- III **, I-IV***, II-III**, II-IV***, III-IV**
Lactose	10,0±0,6	9,7±0,6	8,6±0,7	7,0±5,7	I- III **, I-IV***, II-IV**
Cellulos e	7,2±0,3	6,5±0,2	5,3±0,2	4,3±0,2	I- II*, I- III **, I-IV***, II- III***, II-IV***, III-IV***
Food fibres	19,3±0,5	17,7±0,4	14,5±0,5	11,5±0,5	I- II*, I- III **, I-IV***, II- III***, II-IV***, III-IV***
Энергоцен ность, ккал	2012,1±52, 3	1879,9±41,4	1651,2±55,4	1530,3±90,5	I- III **, I-IV***, II-III**, II-IV***, III-IV*

Note: M – average arithmetical parameter, SD – standard deviation. * p<0,05; ** p<0,01; *** p<0,001.

Fig. 1





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