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## CLINICAL MANIFESTATIONS OF ATHEROSCLEROSIS AMONG THE GROUP OF PATIENTS OVER 60 YEARS OF AGE WITH CHD LIVING IN CONDITIONS OF THE FAR NORTH

### ABSTRACT

The clinical manifestations of atherosclerosis in the indigenous and non-indigenous population in a group of patients with CHD older than 60 years, living in the Far North, were studied. The highest frequency of myocardial infarction has been identified (at the time of the survey) among the group of patients of senile age (75 years). The frequency of myocardial infarction and angina pectoris decreases as the age increases. The gender disparities have been observed on clinical manifestations of angina pectoris that can be clearly monitored in the indigenous group. The analysis of five-year survival observation revealed the senile age, myocardial infarction and higher class of angina pectoris to be the most relevant factors of mortality in the group of people over 60 years of age.

**Keywords:** coronary heart disease, myocardial infarction, non-indigenous, indigenous (Yakut) population, elderly, senile age, long-livers.

**Introduction.** The death from the diseases of the circulatory system has been rated the major cause in Russia and mostly due to CHD [8]. In Russia more than 50% of mortality accounts for cardiovascular diseases compared to in West countries. Furthermore, more than 80 per cent of fatal cases are related to the CHD and cerebral stroke [5,7,10]. From the studies it can be seen that CHD is still one of the major health-related issues and more common among the older and senior aged population rather than young [6,12]. Myocardial infarction (MI) is one of the serious forms of CHD for people aged over 60. According to studies, the compared analysis of the mortality rate due to MI taken from 2006 to 2015 years revealed the significant increase of the death rate in the group of long-livers and its stability in the group of patients aged 80 years and older [3]. Most patients with cardiovascular diseases living in the Far North have demonstrated the significant change in the threshold of the physiological reaction to the climatic factors that in turn lead to the decrease of body adaptation

to the external environment. Severe climatic factors of Sakha Republic are proved to play the negative role in the formation and prognosis of the different diseases, particularly the atherosclerosis and myocardial infarction [11, 13].

**Purpose.** To study the clinical manifestations of atherosclerosis in the group of patients with CHD aged over 60 years living in the Far North.

**Materials and methods.** We analyzed 354 patients aged 60 years and older with a verified diagnosis of CHD who had passed the examination and treatment at Cardiology department of Geriatric Center, Yakutsk city. The studied population were divided into two groups as following: native – Yakut people (100%) (n=205, average age 77,6±0,6) and non-native – Russians (91,3%), Ukrainians, Tatars and Germans (8,7%) (n=149, average age 75,5±0,7). We divided all the surveyed patients based on gender – men (n=187) and women (n=167), on age – elderly (from 60 to 74 years, n=154), senile (from 75 to 89 years, n=149) and long-livers (aged 90 years and over, n=51) (WHO, 1963). By the time of the

study, the period of residence of non-native patients in Yakutia was more than 30 years.

The diagnosis of CHD was verified based on complaints, medical history, laboratory research, data taken with instrumental methods – electrocardiographs (ECG with the use of Minnesota code) for the estimation of ECG [Rose G.A. et al., 1982]), echocardiography, Holter monitoring of ECG and careful study of patients' medical records taken from repository of medical authority.

The local committee on biomedical ethics at Science Centre of Complex Medical Problems approved the study.

Parametric and non-parametric statistical methods were used to conduct the statistical processing of the received results. Student's T-test was applied to estimate the cross-group differences in evidence having continuous distribution, while Pearson Chi-square test and Fisher's method were used for comparison of frequency values. Other used methods were Kruskal-Wallis H test, one-, two- and three-factor analysis

of variance (ANOVA). The comparison of paired samples was implemented using the paired Td test (Student's). The analysis of dependency between the indicators was conducted with the use of the following criteria: Pearson product-moment correlation coefficient (Pearson's  $r$ ), Spearman Rank-order Coefficient ( $r_s$ ) and  $\chi^2$ -Pearson criterion. Used also the linear discriminant analysis method. The statistical processing of the material was conducted with Statistica for Windows (v. 6.0). The figure 0.05 was taken as the critical level of credibility of nil statistical hypothesis (the absence of significant distinctions or factor influences).

**Results.** The frequency of MI was 56,2% (199 patients out of 354). MI was found in 53% of cases among non-native representatives ( $n=79$ ), native – 58,5% of cases ( $n=120$ ) ( $\chi^2=0,85$ ;  $p>0,10$ ).

The study revealed MI to be more common with pathological Q-wave (27,4%), less frequently with non-Q wave (16,1%) and MI established based on medical history.

No statistical differences were received ( $p>0,10$ ) on the MI's frequency between the non-native and native patients.

Yakut people with MI have a more often tendency (change the word) to the damaged anterior wall of left ventricular non-Q ( $\chi^2=3,64$ ;  $p=0,056$ ) and significantly more often - across the whole anterior wall ( $\chi^2=4,44$ ;  $p=0,035$ ).

Non-native patients demonstrate the changes in scarring of the anterior and posterior wall of the left ventricle - 16,8 and 12,8 respectively, native patients - 12,2 and 9,8% of cases. MI non-Q is more often observed among native people ( $\chi^2=3,76$ ;  $p=0,050$ ).

Macrofocal and microfocal MI were identified in the group of men and women with roughly the equal frequency, while MI by medical history was seen more often among men. The more detailed picture demonstrated the tendency of the increased scarring frequency of posterior wall ( $\chi^2=2,91$ ;  $p=0,088$ ) as well as anterolateral wall non-Q wave ( $\chi^2=3,45$ ;  $p=0,063$ ) among men.

The same frequency of MI with pathologic Q-wave was detected in the groups of elderly, senile age and long-livers ( $p>0,10$ ).

It was found that at senile age (149 patients) there were more cases of non-Q wave MI (22,8% cases, 34 patients) in comparison with other age groups ( $\chi^2=13,39$ ;  $p<0,001$ ). Furthermore, patients of senile age tend to have myocardial infarction of the anterior-partition with Q ( $\chi^2=7,56$ ;  $p=0,023$ ) and myocardial infarction established anamnestic (16,1% cases, 24 patients) ( $\chi^2=6,87$ ;  $p=0,032$ ) more often compared

to other age groups.

The group of long-livers demonstrated the approximately similar frequency of MI both with pathologic Q wave (23,6%) and non-Q (21,6%); much less likely MI established based on medical history (2,0% of patients).

Correlation analysis was used to determine the MI depending on age among the group of patients with CHD. Thus, the frequency of MI established based on medical history and non-Q decreases with age ( $r=-0,13$ ;  $p=0,048$  and  $r=-0,14$ ;  $p=0,030$  respectively).

The decrease with age can be noticed in frequency of MI with localization of posterior wall in the group of non-native patients ( $r=-0,17$ ;  $p=0,038$ ;  $r_s=-0,16$ ;  $p=0,046$ ) as well as in the circular MI ( $r=-0,16$ ;  $p=0,059$ ;  $r_s=-0,14$ ;  $p=0,099$ ). The previous stated tendency was not observed in the native group of patients.

The use of regression analysis revealed the downward trend in the proportion of Yakut patients after non-Q wave MI and also the lower number of people with MI anamnestic. The relative number of patients after non-Q wave MI decreases by 0,05% as the age of patients increases by 1 year. The similar picture is observed in the group with MI established anamnestic, the only difference is in slightly higher mortality rate - 0,06% (table 1).

As can be seen from the picture, the frequency of MI established based on medical history non-Q wave is complex (parabolic) function depending on the age of examined people. The mean value (for the whole range of age groups) of frequency Q neg is 19,0% (red horizontal line).

The frequency of non-Q wave MI established based on medical history does not depend on the age and accounts for 11,4% (blue horizontal line) for non-native population, which is far less than in the native group ( $\chi^2=3,76$ ;  $p=0,050$ ).

The highest frequency of non-Q wave MI and defined on medical history is found at age of 75 in the general group of patients. In the non-native group of patients, the highest frequency of MI of posterior wall with pathological Q wave and circular MI is found at age of 60 and 70 respectively. As for the native group, the highest frequency of non-Q MI and defined on medical history is found at age of 73 and 77 respectively.

Gender differences in clinical manifestations of angina can be traced in the group of native patients. Angina of III functional class ( $\chi^2=4,22$ ;  $p=0,040$ ) is more often identified among men. There is also the tendency of more frequent identification of unstable angina ( $\chi^2=2,71$ ;  $p=0,099$ ).

Native people tend to have different classes of angina depending on the age: the older the patients are, the less is the angina class ( $r=-0,16$ ;  $p=0,021$ ), which is not observed in the non-native group ( $r=0,14$ ;  $p=0,095$ ).

The frequency of angina detection decreases with age in the total group of patients: Functional Class (FC) II ( $r=-0,17$ ;  $p<0,001$ ), FC III ( $r=-0,16$ ;  $p=0,003$ ) and FC I ( $r=-0,12$ ;  $p=0,021$ ).

222 people out of 354 were included to the catamnestic follow up group. The share of the age groups was distributed as following: 40% ( $n=80$ ) – older people, 49,5 ( $n=101$ ) – people of senile age and 51,2% ( $n=41$ ) – long-livers. According to the analysis of survivability ( $n=222$ ), the patients with Q-negative MI and angina of FC II, III, IV were more common demonstrating 73,2% (41 people out of 56) ( $\chi^2=3,14$ ;  $p=0,073$ ) and 63,2% (134 people out of 212) ( $\chi^2=12,23$ ;  $p=0,032$ ) respectively. The main disease, which determined the high mortality rate in this group of patients, was CHD with the proportion of 51,5% ( $n=53$ ) in the structure of CVD. MI of the anterior wall (Q-positive) was recorded in anamnesis of 33 patients out of 222, 22 of them died within five years (66,7%). That was higher compared to the mortal cases due to other clinical form of CHD ( $n=81$ , or 42,9%) ( $\chi^2=6,40$ ;  $p=0,011$ ).

High mortality rate was observed in the group of patients with the acute form of CHD. Most clearly it can be seen while studying the causes of death of elderly patients. The angina of II, III, IV were identified in 116 patients (52,3%) and 209 (94,0%) had I, II, III. It was found that the higher angina, the higher was the risk of mortality in the group of patients CHD of older age groups (Table 2).

**Discussion.** The absence of significant ethnic diversities in the frequency of MI was not surprising as the frequency of CHD tends to increase with age [9]. The transferred large-focal MI was equally traced in all three age cohorts.

The analysis of MI depending on gender revealed that the men more often suffer from MI than the women. The latest can be confirmed by the results of studies conducted in Yakutsk during 2004–2006 years where MI was the cause of death 3 times more often in men than in women, due to the earlier progression of atherosclerosis [1].

The high frequency of MI (at the time of survey) was found at the age of 75 years in the general group, between 60 and 70 years in the non-native group of patients and 75–80 years in the native group. Judging by the incidence of MI in people of different ages, it can be assumed that atherosclerotic lesion of coronary

Table 1

The frequency of non-Q wave MI and MI anamnestic among the Yakut depending on the age (results based on regression analysis, n=205)

Indicator	Statistical parameters		
	b (coefficient of regression)	t	p
Non-Q wave MI	-0,00048	1,75	=0,081
MI anamnestic	-0,00059	2,38	=0,018

vessels in non-native patients occurs approximately 10 years earlier than in Yakut. The dependence of the vascular lesion by the atherosclerotic process on the national identity and adaptation of a person to the extreme conditions of the Far North can be traced in the number of works [1, 2, 9, 13].

The analysis of the data received on the frequency of angina showed no significant differences in relation to ethnicity, gender, and age. Our research determined the clear evidence of links between angina and age: the older is the patient, the less is the frequency of angina in every FC, particularly in II and III. The decrease with age in the number of patients after MI and high FC of angina are not related to the better prognosis for atherosclerosis over the years, but to the death of people who have previously been recorded with these diseases before they reach a more advanced age. This is also confirmed by the analysis of a 5-year follow-up observation. Mortality was statistically higher in the group with MI and high class of angina pectoris. Other literature sources indicate that the presence of CHD indisputably increases the risk of death in the elderly group of CVD and all other causes [4].

Considering the unfavorable prognosis of atherosclerosis with age and the impact of the length of stay in the Far North on its progression, it is necessary to conduct early preventive measures with the concern of the climatic features of the region.

### Conclusions

1. The highest frequency of MI occurs at senile age (75 years) aligning them into the group with high cardiovascular risk.

2. Dependency analysis revealed the decrease in MI and stroke with age (clearly seen in the group of the native population, and tendency to the decrease in the group of the non-native population).

3. Clinical manifestations of angina pectoris can be clearly traced in the group of Yakut patients depending on the gender: FC III angina is detected more often in men as well as the tendency to the more frequent display of unstable angina.

4. Based on the results of a 5-year follow-up observation, it was noted

that the most significant mortality factors in the group of people over 60 years of age are the senile age, MI and high class of angina pectoris.

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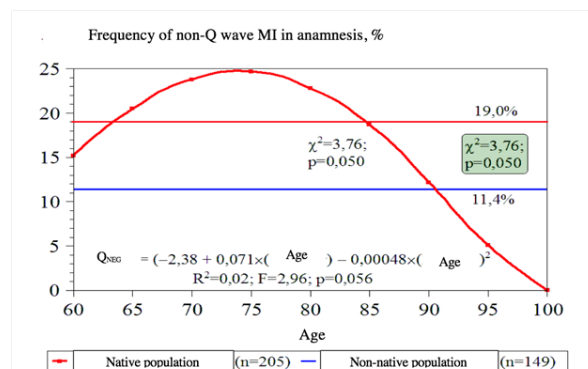


Fig. Dependence of the non-Q wave MI frequency on the age among the non-native and native patients with CHD aged 60 year and over

Table 2

Frequency of the mortality depending on the Functional class of Angina Pectoris (n=116)

Angina Pectoris	n	Patients				$\chi^2$	p
		alive		dead			
		abs.	rel., %	abs.	rel., %		
ФК II	59	41	69,5	18	30,5	12,42	<0,001
ФК III	44	18	40,9	26	59,1	3,16	=0,076
ФК IV	13	2	15,4	11	84,6	6,53	=0,011
Всего	116	61	52,3	55	47,7	—	—

Note.  $\chi^2=16,38$ ;  $p<0,001$ .

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## BASES OF RATIONAL NUTRITION UNDER THE INFLUENCE OF LOW TEMPERATURES

### ABSTRACT

In the article, based on the study of local food raw materials and traditional food, the necessity of optimizing the structure of the population's nutrition and improving the quality of food products under low-temperature conditions is substantiated. The set of factors influencing the increase of interest of food industry enterprises in the output of national specialized products is considered.

Production of northern house and trade animals, gifts of the nature differs a high nutrition value as contains a large amount of proteins, fats, mineral substances, vitamins and the biologically active agents (BAA). Therefore, meat and milk of the Yakut cattle, the Yakut horse, a reindeer, meat of trade animals and fishes, wild berries and wild-growing food plants of Yakutia are the most valuable national wealth on which rational use the special attention has to be paid.

**Keywords:** nutrition in the north, actual nutrition, food products, traditional food, local food raw material, national dishes.

According to domestic and foreign scientists, low ambient temperatures in themselves already violate the balance between energy expenditure and its formation in the body. On their impact, it responds with a kind of protective reaction - increased heat production. This reaction to the cold is called the German hygienist RM. Rubner «chemical heat regulation.» Soviet physiologist A.D. Slonim, for example, believes that in the conditions of prolonged exposure to low temperatures, the maintenance of body temperature at a constant level does not occur due to the processes of chemical thermoregulation, but mainly due to the regulation of heat transfer [2].

Under the influence of low temperatures, the northerners developed a specific so-called «polar», protein-lipid type of metabolism. This means that in

the North, nutrition should be built with a slightly larger inclusion of proteins and fats at a lower relative energy significance of carbohydrates [3, 4].

In actual nutrition of the inhabitants of the republic, there was a replacement of the traditional for the peoples of the North protein-lipid ration for carbohydrate, characteristic for residents of European countries. The change in the historically formed structure of food causes the prevalence of alimentary-dependent pathology, especially of the hemopoiesis (anemia), the endocrine system (obesity), the circulatory system, the musculoskeletal system (osteoporosis). In the diet, the ratio of proteins of animal and vegetable origin, half-saturated fatty acids is violated, a low content of water-soluble vitamins is revealed [3, 10].

Identified by researchers the signs

of nutritional deficiency in Yakutia, in particular, a deficiency of proteins, fats in the body is considered a factor that increases the risk of developing immunodeficient conditions leading to chronic non-infectious diseases. On the other hand, with a deficiency of proteins, fats and vitamin C, the propensity of development of hypochromic anemia in the inhabitants of the North is associated. In addition, with a deficiency of calcium, phosphorus is associated with a risk of osteoporosis. However, the combination of a lack of these minerals with a pronounced potassium deficiency, magnesium in the body predisposes to a breakdown of neuromuscular conduction. At the same time, the combination of established forms of mineral deficiencies is a risk factor for cardiac rhythm disturbances. Against this background,