7. Nikolaeva L.A., Bureva T.B., Chasnyk V.G. Sovremennye predstavlenija ob jetiologii i pervichnoj profilaktike jessencial'noj arterial'noj gipertenzii [Modern ideas about the etiology and primary prevention of essential hypertension]. Jakutskij medicinskij zhurnal [Yakut Medical Journal]. Yakutsk, 2007, № 3, P.57-59.
8. Petunina N.A., Tel'nova M.Je. Nealkogol'naja zhirovaja bolezn' pecheni [Non-alcoholic fatty liver disease]. Medicinskij sovet [Medical advice]. 2016, № 04, P.92-95.
9. Sharonova L.A., Verbovoj A.F., Verbovaja N.I. [et al.] Vzaimosvjaz' nealkogol'noj zhirovoj bolezni pecheni i saharnogo diabeta 2-go tipa [Interrelation of non-alcoholic fatty liver disease and type 2 diabetes mellitus]. Russkij medicinskij zhurnal [Russian Medical Journal]. 2017, №22, P.1635-1640.
10. Association of *PNPLA3* SNP rs738409 with liver density in african americans with type 2 diabetes mellitus / AJ. Cox, MR. Wing, JJ. Carr, [et al.]Diabetes & metabolism. 2011. – Vol. 37,№5. – P.452-455. doi:10.1016/j.diabet.2011.05.001.
11. Association of the rs738409 polymorphism in *PNPLA3* with liver damage and the development of nonalcoholic fatty liver disease / K. Hotta, M. Yoneda, H. Hyogo [et al.] // BMC Med. Genet. – 2010. – Vol. 11. – P.172.
12. Specifically *PNPLA3*-Mediated Accumulation of Liver Fat in Obese Patients with Type 2 Diabetes / J-M. Petit, B. Guiu, D. Masson, L.[et al.] // The Journal of Clinical Endocrinology & Metabolism. – Vol. 95.– №12.– P.E430–E436 https://doi.org/10.1210/jc.2010-0814
13. Kan, H.Influence of the rs738409 polymorphism in patatin-like phospholipase 3 on the treatment efficacy of non-alcoholic fatty liver disease with type 2 diabetes mellitus / H. Kan, H. Hyogo, H. Ochi, // Hepatol Res.– Vol.46– E146–E153. doi: 10.1111/hepr.12552.
14. Morbid obesity exposes the association between *PNPLA3* I148M (rs738409) and indices of hepatic injury in individuals of European descent / S. Romeo, F. Sentinelli, S. Dash [et al.] // Int. J. Obes. (Lond). – 2010.– Vol.34.– P.190–194.
15. Costs and consequence associatiated with newer medications for glycemic control in type 2 diabetes / A. Sinha, M. Ragan, T. Hoerger [et al.] // Diabetes Care.– 2010.– Vol. 33.– P. 695–700.
16. The impact of PNPLA3 and JAZF1 on hepatocellular carcinoma in non-viral hepatitis patients with type 2 diabetes mellitus/ M. Ueyama, N. Nishida, M. Korenaga [et al.] //J Gastroenterol. –2015.– Vol.51(4).– 370-9. doi: 10.1007/s00535-015-1116-6. Epub 2015 Sep 3.
17. Day CP: Homozygosity for the patatin-like phospholipase-3/adiponutrin I148 M polymorphism influences liver fibrosis in patients with nonalcoholic fatty liver disease / L.Valenti, A.Al-Serri, AK.Daly [et al.]// Hepatology.– 2010. – Vol.51.– P.1209-1217. 10.1002/hep.23622.
18. Association of*PNPLA3* with non-alcoholic fatty liver disease in a minority cohort: the Insulin Resistance Atherosclerosis Family Study/ LE.Wagenknecht, ND.Palmer, DW.Bowden [et al.] // *Liver international: official journal of the International Association for the Study of the Liver*.– 2011.– Vol.31(3). – P.412-416. doi:10.1111/j.1478-3231.2010.02444.x.
19. Wilfred de Alwis N.M. Genetics of Alcoholic Liver Disease and Nonalcoholic Fatty Liver Disease / N.M.Wilfred de Alwis, C.P. Day // Seminars in Liver Disease.– 2007.– Vol. 27.– P. 44-54.
20. http://www.internationalgenome.org/

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ARTERIAL HYPERTENSION AND METABOLIC SYNDROME IN SMALL INDIGENOUS PEOPLE OF THE NORTH OF YAKUTIA

ABSTRACT

The research was conducted in the north of Yakutia in places of compact residence of indigenous people of the North. High prevalence of hypertension in the adult population was revealed, its highest rate was observed in Anabarsky district. We studied the frequency of metabolic syndrome (MS) in the indigenous people of Yakutia. The highest frequency of MS was identified in the Evenks and the lowest among the Chukchi. In women MS was observed significantly more often than in men.

Keywords: small indigenous people of the North, arterial hypertension, metabolic syndrome.

Cardiovascular diseases are the first leading cause (45.4%) of mortality of the population in Yakutia, as in Russia in total. According to the Federal State Statistics Service from 2013 to 2015 the circulatory diseases morbidity rate of the population remains on the same level, and the mortality decreases slightly by 0.9% that makes 45.4% [2]. Despite the fact there is

a tendency of reduction in the circulatory diseases mortality rate (403.7 per 100 thousand people of the population in 2013, 406.5 in 2014, 386.7 in 2015), the ischemic heart disease mortality rate tends to rise (152.3 per 100 thousand people of the population in 2013, 162.7 in 2014, 167.5 in 2015), including the myocardial infarction mortality rate (23.6; 23.2; 37.7 respectively). A certain role belongs to the metabolic syndrome (MS). This syndrome is one of widely discussed problems in modern medicine. The urgency is caused by high prevalence rate in the world: according to different authors, it is from 20 to 40% and the high frequency of early development of atherosclerosis and its complications as a myocardial infarction and a cerebral stroke. The prevalence of MS is enlarged with age, especially in an average age group (30-40%) [2, 6, 7], depends on gender, age, ethnic origin and widely ranges: among male population – from 8% in India to 25% in the USA, among women's – from 7% in France to 46% in Iran [4, 5]. According to the conducted researches, at the beginning of the 2000-s among indigenous people of Evenkia there is a significant increase in prevalence of hypertension (44.6%) and overweight (men have 42.4% and women have 51.7%) [3]. Except Yakuts, aboriginal residents, there are representatives of small indigenous nations (Dolgans, Evenks, Evens etc.) in Yakutia. In earlier researches of MS prevalence, the allocation of them as separate ethnoses was not carried out. But such research in small indigenous people of the North has important clinical value considering changes of traditional life, nutritional habits, and high prevalence of arterial hypertension.

Research objective -studying of frequency of arterial hypertension and metabolic syndrome in small indigenous northerners of Yakutia.

Materials and methods of the research

Material for the research is recruited in forwarding conditions in the places of residence of indigenous people of the North: in Kolymskoye and Andryushkino rural localities of the Nizhnekolymsky District, Yuryung-Haya and Saskylakh rural localities of the Anabarsky District, Topolinoe rural locality of the Tomponsky District, Nelemnoye rural locality of the Verkhnekolymsky District. In total 686 people aged from 20 up to 70 years in 4 districts are examined: Anabarsky (Anabar), Nizhnekolymsky (N. Kolyma), Verkhnekolymsky (V. Kolyma), Tomponsky (Tompo) (table 1). In the studied women were identically more than men ($p<0.05$). Average age had no special differences.For the comparative analysis, we created five (Table 2). Inclusion criteria: Representatives of indigenous minorities of the North of Yakutia (Dolgans, Evens, Evenks, Chukchi, Yukaghirs).

Exclusion criteria: representatives of non-indigenous nationalities and Yakuts.

Hypertension is present at the 140/90 mmHg (The Russian references developed by Committee of experts of Society of cardiology of Russian Federation (VNOK), 2004, 2009). Selection was formed according to the lists of workers, which are in administration of settlements. The response made 76%.

The program of a research included the following sections: a questionnaire survey for assessment of an objective state; the informed consent of the respondent to carrying out the researches, blood donation (according to the Ethics Committee protocol); anthropometric inspection with measurement of body height and body weight; blood sampling from a basilic vein in the morning on an empty stomach with 12-hour fasting; measurement of waist circumference in centimeters was taken below a thorax over an omphalus, in the middle of distance between the bottom lateral edge of ribs and top of iliac crest (NIH,1998); circles of hips at the level of breeches, where the biggest circle is.

Laboratory methods of the research included the definition of blood lipids (TC, TG, HDLC, LDLC), glucose test.

The Metabolic Syndrome was diagnosed by criteria of VNOK, 2009: main sign: AO (WC ≥80 cm women, have ≥94 cm at men); additional criteria: HT (ABP>130/85 mm Hg.), the TG level is ≥1,7 mmol/l; the HDLC level <1,0 mmol/l over men; <1,2 mmol/l over women; LDLC level >3,0 mmol/l; a hyperglycemia on an empty stomach (a glucose in a blood plasma on an empty stomach ≥ 6,1 mmol/l) or glucose intolerance (a glucose in a blood plasma in 2 hours after glucose loading within ≥7,8 and ≤11,1 mmol/l).

Statistical data processing was carried out by means of standard methods of mathematical statistics, using the software package of SPSS (version 17.0).

The research was conducted within research projects of YSC CMP "A contribution of a metabolic syndrome to development of atherosclerosis of coronary arteries in residents of Yakutia", R & D "Development of new technologies of treatment and risk prediction of hypertension and insult in the Republic of Sakha (Yakutia)" (Government contract No. 1133).

Results and discussion

During the conducted research we found out prevalence of HT in adult population in the northern districts of Yakutia living in peer climatic conditions. So, in all districts there is the high prevalence of HT, and the highest frequency of HT is in the Anabarsky District.

Considering that the main criterion of MS is abdominal obesity (AO) by criteria of VNOK (2009), we determined the frequency of AO at various ethnic groups of the population. In all groups a high frequency of AO - 47,5% at Chukchi

Table 1

Gender characteristics of small indigenous people of the North on districts of Yakutia

	Anabar	N. Kolyma	V. Kolyma	Tompo
Total	274	182	89	141
Men	81(29,6)	66 (36,3)	35(39,4)	51 (36,2)
Women	193 (70,4)	116 (63,7)	54 (60,6)	90 (63,8)
Average age, years	46,33±0,81	47,04±0,87	47,3 ±2,5	43,02±0,98

Table 2

Gender characteristics of small indigenous people of the North of Yakutia on ethnicity

	Dolgans	Evens	Evenks	Chukchi	Yukaghirs
Total, n	85	141	67	40	77
Men, n (%)	26 (30,6%)	51 (36,2%)	13 (19,4%)	20 (50%)	34(44,2%)
Women, n (%)	59 (69,4%)	90 (63,8%)	54(80,6%)	20 (50%)	43(55,8%)
Average age, years	44,93±1,56	43,02±0,98	48,37±1,64	39,73±1,93	46,49±1,54

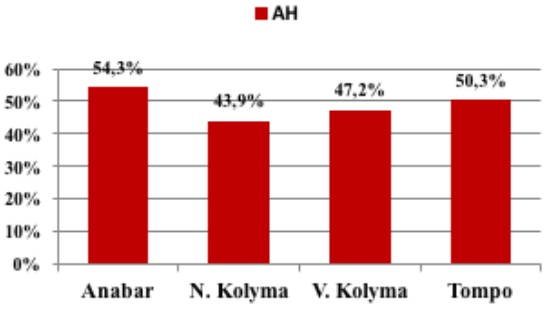

Fig.1. A frequency of arterial hypertension in small indigenous people of the North of Yakutia

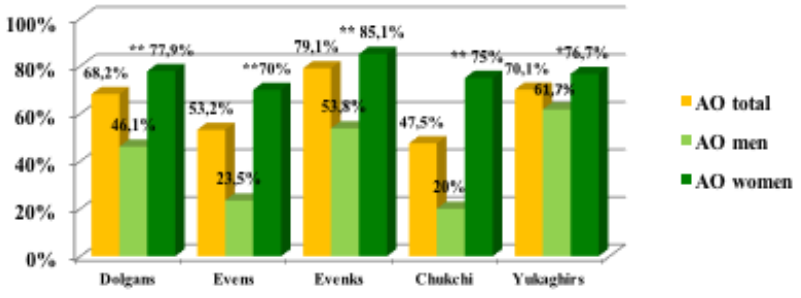

Fig.2. A frequency of abdominal obesity in small indigenous people of the North of Yakutia
* p<0,05, ** p<0,0001 - significant differences on gender characteristics

and 79,1% at Evenks are noted (fig. 2). Statistically significant differences are noted over women in the frequency of the AO in comparison with men. It is necessary to notice that there is equally high frequency of AO overboth men and women of Yukaghirs in comparison with other ethnoses.

Metabolic syndrome frenquency comparison of the examined ethnoses by criteria of VNOK (2009) was carried out (fig. 3). Metabolic syndrome largest frequency was found out of Evenks (56,7%), the smallest of Chukchi (20%). So wide difference in MS frequency is caused by gender differences in these groups, particularly high frequency of AO in women.

Considering the traditional, historically developed essential differences in the level of physical activity and other characteristics of the way of life between men and women, the MS frequency assessment in the compared groups was carried out separately for them (fig. 4). The essential contribution to MS frequency among adult population was made by women. Among them MS is frequent, sometimes superior at three and more times than in men Evens and Chukchi; difference between them are statistically significant (p<0,001), meanwhile there is equally high frequency reaching 85.1% in female Evenks.

Thus, we determined high prevalence of hypertension in the remote north areas of the Republic of Sakha (Yakutia) where representatives of small indigenous nations of North live. Sometimes hypertension is hardly corrected by monotherapy by hypotensive drugs. The high risk of development of cardiovascular complications points to the necessity of further enhanced education of all factors influencing formation of population health in districts of habitat of small indigenous people of Yakutia. Also, the high frequency of Metabolic Syndrome at the examined ethnoses was found out caused by change of traditional life, nutritional habits, low physical activity. Women have the highest frequency of a Metabolic Syndrome. This research confirms the statement of scientific community about Metabolic Syndrome as "pandemic of the XXI century".

REFERENCES

1. Ametov A.S. Ozhirenie – aepidemija XXI veka [Obesity – epidemic of the XXI century]. Terapevticheskij arkhiv [Therapeutic archive]. Moscow, 2002, №10, P.5-7.
2. Zdravookhranenie v Respublike Sakha (Jakutia): Statisticheskij sbornik. Sakha (Jakutia) stat. [Health in the Republic Sakha (Yakutia): statistical collection / Sakha (Yakutia) stat.]. Yakutsk, 2016, 159 p.
3. Khamnagadaev I.I. Rasprostranennost arterialnoj gipertonii, ishemicheskoj bolezni serdtsa I ikh faktorov riska sredi selskogo korennogo i prishlogo naselenija Severa i tsentralnoi Sibiri: avtoref.diss…dokt.med. nauk [Prevalence of arterial hypertension, cardiac ischemia and risk factors of the rural indigenous population of North and Central Siberia: Abstract of diss. of doctor of medical sciences]. Tomsk, 2008, 49p.
4. Assmann G. Harmonizing the definition of the metabolic syndrome: comparison of the criteria of the Adult Treatment Panel III and the International Diabetes Federation in United States American and European populations / G. Assmann [et al.] // Am J Cardiol.- 2007.-Vol. 99(4). - P.541-548.
5. Ford E.S. Prevalence of the metabolic syndrome in US populations / E.S. Ford // Endocrinol Metab Clin North Am. - 2004. - Vol. 33. - P.333–350.
6. Grundy S.M. Diagnosis and management of Metabolic Syndrome. An American Heart Association / S.M. Grundy // Circulation. – 2005. – Vol.112. – P.2735-2752.
7. Zimmet P. Preventing type 2 diabetes and the dysmetabolic syndrome in the real world: a realistic view / P. Zimmet, J.A. Shaw // Diabetic Medicine. – 2003. – Vol.20(9). – P.693-702.

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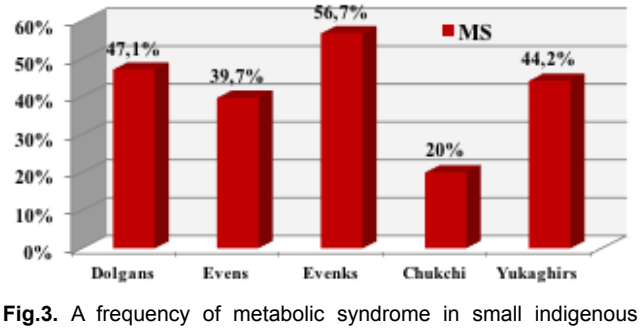

Fig.3. A frequency of metabolic syndrome in small indigenous people of the North of Yakutia

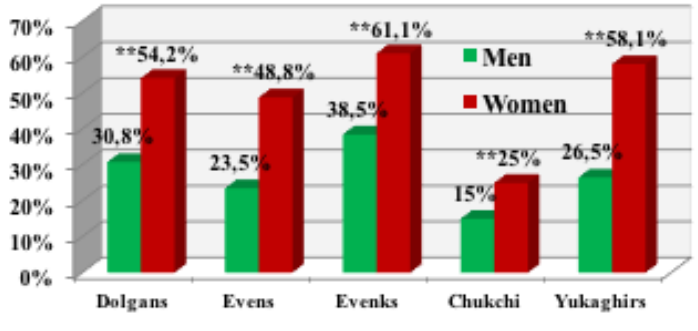

Fig.4 A frequency of metabolic syndrome in small indigenous people of Yakutia depending on gender (by criteria of VNOK, 2009)
** p<0,001- significant differences on gender characteristics