HEALTHY LIFESTYLE. PREVENTION

S.I. Sofronova, A.N. Romanova, V.M. Nikolaev

INFLUENCE OF SMOKING ON METABOLIC DISORDERS AND THEIR RELATIONSHIP IN INDIGENOUS POPULATION OF THE ARCTIC TERRITORY OF YAKUTIA

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The study of effect of smoking on metabolic disorders and determination of the association between them in the indigenous population of the northern territory of Yakutia was carried out. A high frequency of risk factors for the development of cardiovascular pathology, such as overweight, obesity and smoking, was revealed. Overweight is equally common in both men and women, obesity is found almost 2.5 times more often in women. An increase in body weight, systolic blood pressure is not associated with smoking, however, the simultaneous combination of all these factors can affect the risk of cardiovascular accidents. We have confirmed the data of foreign scientists on the suppression of the level of insulin secretion under the influence of nicotine. An increased index of insulin resistance is associated with the simultaneous spread of obesity among nonsmokers. The same association of glucose level with blood pressure was obtained in both smokers and non-smokers. Metabolic disorders in the indigenous population of the northern territory of Yakutia are caused by a change in the traditional way of life with a decrease in physical activity, diet, and non-observance of a healthy lifestyle.

Keywords: smoking, overweight, obesity, insulin, glucose, systolic blood pressure, indigenous population, Yakutia.

Introduction. The prevalence of overweight and obese is a global epidemic affecting both developed and developing countries [13,21,26]. Numerous researchers have proven the relationship between obesity and insulin resistance. Obesity is generally thought to lead to hyperinsulinemia based on pathophysiological and metabolic mechanisms [12]. Hyperinsulinemia, in turn, leads to the development of metabolic syndrome and type 2 diabetes mellitus. The connection between insulin resistance and the risk of developing cardiovascular pathology has been proven in many studies [7,8,10,16,25].

It is generally recognized that tobacco smoking is one of the negative factors affecting the human body. According to the WHO, more than a billion people smoke, with a steady increase every year [31]. Russia is one of the top countries with a high prevalence of tobacco smoking [22]. Scientists have received conflicting results on the effect of smoking on body mass index. For example, scientists proved that nicotine, acting on the levels of various neurotransmitters, such as catecholamines, dopamine and serotonin, suppresses appetite and, therefore, reduces food intake [4,6]. A meta-analysis of prospective cohort studies in China, Singapore, and the United States showed that smokers with type 2 diabetes mellitus had an increased relative risk of cardiovascular complications and death [19]. The relationship between body mass index and insulin levels under the direct or indirect influence of tobacco smoking is currently widely discussed in the scientific community [17]. Previously, results were published on the high prevalence of overweight and obesity among the indigenous peoples of the northern territory of Yakutia [3]. Given the change in the traditional lifestyle and nutrition, the study of the relationship between smoking, obesity and insulin levels in this population remains relevant and poorly understood.

Aim of the study: To study the influence of smoking on metabolic disorders and their relationship in the indigenous population of the Arctic territory of Yakutia.

Materials and research methods. The collection of material for the study was carried out under expeditionary conditions in the Arctic territory of Yakutia in places of compact residence of indigenous peoples (Nizhnekolymsky, Verkhnekolymsky, Tomponsky districts). 348 people were examined using the continuous method. Patient sample consisted of adult population aged from 20 up to 70 years, 225 women, and 123 men. The response made 70%. Average age of the respondents was 48,16±0,52 years, of women 49,71±0,63, of men 44,98±0,91 years.

Inclusion criteria: representatives of indigenous people of Yakutia (Evens, Chukchi, Yukaghirs, Yakuts).

Exclusion criteria: representatives of non-indigenous nationality.

Research program included the following sections: a questionnaire for objective assessment of state; informed consent of the respondent to conduct research and donate blood (according to the protocol of the Ethics committee); anthropometric examination with measurement of height and weight with calculation of body mass index, waist and hips measurements; blood sampling from the cubital vein in the morning on an empty stomach with 12-hour abstinence from food. After centrifugation, blood serum was stored in a freezer (-70°C) until analysis. In the survey, only those who smoked at least 1 cigarette per day during the last 12 months were considered smokers.

For further analysis, the traditional indicator was used - body mass index (BMI) or Quetelet index, which was calculated by the following formula: BMI (kg / m²) = body weight (kg) / height (m²). Overweight was considered to be a BMI ≥ 25 and <30 kg/m², obesity was determined at a BMI of ≥ 30 kg/m² [according to European recommendations of the III revision, 2003].

Laboratory methods included the determination of insulin and fasting glucose. The generally accepted HOMA-IR index was used to calculate insulin resistance (D. Matthews et al., 1985): fasting serum insulin (μIU / ml) x fasting plasma glucose (mmol / l) / 22.5. An index value exceeding 2.7 is considered insulin resistance [27].

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Blood pressure (BP) was measured twice with an OMRON M2 Basic automatic tonometer (Japan) in a sitting position with calculation of average blood pressure with a margin of permissible measurement error of ± 3 mm Hg. (ESH 2002) according to the instructions for the correct measurement of blood pressure, outlined in the European clinical guidelines for the diagnosis and treatment of hypertension. Hypertension is present at the 140/90 mmHg (2017 ACC/AHA Guideline).

The study was conducted according to Ethics Committee protocol YSC KMP on the respondent's informed consent to the processing of personal data and the study.

Statistical data processing was performed using standard methods of mathematical statistics using the SPSS software package (version 19.0). To define the characteristics, the arithmetic mean (M) and the characteristic's standard error of the mean (m) were calculated. Intergroup differences were evaluated using analysis of variance or non-parametric criteria. Correlation was calculated by Spearman's correlation coefficient. Differences were considered statistically significant at p <0.05.

Results and discussion. In the general population, almost half of the respondents (45.7%) were found to smoke, men had the largest number of smokers - 59.3%, women - 38.2%.

The average BMI was significantly higher in women, amounting to 28.73 ± 0.42 kg / m² compared to men (25.51 ± 0.36 kg / m²) (p <0.001). In the general population, 35.9% of the respondents were overweight, and 31.9% were obese. 36% of women were overweight, 39.6% were obese. In men, 35.8% and 17.9%, respectively. Thus, an equally high incidence of overweight BMI was found in both men and women. Obesity is most common among the female population. The high incidence of overweight BMI and obesity is due to changes in lifestyle, low physical activity of the population, especially with regard to women.

We have conducted a study of the relationship between smoking and BMI. In non-smokers, BMI was statistically significantly higher compared to smokers (28.93 ± 0.44 kg / m² and 26.01 ± 0.39 kg / m², respectively, p <0.001). In nonsmoking men, as well as in women, the mean BMI was significantly higher compared to nonsmokers (men: 27.20 ± 0.58 and 24.36 ± 0.41 kg / m2, p <0.001; women: 29, 55 ± 0.55 and 27.42 ± 0.60 kg / m², p = 0.013). A negative relationship between BMI and smoking has been confirmed in many studies [4,6,17]; nevertheless, it has been proven that smoking was an independent risk factor for the development of cardiovascular diseases, including stroke and coronary heart disease [2,11,15,20,23,28].

The table presents a comparative analysis of overweight BMI and obesity by BMI value depending on status of smoking in the general population and on gender. The frequency of overweight BMI in the general population of smokers was higher compared to nonsmokers due to female smokers; the differences are statistically insignificant. With regard to obesity, all respondents had a significantly higher incidence of obesity in non-smokers compared to smokers. In our study, smoking did not affect the development of constitutional obesity, which is confirmed by the studies of several authors on the effect of nicotine on weight loss through an increase in various neurotransmitters [6,17].

Comparing the SBP level among the respondents depending on their smoking status, the following results were obtained. In smokers, the average SBP was significantly lower than in nonsmokers (134.84 ± 1.85 and 147.83 ± 1.98, respectively, p <0.001), while the average SBP in nonsmokers was higher than normal. There was also a negative correlation between the number of smoked cigarettes and the level of SBP (r = -0.226, p <0.001), the stronger correlation was obtained in women (r = -0.220, p = 0.001) than in men (r = -0.147, p = 0.104). Accordingly, 64.2% of nonsmoking respondents had a significantly increased blood pressure compared with smokers, whose blood pressure increased in 35.8% of cases (p <0.001). Thus, we obtained results in which smoking is not associated with an increase in blood pressure, possibly due to its indirect effect on BMI reduction. Nevertheless, according to previous research, the combination of these two risk factors affects the mortality rate from cardiovascular complications [1,5,9,15].

Due to conflicting research data on the effect of smoking on the level of insulin secretion, we carried out a comparative analysis of the average values of insulin and the HOMA-IR index in respondents depending on their relationship with smoking. The average insulin concentration did not exceed the reference values, in smokers it was 7.19 ± 1.23 IU / ml, which is statistically significantly lower than in non-smokers (12.74 ± 2.35 IU / ml) (p = 0.035). By gender, only men had significant differences in mean insulin concentration; in smokers it was lower and amounted to 4.91 ± 0.75 IU / ml compared to non-smokers (8.42 ± 1.76 IU / ml, p = 0.034) There were no significant differences in women, in smokers - 8.94 ± 2.09 IU / ml, in non-smokers - 13.86 ± 2.92 IU / ml (p = 0.201). We also determined the average values of the HOMA-IR index, which was 1.48 ± 0.24 in smokers - significantly lower compared to non-smoking respondents (2.77 ± 0.46, p = 0.014). In non-smokers, these indicators were higher than the reference values. Thus, our study shows that smoking suppresses insulin secretion, which may affect the development of type 2 diabetes. Similar results were obtained in the studies of certain foreign authors [17,18,29]. The increased HOMA-IR index in nonsmoking respondents, which characterizes insulin resistance, is most likely associated with the prevalence of obesity among them.

When comparing the relationship between the number of smoked cigarettes and BMI, we obtained a statistically significant negative correlation (r = -0.318, p <0.001). This correlation was most clearly observed in men (r = -0.423, p <0.001) rather than in women (r = -0.134, p = 0.088). With insulin, a statistically significant inverse relationship was also obtained with the number of cigarettes smoked (r = -0.140, p = 0.029). Separately, in men and women, there was no clear relationship (men: r = -0.163, p = 0.153; women: r = -0.140, p = 0.029).). We did not find any particular relationship between the number of cigarettes smoked and the glucose level (r = -0.045, p = 0.489). Separately, in men and women, there was no correlation either. The obtained result does not reflect the influence of one of the risk factors on the development of atherosclerosis and type 2 diabetes mellitus, since we have not determined the duration of smoking. Thus, the number of cigarettes smoked is not associated with BMI and insulin levels.

We analyzed the association of insulin, glucose, SBP and BMI parameters under the direct influence of smoking. A study on the relationship between insulin and the level of systolic blood pressure in the general population was carried out. There was a positive correlation between insulin levels and SBP (r = 0.239, p = 0.003), which is confirmed by studies abroad [14,24]. Analysis of the effect of smoking on the relationship between insulin and SBP showed that nonsmokers had a significant correlation (r = 0.197, p = 0.034), in contrast to smokers (r = 0.116, p = 0.198).

A study of the relationship between insulin levels and BMI showed that there is a strong positive correlation between

Frequency of overweight and obesity by BMI depending on status of smoking (%)

		Overweight	p	Obesity	p
Total	smokers	37.7	0.587	20.8	**0.001**
	nonsmokers	34.4		41.3	
men	smokers	32.9	0.412	9.6	**0.042**
	nonsmokers	40.0		30.0	
women	smokers	41.9	0.122	30.2	**0.039**
	nonsmokers	32.4		45.3	

these indicators (r = 0.283, p <0.001). Depending on the adherence to smoking, it was proven that in smokers (r = 0.223, p = 0.013), as in nonsmokers, the level of insulin was equally significantly correlated with BMI (r = 0.220, p = 0.017). As for the relationship between glucose level and BMI, a strong correlation was obtained in nonsmokers (r = 0.287, p = 0.002), but not in smokers (r = 0.031, p = 0.731). Glucose was also associated with SBP in both smokers (r = 0.183, p = 0.021) and non-smokers (r = 0.420, p <0.001). Thus, an association of insulin with BMI was obtained, including smokers, which is confirmed by a number of studies abroad [17,29].

Conclusion. Summarizing the above analysis, we summarize that the indigenous population of the northern territory of Yakutia has a high frequency of risk factors for the development of cardiovascular pathology, such as overweight, obesity and smoking. Overweight is equally common in both men and women; obesity is almost 2.5 times more common in women. An increase in body weight and systolic blood pressure is not associated with smoking, however, the simultaneous combination of all these factors can affect the risk of cardiovascular accidents. We have confirmed the data of foreign scientists on the suppression of the level of insulin secretion under the influence of nicotine. An increased index of insulin resistance is associated with the simultaneous spread of obesity among nonsmokers. The same association of glucose level with blood pressure was obtained in both smokers and non-smokers. Metabolic disorders in the indigenous population of the northern territory of Yakutia are caused by a change in the traditional way of life and nutrition with a decrease in physical activity, and a lack of adherence to a healthy lifestyle. By addressing modifiable risk factors, including overweight, obesity and smoking, it is possible to prevent morbidity and premature mortality from cardiovascular disease.

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HEALTHCARE, MEDICAL SCIENCE AND EDUCATION ORGANIZATION

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EXPERIENCE IN CREATING A SPECIALIZED MEDICAL CARE CENTRE FOR PATIENTS WITH NEURODEGENERATIVE DISEASES BASED ON THE CLINIC OF SCIENTIFIC INSTITUTION

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The article presents the experience of creating a specialized center of medical care for patients with neurodegenerative diseases on the basis of the clinic of the Federal State Budgetary Scientific Institution of the Yakutsk Scientific Center for Complex Medical Problems (YSC KMP). The aim of this work is to present a model for creating a specialized center for patients with neurodegenerative diseases, as an improved model for providing specialized care for patients with neurodegenerative diseases in the Republic of Sakha (Yakutia) and an example of the consolidation of a federal medical research institution and the regional ministry of health. The materials in the work were the register of patients with SCA 1 and MND, reporting data of regional neurologists from 2016-2018, regulatory documents of the Ministry of Health of the Russian Federation and the Republic of Sakha (Yakutia). Clinical, comparative analysis and organizational modeling were used for the study. The result of the analysis was the opening of the Center for Neurodegenerative Diseases at the YSC KMP.

Key words: neurodegenerative diseases, specialized care, type 1 spinocerebellar ataxia, medical and social care

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Relevance. Currently, one of the urgent problems of public health and social protection is the provision of high-quality medical and social assistance to the population of patients with diseases of the nervous system, including neurodegenerative diseases. It is known that neurodegenerative diseases (NDD) are age-dependent and affect people of the older age group. In most of these diseases, the etiology and pathogenesis remain unclear, despite many years of scientific research in the world [3,4,6]. Solving the issue of providing medical and social assistance to this a group of patients at the outpatient hospital stage is a difficult task for healthcare in Russia, including healthcare in the Republic of Sakha (Yakutia). The financial crisis that health care is going through affects primarily the vulnerable segments of the population suffering from various diseases, which limit their ability to receive adequate medical care.

The lack of specialized departments for patients with neurodegenerative diseases deprives this category of patients of medical care not only in the hospital, but also at the outpatient stage, because most of these patients have problems with motor, speech, and cognitive functions. Thus, patients with neurodegenerative pathology are practically deprived of medical care. In addition, this problem is interdisciplinary in nature, since neurodegenerative diseases cause disturbances not only on the part of the nervous system, but also on the part of other systems of the body, impairing vital functions. All of the above requires the organization of a set of measures in the field of practical health care and social services for citizens. In our opinion, scientific institutions of a medical direction, which have their own clinics, in which both medical care at the outpatient hospital stage and scientific research can be carried out, can make their contribution to the provision of specialized care. It is the consolidation of medical science and practical health care that could bear fruit in this direction. In this article, we want to show a joint solution to this problem by the efforts of a scientific institution of the federal state Yakutsk Scientific Center for Complex Med-