

ARCTIC MEDICINE

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RELEVANCE OF RESEARCH OF ANTHROPOMETRIC PORTRAIT AS A PREDICTOR OF REPRODUCTIVE MALE DISORDERS IN THE RS (YA)**ABSTRACT**

Literature review is based on the analysis of sources covering demographic situation, changes in hormonal regulation of the metabolic syndrome and the effect of the metabolic syndrome on the functions of the organism.

Keywords: metabolic syndrome, reproductive function, anthropometric indices.

At present, there are 146.8 million people living in Russia (according to the Federal State Statistics Service as of July 1st, 2017). Yet, since the beginning of 2017 the number of people in Russia decreased by 17 thousand, or 0.01% as a result of the existing natural population decline [29]. Russia has experienced several demographic crises, general demographic loss of Russia in the 20th century as a result of wars, famines, repression, economic and social turmoil is estimated at 140-150 million people. [6] Birth rate in Russia does not reach the level required for reproduction of the population.

According to the Federal State Statistics Service (FSSS) data for 2017, 962.8 thousand people live in the Sakha (Yakutia) Republic. The concepts of family and demographic policies of the Sakha (Yakutia) Republic until 2025 defines the general strategy, principles and priority directions of the state policy on family and demographic development aimed at increasing the life expectancy of the population, reducing the death rate, increasing the birth rate, regulating migration flows, and preserving and strengthening health of the population. [30]

Sakha (Yakutia) Republic is a region of the Far North with a subarctic, sharply continental climate. Changes in photoperiodism, low temperatures, increased humidity, and geomagnetic disturbances constitute a core set of environmental factors affecting the human body and having a negative impact on health [1]. To date considerable amount of material has been accumulated, indicating the formation of a specific northern hormonal profile with more actively functioning pituitary gland-adrenal cortex, decrease in insulin synthesizing function of the pancreas, high lability in thyroid and reproductive hormones numbers [3]. A complex of negative environmental factors affecting

the population of the region, as well as the effect of stressful social factors necessitates comprehensive research of public health. Research aimed at preventive measures for the diagnosis of morbidity proves the most relevant.

One of the most sensitive systems of the body reacting to the effect of environmental factors, regardless of their nature, is the reproductive system [28]. Accordingly, the study of the reproductive capacity of male and female population as objective factors of fertility decline is relevant.

Currently in the country there is a more or less developed system of prevention and treatment of reproductive health aimed at the female part of the population, but a similar system in relation to men is just beginning to be considered and put into practice. [10] In recent years, male reproductive disorders are of particular medical and social importance, since male infertility factor in married couples is 30-50% [19]. Male infertility is the result of a number of diseases and pathological effects on the male reproductive system [16, 23, 28]. In particular, it shows the effect of the metabolic syndrome as comorbid condition fertility in [9, 10]. Metabolic syndrome in men of young and middle age in 90.1% of cases is characterized by a violation of sexual function in general or its individual components [23]. Hormonal disorders and metabolic syndrome firstly cause adipopexia predominantly in the visceral area, and also insulin resistance, metabolic disorders and formation of systematic hyperinsulinemia [4, 11]. As shown by recent studies, adipose tissue has auto-, para- and endocrine functions and secretes a large number of substances that have different biological effects, which can cause development of obesity related complications, including insulin resistance. The most studied to date are tumor necrosis factor- α (TNF- α) and leptin. Many researchers view

TNF- α as a mediator of insulin resistance with obesity [4, 13]. Leptin secreted predominantly by adipocytes exerts its action on level of hypothalamus, affecting eating behavior, and the activity of the sympathetic nervous system, as well as several neuroendocrine functions [8].

Of the external factors that adversely affect the sensitivity of tissues to insulin, the most important are hypodynamia and excessive fat intake. It is estimated that in 25% of individuals leading a sedentary lifestyle, it is possible to detect insulin resistance [15, 27]. Excessive intake of animal fat containing saturated fatty acids leads to structural changes in cell membrane phospholipids and impaired gene expression controlling conduction of insulin signal inside the cell, i.e., to the development of insulin resistance [2, 12].

This is not an exhaustive list of possible insulin resistance development mechanisms in abdominal visceral obesity, which certainly calls for further research in this area.

Metabolic syndrome and obesity in general have become one of the major public health problems. According to WHO, the problem of excess weight affects more than 1.9 billion people, of which 600 million suffer from obesity. Morbidity and mortality among the population from diseases associated with obesity cause major damage to the economy (diabetes, cardiovascular diseases, etc.). Up until the early '90s we observed relative stability in northern populations, despite high levels of fats in the diet, related to diabetes mellitus, atherosclerosis and other diseases associated with obesity because of biochemical adaptability to protein-fatty diet type [5, 8, 15, 17]. With increasing urbanization and improvement of social living conditions minimizing the effects of cold on the human body, incidence of obesity, metabolic syndrome, type 2 diabetes, and atherosclerotic lesions of the cardiovascular system in population

in the regions with cold climates has sharply increased [22, 24, 26].

Anthropometric indicators are closely interrelated with the metabolic syndrome and obesity and hormonal imbalance, which can serve as predictors of reproductive system damage in andrological practice [7,18]. Morphophenotype (somatotype, body type) being a macromorphological subsystem of general constitution, forms its basis. Somatotype is an outer, most accessible to research and measurement, relatively stable in ontogeny and hereditary subsystem of general constitution and reflects the main features of the dynamics of ontogenesis, metabolism and reactivity [14, 18, 20, 25].

Analysis of scientific literature shows that there weren't studies conducted in Sakha (Yakutia) Republic showing the relationship of metabolic syndrome and reproductive disorders in young women in anthropometric aspect among the indigenous and non-indigenous populations. Research of individually-typological features of men in conjunction with clinical laboratory methods will allow to identify a number of morphological and anthropomorphic signs that can be considered as predictors of reproductive function disorder and important factors in family planning and birth of healthy children, early detection and prevention of infertility.

Thus, the study of this problem has social value as impaired fertility leads to an increase in the number of sterile marriages, small families and causes deterioration of country's demographic indicators.

REFERENCES

1. Agadzhanian N., Konovalov G., Ozheva R., Urakova T. Vozdejstvie vneshnich faktorov na formirovanie adaptacionnyh reakcij organizma cheloveka [The impact of external factors on formation of Adaptive responses of the human body] *Novye tehnologii* [New technology], 2010, 4, pp. 3-7.
2. Aleshin S. V., Druzhinin P. V., Novikov A. F. Metabolicheskij sindrom X: sostoyanie vysokogo riska. Metodicheskie rekomendacii [Metabolic Syndrome X: high risk status. Methodical recommendations] Moscow : RUD, 2005, 41 p.
3. Bartosh T. P. Adaptacionnye gormonalnye perestrojki u muzhchin na Severo-Vostoke Rossii [Adaptive hormonal adjustment in men in Northeast Russia] *afteoref. dis. ... kand. biol. nauk* : 03.00.13 [Extended abstract of candidate's thesis], Magadan, 2000, 23 p.
4. Butrova S. A. Metabolicheskij sindrom: patogenez, klinika, diagnostika, podhody k lecheniu [Metabolic syndrome: pathogenesis, clinic, diagnosis, approaches to treatment] *Russkii medicinskij zhurnal* [Russian medical journal], 2001, 2, pp. 56-60.
5. Vasilkova T. N., Mataev S. I. Metabolicheskij sindrom v populyacii korenyh narodov Krainego Severa [Metabolic syndrome in the population of indigenous peoples of the far North] *Vestnik YUGU* [Herald SUSU], 2009, 27, pp. 72-73
6. Vishnevskiy A. G. Pyat' vyzovov novogo veka [Five challenges of the new century] *Mir Rossii* [Universe of Russia], 2002, 4, pp. 3-22.
7. Gordeeva A. Y., Tkachev M. V., et.al Vliyanie metabolicheskogo sindroma na reproduktivnuu funkciu i kachestvo zhizni [Impact of metabolic syndrome on reproductive function and quality of life] *Doktor* [Doctor], 2016, pp. 2-5.
8. Ginzburg, M. M., Kryukov N. N. Ozhirenie. Vliyanie na razvitiye metabolicheskogo sindroma [Obesity. Influence on the development of metabolic syndrome] *Profilaktika i lechenie* [Prevention and treatment], 2002, pp. 39-47.
9. Genser E. A. Vstrechaemost' metabolicheskogo sindroma sredi rabotauwego naseleniya na Severe [Incidence of metabolic syndrome among the working population in the North] *Okruzhauwaya sreda i zdorov'e: III Vserossiiskaya nauchno-prakticheskaya konferenciya molodyh uchenykh i specialistov* (Elektronnyi resurs) [Environment and health: the III all-Russian scientific-practical conference of young scientists and specialists (Electronic resource)], Moskva, 2009, available at: <http://www.sysin.ru/blocks/9/>
10. Douglas N. A. Rezervy optimizacii reproduktivnogo zdorov'ya zhenwin Respubliki Sakha (Yakutia) [Reserves of optimisation of the reproductive health of women of the Republic of Sakha (Yakutia)] *afteoref. dis. ... dok. med. nauk*: 14.01.01 [Extended abstract of Doctor's thesis], Moskva, 2011, 71 p.
11. Eganyan R. A., Kalinin A. N. Korrekciya izbytochnoi massy tela – neobchodimoe uslovie profilaktiki serdechno-sosudistyh zabolevanii [Correction of excess body weight is a necessary condition for the prevention of cardio-vascular diseases] *Medicinskaya sestra* [Nurse], 2003, 2, pp. 13-14
12. Ekimovskiy G. A., Smirnov M. G., Voronkov Y. I., Ekimovskiy T. V. Nekotorye patogeneticheskie faktory metabolicheskogo sindroma [Some pathogenic factors of the metabolic syndrome] *Zdorovie. Medicinskaya ekologiya. Nauka* [Health. Medical ecology. Science], 2011, Vo. 1(44), pp. 23-26.
13. Kvitkova L. V., Yelensky T. S., Blagoveshenskaya O. P. Insulinorezistentnost' i faktory ee opredelyauwie [Insulin resistance and its determining factors] *Sibirskii medicinskij zhurnal* [Siberian medical journal], 2008, 5, pp. 12-16.
14. Klimova T. M., Fedorova V. I., Baltakhinova M. E. Kriterii ozhireniya dlya identifikacii metabolicheskikh faktorov riska u korenogo sel'skogo naseleniya Yakutii [The obesity criteria to identify the metabolic risk factors from the indigenous rural population of Yakutia] *Sibirskii Medicinskij zhurnal* (Irkutsk) [Siberian Medical journal (Irkutsk)], 2012, 8, pp. 110-113.
15. Kulbanova E. S., Shcherbakova L. V., Simonova G. I., Malyutina S. K. Izbytochnaya massa tela i ozhirenie sredi prishlogo naseleniya Yakutiya [Overweight and obesity among newcomers of population of Yakutia] *Perspektivy rossijskoj kardiologii : tez. dokl. Ros. nac. kongr. Kardiologov* [Russian Perspectives of cardiology : abstracts of the Russian national Congress of cardiologists], Febr. 2005, Moskva, 2005, p.184
16. Loginov P. V. Reprodukivnaya funkciya muzhchin, podverzhennyh vozdeystviu nablagoipriyatnyh faktorov [The reproductive function of males exposed to adverse factors] *Fundamental'nye issledovaniya* [Basic research] 2015, 2-27, pp. 6043-6049
17. Snodgrass D., Leonard V., Tarski L. A., Klimova T. M. et al. Metabolicheskaya adaptaciya yakutov [The Metabolic syndrome in indigenous population of Yakutia] *Yakutskij medicinskij zhurnal* [Yakut medical journal], 2011, 2(34), pp. 34-37
18. Osakovskiy V. L., Goldfarb L. G., Klimova T. M., et al. Metabolicheskij sindrom u aborigennogo naseleniya Yakutii [The Metabolic syndrome in indigenous population of Yakutia] *Yakutskij medicinskij zhurnal* [Yakut medical journal], 2010, 2, pp. 98-102
19. Nikitin, Y. P., Voevoda M. I., Simonova G. I. Saharnyj diabetes i metabolicheskij sindrom v Sibiri i na Dal'nem Vostoke [Diabetes mellitus and metabolic syndrome in Siberia and the far East] *Vestn. Ros. akad. med. nauk* [Herald Russian Acad. Med. Sciences], 2012, 1, pp. 66-74
20. Nikitiuk D. B., Miroshkin D. V., Bucaneve N. S. Kliniko- antropologicheskie paralleli: novye podhody [Clinical and anthropological parallels: new approaches] *Morfol. vedomosti* [Morphol. statements], 2007, 1-2, pp. 259-262
21. Nikolaev, A. A., Loginov P. V. Sposob ocenki reproduktivnoi funkicii u muzhchin [Method of assessment of reproductive function in men] *Patent Rossii* 2591619 [Patent of Russia] 2016, Bul. 20
22. Nikolaev V. G. Izmenchivost' morfofunkcional'nogo statusa cheloveka v otechestvennoj biomedicinskoj antropologii (soobwenie 1) [Variability of morphofunctional status in domestic biomedical anthropology (1 message)] *Sib. med. obozrenie* [Sib. med. review], 2008, 3, pp. 49-52.
23. Romanova A. N. Associaciya metabolicheskogo sindroma s koronarnym aterosklerozom u zhitelej Yakutii [Association of metabolic syndrome with coronary atherosclerosis among residents of Yakutia]

avtoref. dis. ... dokt. med. nauk: 14.01.05 [Extended abstract of Doctor's thesis], Novosibirsk, 2012, 150 p.

24. Romanova E. V. Fertil'nost' i polovaya funkciya muzhchin pri metabolicheskom syndrome [Fertility and sexual function of men with metabolic syndrome] avtoref. dis. ... kand. med. nauk: 14.01.03 [Extended abstract of candidate's thesis], Moscow, 2009, 141 p.

25. Sozonova K. K. Etnicheskie osobennosti rasprostranennosti metabolicheskogo sindroma u lic pozhilogo, starcheskogo vozrasta i dolgozhitelej [Ethnic differences of the prevalence of metabolic syndrome in elderly, senile age and long-livers] avtoref. dis. ... kand. med. nauk: 14.01.02 [Extended abstract of candidate's thesis], Yakutsk, 2014, 140 p.

26. Sydykova L. A. Dislipidemiya u bol'nyh saharным diabetom 2 tipa v Respublike Sakha (Yakutia) [Dyslipidemia in patients with diabetes mellitus type 2 in the Republic of Sakha (Yakutia)] avtoref. dis. ...kand.med. nauk :14.00.16, 14.00.03 [Extended abstract

of candidate's thesis],Yakutsk, 2006, 92p.

27. Hakunov R. N. Metabolicheskij sindrom: aktual'nye voprosy. Obzor literatury [Metabolic syndrome: current issues. A review of the literature] Novye tehnologii [New technologies], 2012, 4, pp. 318-324.

28. Khlyakina O. V. Sravnitel'naya ekologo-fiziologicheskaya charakteristika zavisimosti reproduktivnoj funkicii muzhchin ot urovnya antropogennoj nagruzki regiona prozhivaniya [Comparative ecology-physiological characteristics of male reproductive function dependencies from the level of anthropogenic pressure of the region] avtoref. dis. ... kand. med. nauk : 03.00.13 [Extended abstract of candidate's thesis], Lipetsk, 2006, 142 p.

29. Vikipediya. Svobodnaya enciklopediya (Elektronnyj resurs) [Wikipedia. Free encyclopedia (Electronic resource)] Rezhim dostupa: <http://ru.wikipedia.org>. [available at : ru.wikipedia.org.]

30. Oficial'nyj informacionnyj portal Respubliki Sakha (Yakutia) (Elektronnyj resurs) [Official information portal of the

Republic of Sakha (Yakutia) (Electronic resource) Official information portal of the Republic of Sakha (Yakutia)[(Electronic resource)] Rezhim dostupa: <http://sakhagov.ru>. [available at : <http://sakhagov.ru>

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