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PHYSICAL DEVELOPMENT OF WOMEN IN MAGADAN REGION IN AGE AND ETHNIC ASPECTS

Anthropometry is known to be a qualitative measure that reflects the level of health state of a population. For the first time, an assessment study on physical development of women in age and ethnic aspects was conducted in the territory of Magadan Region. This research aimed at studying age dynamics in basic anthropometric indicators among women of different ethnicity from different regions of residence, at mature and old ages.

Materials and methods. In the year of 2022 we analyzed data of medical records of one thousand and sixty-four women from Severo-Evensk District and the city of Magadan. The following anthropometric indicators were included in the general database: Body Length, Body Mass, and Waist Circumference, with further calculating the Body Mass Index. The subjective sample was divided into six groups according to the ethnicity, as well as based on the age. The main indicators of physical development were evaluated by standard research methods.

Results. From the obtained data we could see a reduction in subjective Body Length variables with those of Body Mass, Body Mass Index, and Waist Circumference growing with increasing age, from the middle age (maturity) to the elderly period of ontogenesis. In the settlement of Evensk, the percentage of middle-aged women diagnosed with obesity was 40% among Aboriginals and 24% among Caucasians growing up to 68% and 47%, respectively, in old women. The obesity incidence among women of Magadan made up 25% and 45%, respectively.

Conclusion. The observed characteristics indicate unhealthy tendencies, which the increased Body Mass Index suggests owing to shorter Body Length and significantly bigger Body Mass indices progressing from mature to old ages. To a greater extent, obesity is experienced by women of the Aboriginal population of Magadan Region. All the examinees show Waist Circumference measurements that excess the normal standards, which indicate the development of such an unfavorable factor as abdominal obesity.

The age- and ethnicity-based somatometric status was also specified for Magadan Region women, which should be considered when forming the region-related standards of physical development.

Keywords: anthropometric indicators, ethnicity, human population, women of the Magadán region, obesity.

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Introduction. According to the WHO, obesity is recognized as the epidemic of the XXI century due to the constant spread of this disease [27]. For some experts' estimates, the incidence of obesity among the female population is expected to 50% increase by the year of 2025 [24]. To reveal abnormalities in physical development, anthropometric indicators have been used in clinical healthcare practice for many decades as a way to identify some diseases, classify impairments and evaluate further treatment [29]. They are also integrative characteristics that ascertain the quality of life, respond to environmental, social, and hygienic changes [18]. The anthropometric method is inexpensive, non-invasive and universally applicable for assessing the size, proportions and composition of the human body – all these vary throughout human life [31, 5].

The growth of the elderly population is an inevitable consequence of social and economic development and improvement of medical technologies. [22]. This group is characterized by a higher risk of many diseases including cardiometabolic ones [14, 33]. Being a way to detect overweight and obesity, the careful monitoring of physical development and BMI indicators throughout life also appears to be a predictor of a number of diseases including cardiovascular and metabolic diseases in old age [28].

The conditions of the North bring unfavorable climatic factors as an additional negative impact on the human body [3]. Because of the worse functional abilities as well as limited adaptive capabilities, the elderly people are the most vulnerable to the climatic and geographical factors of the North [2]. At the same time, the study of somatometric picture needs to be conducted among both newcoming and indigenous populations, despite the fact that the latter perceive the sub-extreme and extreme conditions of the northern regions as quite adequate [6]. Monitoring of physical development of the Aboriginal population of Russia's north is still relevant since during the first decade of the XXI century they experienced the growth in diseases of civilization including cardiovascular and endocrine pathologies [4].

Thus, the purpose of this research was to analyze somatometric pictures of mature and elderly women residing in Magadan Region who differ by their ethnicity.

Materials and Methods. Outpatient records and the results of medical examination of residents of Severo-Evensk District were studied in the survey. Similar work was carried out in the city of Magadan. The data were taken from the Severo-Evensk District Hospital and Department No. 1 of Magadan Regional State Healthcare Institution of the City Polyclinic.

In the course of the work, we collected basic somatometric data: BL (cm), BM (kg), and WC (cm). Then, the Body Mass Index (BMI) was calculated using the formula $BMI = BM/BL^2$, where BL is the length of the body in meters. The interpretation of the Caucasian women's BMI was carried out in accordance with the recommendations of the World Health Organization (WHO) [34]. The Aboriginal women's variables were processed using the interpretation proposed for the Asian population [21].

In total, 1064 mature and elderly women's medical records were analyzed. The age classification of women was carried out according to the periodization adopted at the VII All-Union Conference on Problems of Age Morphology, Physiology and Biochemistry in 1965 [8]. The data obtained were divided into six groups according to ethnic and age criteria: Groups 1 and 2 were made up of the female Aboriginal population of mature and elderly ages from the settlement of Evensk. Groups 3 and 4 were represented by the female Caucasian population of mature and elderly ages from the settlement of Evensk. Groups 5 and 6 were the Caucasian females of mature and elderly ages from the city of Magadan. The Aboriginal sample was represented by two peoples: Evens and Koryaks who belong to the Mongoloid anthropological type [15]. The Caucasian sample was represented by those born in Magadan Region in the 1st -2nd generations, mainly the Slavs.

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The results were processed using the Statistica 7.0 application software package. Verification of the normality of the distribution of the measured variables was carried out based on the Shapiro-Wilk test. Statistical analysis of the data obtained was made using the parametric Student t-test for independent samples. The results presented were an average value and its error (M±m). In the work, the critical significance level (p) was assumed to be 0.05.

Results and Discussion. Table 1 shows basic physical indicators of the females of Aboriginal and Caucasian populations of Magadan Region. Table 2 demonstrates statistically significant differences among the studied characteristics. It should be noted that Body Length is the main indicator for assessing physical development which is genetically deter-

Table 1

Anthropometric variables in women of different age and ethnicity, (M±m)

Indicator	Aboriginal Population, Evensk		Caucasian Population, Evensk		Caucasian Population, Magadan	
	Mature Age (1)	Old Age (2)	Mature Age (3)	Old Age (4)	Mature Age (5)	Old Age (6)
Mature age, yrs	41.3±1.3	62.3±1.0	39.5±1.1	62.8±1.2	43.4±0.4	67.3±0.4
Body Length, cm	157.8±1.1	154.5±1.2	164.3±1.1	160.3±1.3	163.3±0.3	160.3±0.4
Body Mass, kg	62.1±1.2	65.8±1.4	71.7±1.2	74.9±1.1	71.0±0.6	74.5±0.9
Waist Circumference, cm	81.4±1.6	87.5±2.6	89.3±1.8	89.7±2.5	82.6±1.7	87.9±0.8
BMI, kg/m^2	25.0±0.6	27.6±1.0	26.±1.0	29.7±1.1	27.3±0.5	29.4±0.4
N	52	22	34	23	702	226

Table 2

Statistically significant differences between the study groups

| Indicator	Groups								
	1-2	3-4	5-6	1-3	1-5	3-5	2-4	2-6	4-6
Body Length. cm	p<0.05	p<0.05	p<0.001	p<0.001	p<0.001	0.38	p<0.01	p<0.001	p=1
Body Mass. kg	p<0.05	p<0.05	p<0.001	p<0.001	p<0.001	0.60	p<0.01	p<0.001	p=0.78
Waist Circumference. cm	p<0.05	p=0.89	p<0.001	p<0.01	p=0.61	p<0.01	p=0.54	p=0.88	p=0.49
BMI. kg/m^2	p<0.05	p<0.05	p<0.001	p=0.39	p=0.99	p=0.24	p=0.16	p=0.09	p=0.79

mined [16] and tends to change with age [30]. The study revealed a pronounced and statistically significant shortening in the Body Length with age among the examined females of both Aboriginal and Caucasian populations from both Evensk and Magadan. Statistically significantly lowest Body Length variables in mature and elderly ages were recorded in the Aboriginal women of Evensk in comparison with the Caucasian subjects as characteristic of the indigenous small-numbered peoples of the North [1, 12]. At the same time, the Caucasian samples did not differ from each other in this indicator.

Body Mass as an indicator of the morphological state of the body [16] reflects a person's health state and their lifestyle [25]. In the course of the work, we could see a statistically significant increase in this indicator with age in each group. The Aboriginal subjects exhibited significantly lower values of both Body Mass and Body Length indicators in comparison with those of the two Caucasian groups. It is worth noting that none of the Caucasian women of Evensk and Magadan showed any differences in this indicator in mature or elderly age.

Of greatest interest is the BMI indicator since its growth accelerates the risk of chronic non-communicable diseases and health deterioration [17] and it is considered as a predictor of cardiovascular and metabolic diseases [19, 32]. This index is used to identify excess weight and obesity which denote the body overweight resulting from an imbalance in the three energy components: food consumption, energy expenditure and energy storage [23]. During the analysis of the average BMI values, the Aboriginal women of the settlement of Evensk, both mature and old examinees, were diagnosed with obesity. The Caucasian women of Magadan Region showed excess weight. We found statistically significant growth in this indicator in each group with age owing to the pronounced increase in the Body Mass with the simultaneous shortening in the Body Length.

For a more detailed study of the Body Mass Index, we differentiate the analyzed groups by this indicator and presented the results in Figure 1. It can be seen that 2% of mature and 5% of elderly representatives of women of the Aboriginal population were underweight (Fig. 1a). Normal or excess weight was characteristic of 46% and 12% of mature women, and 18% and 9% of elderly women, respectively. Serious obesity was observed in 40% of mature women growing to 68% with increasing age.

Figure 1b shows the BMI variables
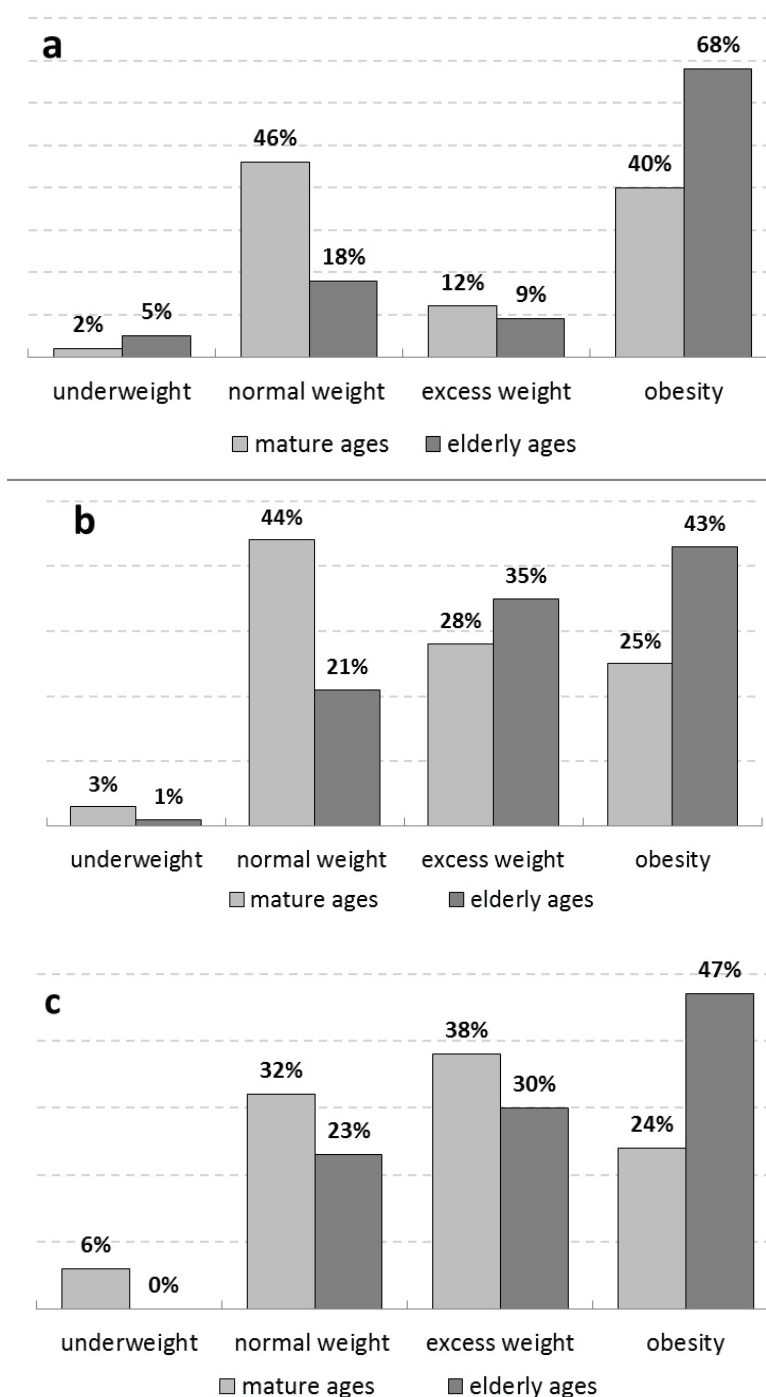
Body Mass Index variables in mature and elderly women: (a) Aboriginal population, Evensk, (b) Caucasian population, Evensk, (c) Caucasian population of Magadan

ranging through the subjects of the Caucasian population in Evensk. From the above data, it can be seen that 6% of mature women are underweight, with none of the elderly applying to this category. Normal weight is observed in 32% of mature women and 23% of the elderly. Excess weight was exhibited by 38% of mature examinees, and 30% by the elderly. Among the Caucasian women of the settlement of Evensk, 24% of middle-aged women are obese, and 47% of

the elderly can be diagnosed with serious overweight.

Among the mature females of Caucasian ethnicity in Magadan (Fig. 1c), we detected underweight in 3% of the subjects, 44% of normal weight cases, with excess weight and obesity being characteristic of 28% and 25% of the examined women, respectively. In the elderly, only 1% of the subjects proved to be underweight, 21% of the surveyed women showed normal weight, excess weight was found in 35%,

and 45% of female residents of Magadan were obese.

Thus, the female population of the settlement of Evensk, both Aboriginal and Caucasian, showed a sharp growth in obesity with increasing age due to a smaller number of those with normal or excess weight: the proportion of obese people from middle-aged to the elderly increased by 28% and 23% in Aborigines and Caucasians, respectively. A distinctive characteristic of the Caucasian women of Magadan was less common incidence of normal weight due to a bigger number of obese people and those with excess weight. However, the proportion of obese women in Magadan, as they age from maturity to the elderly, proved to increase by 18% which was rather smaller than in Evensk. All these variables could be compared with the average values of this indicator through the groups.

Despite being a common indicator of detecting obesity, BMI does not reflect the localization of adipose tissue or the ratio of fat and muscle components in the body [13, 20]. A more accurate indicator that shows the accumulation of the abdominal fat appears to be Waist Circumference. It is also strongly correlated with risks of cardiovascular and metabolic diseases and can serve as an identifier of these diseases [28].

It is believed that the BMI value of ≥25.0 kg/m^2 in Caucasian women and ≥23.0 kg/m^2 in Mongoloid women with the WC value of ≥80 cm testify to abdominal obesity [9] and therefore identify increased risks of concomitant diseases. In this Magadan Region survey, Aboriginal and Caucasian women of all ages have their Waist Circumference values exceeding 80 cm which, together with excess weight and obesity, suggests visceral obesity and increases the risk of metabolic syndrome [20], cardiovascular diseases [9], disorders in carbohydrate and lipid metabolism [10], and reproductive impairments [11]. Visceral obesity in women is associated with a higher risk of heart failure than in men [26]. We could see a significant growth of this indicator with increasing age in Aboriginal women of Evensk and Caucasian women of the city of Magadan, however the Caucasians of Evensk did not show any big changes in this regard, which suggests an accelerated risk of the above mentioned diseases that mature women can develop owing to abdominal obesity. Thus females of the Caucasian ethnicity of the settlement of Evensk appear to be the most vulnerable when it comes to the risk of a metabolic syndrome which may already have its origin at the age of matu-

rity owing to rather high values of the WC indicator. Our Waist Circumference measuring examination among the mature female populations, Aborigines in Evensk and Caucasians in Magadan, showed the average statistical values of the indicators being practically compared with the normal standards except for the Caucasian women in Evensk who demonstrated the values significantly exceeding the upper limit of the range.

Conclusion. Our comparison study on women's physical development depending on their ethnicity, age (mature and old ages), and the region of residence has shown that women of Magadan Region, as they age from mature to old age, develop such unfavorable age-related changes as shortening Body Length with increasing Body Mass Index and bigger Waist Circumference which is the risk of cardiovascular diseases. The female population of the settlement of Evensk, both Aboriginal and Caucasian, exhibited a sharp growth in obesity with increasing age due to a smaller number of people with normal or excess weight. As for the Caucasian women of Magadan, a less common incidence of normal weight could be seen due to a bigger number of obese people and those with excess weight. In this survey, women of all ages were diagnosed with abdominal obesity. The Caucasian women in the settlement of Evensk who were rather high in their WC values at the age of maturity could therefore be referred to having a risk of developing a metabolic syndrome.

In this research, we have identified age- and ethnicity-related features of somatometric status of women in Magadan Region which need to be seen in a regional context when forming physical development standards.

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