

BONE COMPONENT PARAMETERS IN WOMEN WITH DIFFERENT AGE GROUPS AND CONSTITUTIONAL TYPES

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ABSTRACT

Purpose is to study the bone component quantitative parameters in women body with different age groups, including body types. **Material and methods.** The physical status of 580 Kyrgyz women of three age groups studied: adolescence (16 to 20 years) 210 girls, I period of adulthood (21 to 35 years) 186 women and II period of adulthood (36 to 55 years) 184 women. Somatotyping was performed according to the scheme of I.B. Galant, B.A. Nikityuk and V.P. Chtetsov (1983), with informed consent. The body bone component content was determined according to J. Matiegka (1921). **Results.** Among the women under study, the leptosomal group constitutions was 20%, mesosomal 32%, megalosomic 33% and indefinite was 15%. In comparison with absolute bone component content in girls with leptosomal constitution, it almost does not change in girls with mesosomal group, the megalosomal group increases by 1.2 times ($p < 0.05$), the indeterminate constitution is 1.1 times more ($p > 0.05$). The bone component percentage in girls with mesosomal group is 1.2 times less ($p < 0.05$), megalosomic 1.3 times ($p < 0.05$), indeterminate constitution 1.5 times ($p < 0.05$) compared with girls with leptosomal constitution. In the I period mature age women with leptosomal constitution, this indicator, compared with its value in women with mesosomal, megalosomal and indeterminate groups, was 1.4 times less ($p < 0.05$). In the II period mature age women with leptosomal constitution, this parameter, compared with its value in women with mesosomal group, was 1.4 times less ($p < 0.05$), in megalosomal group 1.5 times ($p < 0.05$), in indefinite constitution 1.6 times ($p < 0.05$). **Conclusions.** Body bone component absolute severity has minimal values in mature age girls and women with leptosome constitution (6.0 to 7.1 kg), the maximum with a megalosomal constitution (6.6 to 9.2 kg). In the II period mature age women compared with girls, the value of this indicator in representatives of all somatotypes decreases (by 1.1 to 1.2 times).

KEYWORDS: somatotyping, physique, body composition, bone component, girls and women.

RELEVANCE

Considering temporal (epochal) variability of physical features and physical development indicators, presence of acceleration, development retardation and some other phenomena, population physical status data should be constantly reviewed and supplemented. The need to implement such an approach is constantly pointed out in scientific literature [1, 3]. Despite a significant number of similar profile works, physical status of different groups in population is reflected inhomogeneously; many data are not representative, the studies were performed in people who differ significantly in age and gender; results of many anatomical and anthropometric works are outdated [5, 9, 11].

At the same time, the somatotypological characteristics of various ethnic groups in scientific literature are also presented disproportionately. There are very few modern materials on the Kyrgyz people physical status; study of their physical development specifics and nutritional status, from the standpoint of modern constitutional science, seems to be the most important medical and social problem, since only 56.4% men and 55.9% women have normal body weight; overweight in 34.6% men and 30.2% women of Kyrgyz nationality. More than half men and women aged from 40 and over are overweight or obese (data from the National Statistical Committee of the Kyrgyz Republic, 2015). Alimentary obesity is becoming an epidemic in Kyrgyzstan [11].

One of the fundamental sections of human morphology, which emerged relatively recently, is the study of body composition [5, 6, 12]. The relevance of this topic explained by existence of a significant number of applied and theoretical problems, the solution of which cannot be sufficient without the availability of objective information about body composition [10, 13].

Such problems, in particular, include the issues of assessing physical and nutritional status, adaptation to numerous environmental factors, to sports and professional activities conditions work in different conditions such as gravity, insolation, hypoxia, etc. [4, 7, 9]. Traditional anatomical and anthropometric approaches are complemented by effective high-tech research methods (bioimpedancemetry, etc.), expanding possibilities for an objective assessment of patient's physical and nutritional status. The most significant assessment of body component composition can be recognized in diagnosis and treatment of alimentary obesity and osteoporosis [2, 5]. The body component composition is dynamic, changes with age and body type, including the body bone component and this work is devoted to the assessment of these transformations.

The purpose in this study was to study quantitative data on absolute and relative indicators of body bone component in juvenile and mature aged women in connection with the peculiarities of physique.

Material and methods

The method of complex anthropometry [2] was used to study the physical status of 580 girls and women of mature age, ethnic Kyrgyz women living in the city of Osh and its environs (Kyrgyzstan). The sample did not include cases of diseases that could affect the formation of physical status (osteoporosis, alimentary obesity, degenerative-dystrophic diseases, etc.). Somatotyping was carried out according to the scheme of I.B. Galant, B.A. Nikityuk and V.P. Chtetsov [3]. The bone component content of was determined according to J. Matiegka [8].

This study was approved by decision of local ethical committee Institute of Medical Problems Southern Branch in Kyrgyz Republic National Academy of Sciences (October 12, 2016, Protocol No.4). All examined participants signed an informed consent to participate in anthropometric studies.

Statistical data processing includes calculation of arithmetic mean indicators, their errors; the value of individual minimum and maximum of each indicator (the amplitude of variation series). The significance of differences determined by Student's method.

RESEARCH RESULTS

Among the researched women by us, the leptosomal constitution group was noted in 20%, mesosomal in 32%, megalosomic in 33% and indefinite in 15%. The bone component content largely depends on the constitutional affiliations as shown in Table 1.

Body bone component content in girls (I), mature age women period I (II) and period II (III) with different constitutional types (X + Sx; min-max)

Indicator	Age group	Constitutional group			
		leptosomal	mesosomal	megalosomal	indefinite
Bone component (kg)	I	7.5+0.1 5.1-8.2	7.6+0.1 5.4-9.2	8.8+0.1* 6.3-10.3	8.1+0.2* 6.0-10.0
	II	7.3+0.1 5.1-8.3	7.5+0.1 5.2-9.6	8.7+0.1 6.1-10.1	8.1+0.2 5.8-9.1
	III	6.3+0.1 5.1-8.0	7.1+0.1 5.1-8.2	7.3+0.1 5.9-9.1	6.5+0.1 5.3-9.0
Bone component (%)	I	16.5+0.1 15.1 -19.2	13.5+0.1* 10.1-17.0	12.5+0.2* 9.8-17.0	11.0+0.3* 7.2-14.7
	II	15.8+0.1 13.0 -18.3	11.0+0.1* 8.0-16.0	11.3+0.1* 9.1-16.0	11.0+0.2* 8.0-13.2
	III	13.2+0.1 10.1- 15.2	9.3+0.1* 7.4-13.6	8.5+0.1* 6.1-14.3	7.5+0.3* 6.1-12.2

*p<0.05, differences are significant compared with leptosomal constitution

The bone component absolute value in girls with mesosomal group, compared with girls in leptosomal constitution, almost does not change, the megalosomal group increases 1.2 times ($p < 0.05$) and indeterminate constitution was 1.1 times more ($p > 0.05$).

Compared with body bone component percentage in girls with a leptosomal constitution, the value of this indicator in girls with mesosomal group is 1.2 times less ($p < 0.05$), in megalosomic 1.3 times ($p < 0.05$) and in indefinite constitution 1.5 times ($p < 0.05$). In mature age women with I period leptosomal constitution, this indicator, compared with its value in women of mesosomal, megalosomic and indeterminate groups, is 1.4 times less ($p < 0.05$). In II period mature age women with leptosomal constitution, this parameter compared with its value in mesosomal group women was 1.4 times less ($p < 0.05$), in megalosomal group was 1.5 times ($p < 0.05$), indefinite constitution 1.6 times less ($p < 0.05$).

The individual minimum and maximum absolute bone component content in women with leptosomal constitution is less, and the percentage is greater than in women with other constitution. Analysis of age characteristics absolute and relative content of bone component in body revealed the following facts. In women with a leptosome constitution, compared with girls, the absolute amount of the bone component in the first period of adulthood does not change, in adulthood second period it decreases by 1.2 times ($p < 0.05$). The percentage of bone component in comparison with girls, in women I period adulthood constitution decreases by 1.1 times ($p > 0.05$), in second period of adulthood by 1.3 times ($p < 0.05$). In women of the mesosomal constitution, in comparison with girls, the absolute value of this indicator in the first period of adulthood does not decrease, in the second period of adulthood it decreases by 1.1 times ($p < 0.05$). The body bone component percentage in comparison with girls, in women of this constitution in the I period of adulthood decreases by 1.2 times ($p < 0.05$) and in the second period of adulthood by 1.4 times ($p < 0.05$). In women with megalosomal constitution, compared with girls, the absolute value of this parameter in the first period of adulthood does not decrease, in the second period of adulthood it decreases by 1.2 times ($p < 0.05$). The body bone component percentage in comparison with girls, in women of this constitution in the first period of adulthood decreases by 1.1 times ($p < 0.05$) and in second period of adulthood by 1.4 times ($p < 0.05$). In women of indeterminate constitution, compared with girls, absolute amount of body bone component in I period women of adulthood does not decrease, in second period of adulthood it decreases by 1.2 times ($p < 0.05$). The relative amount of bone component, in comparison with girls, in women of this constitution in I period of adulthood does not decrease, in II period of adulthood it decreases by 1.3 times ($p < 0.05$).

The personal minimum and maximum of absolute bone component content in women of II period of adulthood with different constitutions are generally less than in girls of I adulthood period.

DISCUSSION

Study on physical development specifics and nutritional status of Kyrgyz women, from the standpoint of modern constitutional science, seems to be the most important medical and social problem, since only 56.4% men and 55.9% women have normal body weight; overweight present in 34.6% men and 30.2% women with Kyrgyz nationality. More than half men and women aged 40 and over are overweight or obese (data from the National Statistical Committee of the Kyrgyz Republic, 2015). Alimentary obesity is becoming an epidemic in Kyrgyzstan [].

Somatotypological features of physique have been proven earlier in the study of different populations [3, 5], but have never been studied and have not been statistically confirmed in men and women of Kyrgyz population.

For the first time on the Kyrgyz population, we compared the constitutional distribution according to the schemes accepted in modern anthropology [1, 4]. Thus, the results of a study of the Kyrgyz population showed that among women of youthful and mature ages, mesosomal (31 to 33%) and megalosomal (30 to 38%) constitutions dominate, the proportion of leptosomal (15 to 25%) and indeterminate (12 to 6%) constitutions is significantly below. Similar data given during somatotypological analysis on mature and elderly age women of Slavic ethnic group residents of St. Petersburg [5]. Thus, somatotypological analysis has established that during the transition from adolescence to the I period of adulthood, and further to its II period, there are no cardinal changes in the women constitution, which corresponds to a number of researchers position, there is no sharp change in the constitution in postnatal ontogenesis and all possible changes are of a modification character [1]. Probably, some disagreements in our data may be due to presence of "constitutional diversity" regional specifics in population, as well as somatotypological status age-related modifications, since the authors studied mainly the girls' physical status [2, 3, 5].

For the first time by calculation method, we found that body bone component absolute severity has minimal values in mature age girls and women with leptosome constitution ($p < 0.05$), the maximum in women with a megalosomal constitution ($p < 0.05$). In women of II period mature age, compared with girls, the value of this indicator in representatives of all somatotypes decreases (by 1.1 to 1.2 times). The maximum content of bone mass in women of all somatotypes falls on the period of 21 to 25 years.

Skeleton age-related demineralization is obviously associated with both osteoporosis and involution of skeletal muscles, since decrease in muscle pressure on the bone surface can lead to a decrease in metabolic processes [1]. In leptosome group representatives the absolute content of bone component is on average 8.32 kg, in stenoplastic somatotype is 7.42 kg, which is near to our data [2, 5].

A decrease in absolute and percentage amount of bone component with age, obviously, indicates passing involutive changes in the skeleton, which occurs already in adulthood in representatives of all constitutional groups.

CONCLUSION

Thus, women age dynamics and relationship between absolute with percentage values in body bone component were revealed. Absolute severity of body bone component has minimal values in mature age girls and women with a leptosome constitution (6.0 to 7.1 kg), the maximum with a megalosomal constitution (6.6 to 9.2 kg). In II period mature age women comparing with girls, value of this indicator in representatives of all somatotypes decreases (by 1.1 to 1.2 times).

Authors report no conflict of interest in the article.

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