Constitution and Anthropometric Parameters in Indigenous Population of Southern Altai Mountains

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Analysis of anthropometric parameters of 645 indigenous residents of Southern Altai Mountains belonging to two subethnic groups (165 Telengites and 480 Altai-Kizhi) revealed constitutional characteristics distinguishing these groups from each other and from Europeans. Differences in body length and weight, distribution by constitution types, sexual dimorphism, and AB0 blood groups were detected. The specific features of constitution together with environmental factors can determine predisposition of individuals belonging of these subethnic groups to some diseases.

Key Words: *Southern Altai ethnic groups; Telengites and Altai-Kizhi; constitution; anthropometric parameters; blood groups*

Constitutional characteristics reflecting genetically determined morphological adaptation to adverse factors occupy an important place among factors favoring the realization of genetic predisposition to some multifactorial diseases [6,7,11].

Studies of representatives of some ethnic groups (isolates and subisolates) can help to evaluate the role of genetic and ecological factors in the development of some diseases [1-3,5,6]. Among these groups are representatives of the Southern Altai population compactly living in the Altai Mountains at the height of 500, 1000, and 2000 m above sea level [7,9].

The aim of this study was analysis of anthropometric parameters in indigenous population of Southern Altai Mountains belonging to Telengite and Altai-Kizhi subethnic groups.

MATERIALS AND METHODS

Anthropometric parameters were studied in 645 residents (aborigines, 188 men and 457 women aged 20-77 years) of Southern Altai Mountains within the framework of a comprehensive study of health problems of indigenous population of the region under field conditions. 165 of the examined subjects were Telengites, 480 Altai-Kizhi. Physical development was evaluated by anthropometric method. Constitution types were determined using V. V. Bunak's method [4].

Martin anthropometer, large thickness caliper, and standard medical scales were used. Specially designed protocol included the following anthropometric measurements: body weight, standing and sitting heights, biacromial diameter, thoracic size, bicrystal diameter, perimeters of the left arm (at the level of triceps muscles), left wrist, left shin (middle third), and thorax (at the level of scapular edges) [10]. The lengths of the little and fourth fingers of both hands and thickness of fat folds (mm) at the level of the triceps, subscapular and ileac areas were measured.

Body weight was measured using standard medical scales with an accuracy of 0.1 kg. Heigth was measured using a Martin anthropometer with an accuracy of 0.5 cm.

Constitution morphophenotype was evaluated using estimated values of the Rees-Eysenck index [12]. Bearing in mind the transgressive changeability of the interface between somatic types, we determined the

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morphophenotypical discretes by the rule of dividing the control massive multitude by the mean quadratic deviation with an accuracy of up to 0.6 sigma.

Signs of sexual dimorphism (androgenicity) were evaluated using Tanner index [11]. The interface between discrete groups was determined by dividing the control massive multitude by the mean quadratic deviation with an accuracy of up to 1 sigma [8]. Discrete interface between constitutional morphological types was determined for each sex and each ethnic group. Body weight was evaluated by the Ketley index.

Studies of physical constitution of Southern Altai aborigines was paralleled by analysis of their AB0 blood group distribution, performed by standard methods.

RESULTS

Half of examined Southern Altai aborigines were characterized by normosthenic constitution irrespective of their sex and appurtenance to one of the two subethnic groups (Table 1). Others had asthenic or hypersthenic constitution with equal frequency.

Distribution by the types of sexual dimorphism was different and depended on the subethnic group and gender. Significant differences by the sexual dimorphism types were detected in male and female Telengites: the andromorphic type predominated in men (25.5±6.4% of men and 8.5±2.6% of women, $p_t<0.05$) and the mesomorphic type in women (61.7±7.1% of men and 83.1±3.5% of women, $p_t<0.001$). In Altai-Kizhi the distribution by the sexual dimorphism types was similar in men and women.

The results of the main anthropometric measurements in men and women in the total sampling of Telengites and Altai-Kizhi indicate that all the studied parameters, except the bicrystal size, differed significantly in men and women ($p_\sigma<0.001$, Table 2). It is noteworthy that all Altai aborigines were short. All men were significantly taller than women: Telengites by 11.1 cm, Altai-Kizhi by 13 cm. The Telengite women were significantly taller (by 4.2 cm) that the Altai-Kizhi women ($p_\sigma<0.01$).

Male Telengites weighed 3.5 kg less than male Altai-Kizhi, while female Telengites weighed only 1.2 kg less than the Altai-Kizhi women. Men' body weight in both subethnic groups was significantly greater than women's, which corresponded to the difference in body length.

The circumference of the pelvis was the same in men and women of both subethnic groups, but was less in Telengites both in men (by 2.4 cm) and women (by 2.8 cm). On the other hand, the thickness of the fat fold in women was more than in men for all three measurements in both groups, and was less in Telengites than in Altai-Kizhi. This fact suggests that the difference between Telengites and Altai-Kizhi in body weight is due to the fatty, but not bone component. On the other hand, men of the two groups did not differ by body length, length of fingers, wrist circumference, biacromial size and transverse size of the chest, arm and shin circumference. In other words, these men were approximately similar by osseomuscular component in the total body weight structure.

Analysis of the transverse size and perimeter of the chest in men and women showed the predominance of transverse size in men over this parameter in women. On the other hand, the chest perimeter in men virtually did not differ from that in women, that is, the chest in men was wider in the frontal plane and narrower in the sagittal plane, while in women the shape of the chest was more round.

No differences in the Ketley index between men and women were noted within each group and between the two groups.

TABLE 1. Distribution of Indigenous Population of Southern Altai Mountains by Constitution Types ($M\pm m$)

Subethnic group	Sex	Constitution type, %		
		asthenic	normosthenic	hypersthenic
Telengites	men (n=47)	25.5±6.3	49.0±7.3	25.5±6.3
	women (n=118)	31.4±4.2	39.0±4.4	29.6±4.2
	total (n=165)	29.7±3.6	41.8±3.8	28.5±3.5
Altai-Kizhi	men (n=141)	28.3±3.8	43.4±4.1	28.3±3.8
	women (n=339)	26.6±2.4	47.5±2.7	25.9±2.4
	total (n=480)	27.1±2.0	46.3±2.3	26.6±2.1
Total ethnic group	men (n=188)	27.6±3.2	44.8±3.6	27.6±3.2
	women (n=457)	27.8±2.1	45.3±2.3	26.9±2.1
	total (n=645)	27.7±1.7	45.1±1.9	27.2±1.7

Note. n: number of subjects.

TABLE 2. Anthropometric Parameters of Telengite and Altai-Kizhi Men and Women (*M*±*m*)

Parameter	Telengites		Altai-Kizhi	
	men (*n*=47)	women (*n*=118)	men (*n*=141)	women (*n*=339)
Body length, cm	167.0±1.0*	155.9±0.5*	166.7±0.5*	153.7±0.3*
Body weight, kg	62.1±1.1*	57.6±0.9*	65.6±1.0*	58.8±0.7*
Bicrystal size, cm	34.6±0.4	34.7±0.3	37.0±0.2	37.5±0.1
Fat fold above the triceps, mm	0.9±0.1*	1.5±0.0*	1.3±0.1*	1.9±0.1*
Fat fold in the subscapular area, mm	1.0±0.1*	1.6±0.1*	1.2±0.1*	1.7±0.1*
Fat fold in the ileac area, mm	0.9±0.1*	1.7±0.1*	1.3±0.1*	2.3±0.1*

Note. *p_σ<0.001 in comparison of women with men in the same subethnic group.

AB0 blood group system is a universal genetic marker characterizing the constitutional features of the organism. Blood groups 0(I), A (II), B (III) were equally incident in the whole South Altai ethnic group, while AB (IV) group was rare. Blood group 0 was significantly more incident in Telengites than in Altai-Kizhi (p<0.05) and more incident than groups A, B, and AB (Table 3). Comparison of the blood group distribution with that in the Slavic population of Novokuznetsk [7,9] showed that group A was significantly less incident and group B significantly more incident in Altai residents (p<0.001).

Hence, the representatives of the Southern Altai race are characterized by specific constitutional features differing them from each other and from the Europeans, which should be taken into consideration in studies of the role of biomedical factors in the development of diseases in Southern Altai aborigines. Constitutional characteristics are a phenotypical expression of the gene complex, essential for penetration and expression of individual genes [11] and together with the environmental factors (climate, nutrition, work) determine predisposition to certain diseases.

TABLE 3. Distribution (%) of Telengites and Altai-Kizhi by AB0 Blood Groups (*M*±*m*)

AB0 blood group	Both populations (*n*=671)	Telengites (*n*=165)	Altai-Kizhi (*n*=506)
0	33.9±1.9	40.2±3.8	29.5±2.1
A	27.8±1.7	20.7±3.2	31.1±2.1
B	28.9±1.7	28.3±3.4	26.2±2.0
AB	9.4±1.3	10.6±2.5	13.1±2.3

Note. *p_t<0.05 in comparison of the Altai-Kizhi with Telengites.

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