

Anthropometric features of Altai Youth Sambo Wrestlers

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Abstract:

Athletes from the lowland northern areas of the Altai Mountains exceed in body length and weight and have higher values of chest circumference as compared to the athletes from the highland southern areas of the Altai Mountains. Athletes from the first group are characterized by a hypersthenic body type, they have higher muscle strength indicators (hand and deadlift power) and better lung function compared with Sambo wrestlers from the south of the Altai Mountains. Probably, these differences are related to both climatic and geographic and also socio-economic factors. The latter factors are responsible for the negative trends in the dynamics of public health indicators. There are three main causes of differences in morphological and functional parameters of Sambo wrestlers of the north and the south of the republic: the extreme climatic conditions, environmental pollution and socio-economic instability.

A more detailed answer to these questions requires further study of morphological and functional indicators of the Altai male youth, both involved and not involved in sports, as well as a more thorough description of the Altai Mountains' youth social life conditions, considering environmental factors.

Key Words: Altai people, athletes, Sambo wrestling, anthropology, morphology, constitution.

Introduction

The Altai Mountains' territory mainly belongs to the Altai Republic lying in the south-east of Western Siberia. The Altai Republic borders with such Russian territories like Altai Kray, Kemerovo Region, the Tyva Republic, the Khakas Republic and also foreign countries Kazakhstan, Mongolia and China. The settlement type is mountain valley: almost every large village starts a chain of settlements stretching along the valley of the rivers. The population of the settlements is usually from 500 to 15,000. Mountain Altai is characterized by sharply continental climate, different in some of its regions.

According to the location and direction of the ridges the Altai Mountains can be divided into two parts – the northern and the southern. In the southern part there are the highest ridges: Katun, Saylyugem and South Chui which constitute a centerline. The ridges of the southern Altai rise from 2500 meters in the west and up to 3000-4500 meters in the east. The mountain Belukha the highest peak of Siberia (4506 m) is located here.

The southern Altai has a sharply continental dry and cold climate with low average annual temperatures, which makes it possible to consider the southern Altai as a highland area of the Altai Mountains (Marinin, 1992).

Northern Altai belongs to the excessively-wet areas, and this territory has a lowland relief (up to 350 m), only to the south-east there are several mountain ranges rising from 500 to 1800 m. The climate is warmer and more humid here. Thus, the northern Altai can be considered as a lowland area of the Altai Mountains (Marinin, 1992). 36.5% of the Altai Republic population (45527 people) are the indigenous people – the Altais, inhabiting this area for many hundreds of generations. On a geographic basis the Altais are divided into the southern and the northern.

The isolation of the southern and the northern Altais is manifested through languages and dialects, as well as in the anthropological type. The southern Altais have a more mongoloid facial type, they belong to the Central Asian and South Siberian type. The northern Altais are less mongoloid in terms of basic anthropological features, they belong to the Uralic type (Kolbasko, 2000; Anthro-ecology of Central Asia, 2005).

The purpose of this study was to identify morphological characteristics and constitution types of the Altai Sambo wrestlers living in the northern and the southern areas of the Altai Mountains.

Material & methods

To achieve these goals 65 indigenous Altai young men aged 17 to 20 were examined. They regularly practiced Sambo wrestling and had sport qualifications ranking from the First-Class sportsmen to the Candidates and for Masters of Sport and Masters of Sport of Russia.

The survey was conducted on the basis of the republican medical sports clinic; the measurements of morphological and functional parameters were performed in the first half of the day. The wrestlers at the time of the survey were in the preparatory period of the training cycle.

All tested athletes were divided according to climatic and geographic parameters into 2 groups: the northern (27 young men) and the southern (38 young men). The research program included: 1) the analysis of medical records of the subjects; 2) anthropometric measurements (body length (BL), body weight (BW), chest circumference (CC), carried out according to the standard anthropometric program (Bunak, 1941). On the basis of the measured physical features the weight and height index was calculated: the Quetelet Index (QI). $QI = BW (g) / BL (cm)$ (Makarova, 2002); 3) somatic type assessment was carried out by the body type classification by M.V. Chernorutski (1938), according to which there are two extreme and mutually antithetical as well as one medium type: asthenic, normosthenic and hypersthenic types respectively.

The determination of constitution type was performed by measuring such parameters as length, body weight, chest circumference and calculating the Pignet index (PI) according to the formula: $PI = BL (cm) - BW (kg) + OGC (cm)$. The asthenic type is characterized by a narrow thorax, the prevalence of height over weight, the epigastric angle $<90^\circ$; $PI > 30$ conventional units. The normosthenic type has an average bone and muscle tissue growth, moderate fat deposition, harmoniously combined height and weight, the epigastric angle is about 90° ; PI is within 10-30 conventional units. The hypersthenic type is represented by massive, well-nourished people, characterized by a relatively long body and short limbs, with a predominance of weight over height, the epigastric angle greater than 90° ; $SP < 10$ conventional units;

To determine the organism functional state level we implemented a set of techniques normally used in physiology and practical medicine. To determine the muscular system functional capacity we evaluated the power of hand and spinal muscles (deadlift) via the carpal and spinal dynamometry. The external respiration functional capacity was evaluated in terms of vital capacity (VC), with a dry portable spirometer SSP-11 in liters. To calculate the proper vital capacity (PVC) we used the formula of L.K. Velikanova (1993) for people over 16 years: $PVC (ml) = (BL * 0,052 - A * 0,022) - 3,60$, where A is the age of the subject. Normally, the actual vital capacity should be at least 90% of the proper vital capacity (Dembo, 1988).

The experimental data obtained were analyzed by the software packet Statistica 6.0. Morphological features were evaluated using the nonparametric Mann-Whitney criterion for small independent samples.

Results

The results of the study of Sambo wrestlers' anthropometric characteristics show that the representatives of the northern region significantly exceed the Sambo wrestlers of the south. The body length of the northern group athletes is 6.1 cm higher than that of the southern group Sambo wrestlers and makes $174,4 \pm 1,66$ cm and $168,3 \pm 1,12$ cm respectively ($p < 0,001$). The body weight of the northern group representatives is 6.2 kg more than the corresponding parameter of the southern group and makes $67,8 \pm 1,97$ kg and $61,6 \pm 1,12$ kg, respectively ($p < 0,05$).

The chest circumference of the northern group Sambo wrestlers is 3.7 cm higher than that of the southern group ($p < 0,05$) ($88,5 \pm 1,33$ cm and $82,4 \pm 0,98$ cm respectively). The calculations of selected anthropometric indexes allowed to determine the physical development of young people which is characterized by considerable individual variability, which indicates the proportional correlations between body weight and body length at this age (Koynosov et al., 2008).

As a result the Sambo wrestlers of the south have body weight index equal to $365,2 \pm 6,21$ g / cm, while the same index of the northern group makes $387,7 \pm 8,72$ g/cm ($p < 0,01$). However, the overall average Quetelet index reflects the "average weight" in both examined groups of Sambo wrestlers.

The Pignet index allows to evaluate not only the proportionality but also the physique type of the surveyed groups. It was found that the northern Sambo wrestlers tend to have the "good" physique ($16,5 \pm 2,48$), while in the group of the south we detected the "average" physique ($20,3 \pm 1,39$) ($p < 0,05$) (Fig.1). In general, the normosthenic body type prevails among the Sambo wrestlers of the Mountain Altai (59,3% and 73,7% by the northern and southern groups respectively).

Athletes with the hypersthenic body type prevail in the northern region (25,9% vs. 7,9%), the asthenic body type is more characteristic for the southern group (18,4% vs. 14,8%).

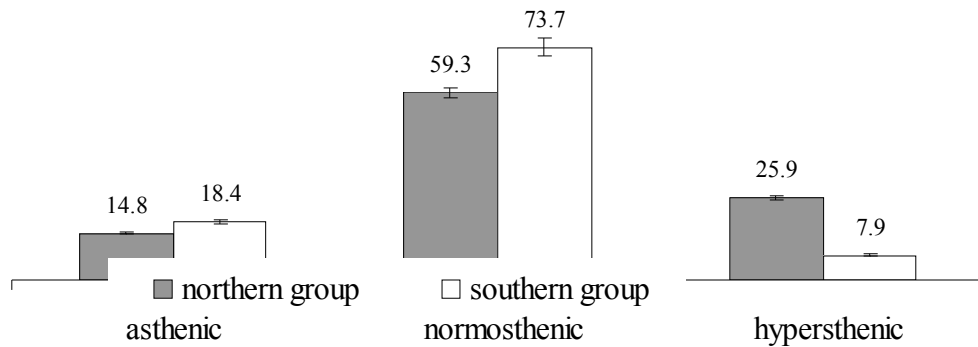


Fig. 1. Physique types of the Altai Mountain Sambo wrestlers (%)

Thus, the Sambo wrestlers of the northern Altai Mountains are characterized by significantly higher anthropometric indexes of length, weight, chest circumference, have a "good" physique and "average" weight if compared with the southern group. Among the Sambo wrestlers of the north there are more people with the hypersthenic body type and fewer representatives of the normosthenic and asthenic physique in comparison with the Sambo wrestlers from the south of the Altai Mountains.

The analysis of the Sambo wrestlers body muscular system shows that the hand power and the deadlift power of the northern group athletes slightly outperform the Sambo wrestlers of the south. However, it should be noted that our findings are generally lower than the corresponding figures of Sambo wrestlers from other regions of Russia (Tumanyan & Gozhin, 2002).

The analysis of external breath functional parameters of the Mountain Altai Sambo wrestlers shows that the vital capacity of the northern group athletes is significantly higher than that of the southern group representatives and exceeds it by 16,7% ($p < 0,001$). Accordingly, the Sambo wrestlers of the north have a significantly higher vital capacity rate ($p < 0,001$).

The actual lung vital capacity falls behind the proper lung vital capacity both in the northern (by 17.6%) and the southern groups (by 27.1%) with a high degree of confidence ($p < 0.001$).

The observed low rates of lung capacity among all athletes of the Altai Mountains, including, in particular, the Sambo wrestlers of the highlands, are possibly due to the fact that the athletes surveyed had problems with the respiratory system, which is confirmed by the data of medical survey forms. The first place in the sickness rate is occupied by respiratory diseases (47.6%) (Makhalin, 2006).

Discussion

We emphasize that the athletes from the lowland northern districts of the Altai Mountains are characterized by a bigger body length and weight, higher values of the chest circumference, compared with the athletes of the southern highlands of the Altai Mountains. Our findings contradict the data usually occurred in literature that highlanders tend to have a complex of adaptive morphological and functional characteristics, namely, a volumetric thorax, and relatively high rates of lung capacity (Alekseeva, 1986).

Among the athletes from the lowland northern areas there are more people with hypersthenic body type, they have higher muscle strength indexes (hand and deadlift power) and better lung functions compared with Sambo wrestlers of the south of the Altai Mountains. Probably, these differences are related to both climatic and geographic and socio-economic factors. The latter are responsible for the adverse trends in public health indicators (Meshkov & Valtseva, 1999; Kolbasko, 2000; Ilyinskikh et al., 2010).

There are three main causes of differences in morphological and functional parameters of the Sambo wrestlers from the north and the south of the republic: these are extreme climatic conditions, environmental pollution as well as socio-economic instability. For a more profound answer to these questions further study of morphological and functional indicators of the Altai youth is required, both involved and not involved in sports, as well as a more detailed description of life conditions of the Mountain Altai young people also taking into account the environmental factors.

Conclusions

Sambo wrestlers from the north of the Altai Mountains have significantly higher anthropometric indexes (BL, BW, CC) compared to Sambo wrestlers from the south of the Altai Mountains.

The normosthenic body type is more typical for the southern athletes' group compared to the athletes from the north of the Altai Mountains. People with the hypersthenic body type are more often met among the northern group, while the asthenic body type is more common in the southern regions of the Altai Mountains.

Athletes of the northern Altai Mountains have better indicators of external respiration (VC, PVC), muscular system of the body (hand and deadlift power) compared to the athletes from the south of the Altai Mountains.

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