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**COMPREHENSIVE CHARACTERISTICS OF PHYSICAL DEVELOPMENT, SEXUAL
DIMORPHISM, VEGETATIVE FUNCTIONS AND HEALTH OF YOUNG MEN OF DIFFERENT
ETHNIC AND SAME TERRITORIAL BELONGING**

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Abstract

In order to reveal the types of body constitution, sexual dimorphism, body mass and density indices, a number of anthropometric indices, vegetative functions and somatic health, we examined, with a complex of gravimetric methods, 348 males (17–21 y.o.), of them 172 Caucasoid and 176 Mongoloid (Khakass) young men in the same climatic-geographical conditions. All young men since birth lived in Khakass Republic, in towns, settlements and villages of Minusinsk Depression and Khakass steppe zone with weak anthropogenic impact, studied at Khakass State University named after N.F. Katanov, national and comprehensive schools. The influence of climatic-geographical and genetic factors was determined. It was stated that the young men of different genotypes mostly have asthenic, dolichomorphic and gynecomorphic body types, with decrease to normosthenic and mesomorphic types and further to pyknic, brachymorphic and andromorphic body types. The dynamic index of the functional status of the neuromuscular system is also at the same (unsatisfactory or poor) level. The peculiar features of Caucasoid young men, related to the phenotype, are: higher gravimetric values, larger number of young men with overweight and obesity, faster growth of lower extremities compared to torso growth, mixed tonus of vegetative regulation with the predominance of parasympathetic part, broader and flatter chest, weaker adaptation to environmental conditions and a resulting moderately weaker health. The genotype preserves the common features characteristic for both races.

Keywords

Constitution – Physical development – Sexual dimorphism – Caucasoid young men

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Introduction

In the regions of Siberia, a diversified complex of unfavorable social-economic factors is combined with sub-extreme climatic and intense anthropologic impacts on a human body. All these impacts are exhibited differently in rural areas and in cities¹, among the ethnic population living in the same or different climatic-geographical conditions. This reflects differently on the state of bodily functions and health of the younger generation. A combination of impacts may screen or, on the contrary, strengthen the negative influence of environmental factors². In populations of various climatic-geographical regions, the variability of anthropometric indices determines the long-term influence of environmental factors³. This said, the complex evaluation of the health of the population implies constant monitoring of somatometric and constitutional changes⁴. Some authors consider young age to be the most promising period of ontogenesis for studying the constitutional and other features of the population⁵. Using the data on the features of population of various climatic-geographical regions promotes the efficiency of the sports, physical training, health-improvement and treatment-preventive measures⁶.

¹ A. A. Baranov; V. R. Kuchma; N. A. Skoblina et al., Physical development of children and adolescents in the Russian Federation (Moscow: Pediatr, 2013) y Yu. S. Afanasiyevskaya, Anthropometric parameters and distribution of somatic types in youths of Krasnodar region: abstract of PhD (Medicine) thesis (Volgograd, 2011).

² M. V. Panyukov; L. B. Andronova; V. P. Plotnikov et al., "Research of morpho-functional features of physical development and physical efficiency in students-athletes and professional athletes", Curative gymnastics and sports medicine, num 11 (2010): 19–22; I. A. Parenkova; V. F. Kokolina & S. I. Parenkov et al., "Physical and sexual development of children and adolescents under iodine deficit and environmental ill-being (literature review)", Upper Volga Medical Journal, vol: 8 num 4 (2010): 49–53; L. N. Medvedev; E. I. Kashkevich; T. V. Demidova, & I. B. Chmil, "Physical development of 7–17 y.o. children in Siberian region", New research, Vol: 1 num 26 (2011): 77–8 y E. I. Kashkevich; L. N. Medvedev & I. B. Chmil, "Environmental impact on the long-term changes of some indicators of physical and sexual development of 7–14 y.o. children in Krasnoyarsk region", Newsletter of Samara Scientific Center of the Russian Academy of Sciences, Vol: 14 num 5–2 (2012): 355–358.

³ V. G. Nikolaev; L. V. Sineevea; V. N. Nikolenko; G. N. Kazakova & A. B. Guryeva, "Features of physical development of women in different climatic-geographic zones of the Russian Federation". Modern issues of science and education, num 3 (2015). Retrieved 05.02.2018 from URL: <https://www.science-education.ru/ru/article/view?id=19999>; K. T. Timoshenko, et al., "Anthropometric indicators of student youths at the initial stage of university education", Population health and environment, num 6 (279) (2016): 29–32; A. A. Fomchenkova; A. I. Krayushkin & E. D. Lyutaya, "Anthropometric indicators and distribution of somatic types in young, mature and old residents of Kamchatka region", Morphology, num 3 (2016): 216 y M. B. Kuchieva; E. V. Chaplygina; N. Yu. Nelasov & T. E. Ovseenko "Characteristic of anatomic components of the somatic type young women of Rostov oblast in the norm and with thyroid gland hypoplasia", Modern issues of science and education, num 3 (2017). Retrieved 04.08.2017 from: <https://science-education.ru/ru/article/view?id=26474>.

⁴ D. B. Nikityuk et al., « Body mass index and other anthropometric indicators of physical status, taking into account the age and individual-typological features of constitution in women», Issues of nutrition, num 4 (2015): 47–54 y L. V. Sineevea & G. N. Kazakova, "Anthropometry and bio-impedancometry: parallels and diversions", Fundamental research, num 9–3 (2013): 476–480

⁵ V. A. Tutelyan et al., « Features of macro-anthropometric indicators in women of different somatic types», Morphological Bulletin, num 1 (25) (2017) 20–22 y E. V. Chaplygina; O. A. Kaplunova & A. V. Markevich, "Anthropological area of scientific research in the works by Rostov anatomists", Journal of Fundamental Medicine and Biology, num 3 (2015): 13-17.

⁶ R. N. Dorokhov & V. G. Petrukhin, Technique of somatic typization of children and adolescents. Medical-pedagogical aspects of young athletes' training (Smolensk, 1989); O. V. Kalmin & T. N. Galkina, "Changes of anthropometric parameters of women in Penza region in the recent 9 years",

The research objective is to comprehensively study the physical development, constitutional features, sexual dimorphism, vegetative regulation and health level of young men of different ethnic belonging under the same environmental conditions.

Research materials and methods

The research was carried out on the territory of Minusinsk Depression and Khakass steppe zone, in towns and settlements. Khakass Republic is situated in the south-west of Eastern Siberia, in the left-bank part of the Yenisei river basin, on the territories of Sayan-Altay uplands and Khakass-Minusinsk Depression, the plains of which are associated with the river valleys and are called steppes (Abakan steppe, Koybalskaya steppe, etc.). The climate of Khakass Republic is varied due to the features of its geographical position and relief; it is characterized as acutely continental, with hot summers and cold winters.

The research was carried out at the Department of Fundamental Medicine and Hygiene of Institute for Medicine, Psychology and Sociology of Khakass State University named after N.F. Katanov and Scientific-Research Institute for Medical Problems of the North of Federal Research Center “Krasnoyarsk Science Center” of the Siberian Branch of the Russian Academy of Sciences. The research was performed in compliance with ethical and legal norms (Art. 21, 22 of the RF Constitution). The performance of the research was approved by Expert Council of Scientific-Research Institute for Medical Problems of the North of Federal Research Center “Krasnoyarsk Science Center” of the Siberian Branch of the Russian Academy of Sciences in Krasnoyarsk.

In accordance with the flowchart of age periodization of human ontogenesis, we examined 348 males (17–21 y.o.), of them 172 Caucasoid young men (Russians, Ukrainians, Belarusians, Poles, Czechs, Finns, and Germans) and 176 Mongoloid young men (Khakass). All young men since birth lived in Khakass Republic, in towns, settlements and villages of Minusinsk Depression and Khakass steppe zone with weak anthropogenic impact, studied at Khakass State University named after N.F. Katanov, national and comprehensive schools.

The research material corresponds to the following inclusion criteria:

- 1) place of birth and residence – territory of Minusinsk Depression and Khakass steppe zone;
- 2) age of young males: 17–21 y.o.;
- 3) no acute and chronic diseases (data of medical certificate of 086/u form).

Exclusion criteria:

Morphological Bulletin, num 3 (2016): 64-68; M. B. Kuchieva; E. V. Chaplygina; O. T. Vartanova; O. A. Aksenova; A. V. Evtushenko; K. A. Nor-Arelyan; E. S. Elizarova & E. N. Efremova, “Comparative analysis of constitutional features of different generations of healthy young men and women in Rostov oblast”, Modern issues of science and education, num 5 (2017). Retrieved 05.12.2017 from: <https://science-education.ru/ru/article/view?id=26797> y A. S. Pulikov; N. S. Kochan; E. B. Markovich & I. A. Petrov, “Constitutional characteristic of physical development and sexual dimorphism in aborigine young men of Khakass Republic”. Modern issues of science and education, digital scientific journal, num 6 (2016). Retrieved 13.08.2017 from: <https://www.science-education.ru/ru/article/view?id=25980>

- 1) place of birth and residence – outside the territories of Minusinsk Depression and Khakass steppe zone;
- 2) age less than 16 y.o., older than 21 y.o.;
- 3) acute or chronic diseases.

Anthropometric measurements were carried out on voluntary basis, in the first half of the day, in a light premises, with a standard set of anthropometric tools and devices which underwent metric calibration, according to the well known and widely accepted technique⁷, described in many monographs, textbooks and manual on anthropometrics.

Besides absolute and relative values, we calculated coefficients and indices: sexual dimorphism index (SDI) by J. Tanner, body mass index (BMI, Quetelet 2) by WHO recommendations, body proportions index (type of body constitution) by L. Rees - H.J. Eisenk, body density index (Rohrer), chest proportions index (Erisman), chest index (CI) and chest width index (CWI), “stenia” index (SI), shoulder width index (SWI), Kerdo index, hip-shoulder index (HSI) and others.

The research results were recorded in individual protocols and an electronic database. The statistical analysis of data was performed with software “MS Excel 2000” and STATISTICA FOR WINDOWS VERSION 6.0. The research results of quantitative indices, due to their large dispersion, are represented by median (Me) an interquartile interval (C₂₅–C₇₅). The confidence of differences of quantitative properties was analyzed with Wilcoxon criterion – for analysis of changes between the researched groups and subgroups, and Kruskal-Wallis H-criterion – for inter-group analysis. The analysis of statistical significance of the differences of qualitative properties was carried out with χ^2 criterion, and for small groups – a two-tailed Fisher’s exact test. The differences at $p < 0.05$ were considered statistically significant⁸. Table 1 shows the significant differences of values.

Results and discussion

Physical development and its features play a significant role for health, especially of a young growing organism during its formation and pubescence at pubertal and post-pubertal periods. The biological and psychological factors (age, gender, constitution, heredity, adaptation features, typological characteristics), as well as life-style factors, can be regarded as the variables, which, on the background of constant parameters, will determine the health level of a certain population group in a certain region and at a certain time period⁹.

⁷ A. S. Pulikov & O. L. Moskalenko, “Male hypogonadism and its interrelation to physical development of young males in Central Siberia”, In the World of Scientific Discoveries, Series B, vol: 1 num 1 (2013): 128–142; A. S. Pulikov; O. L. Moskalenko; N. P. Kuzenkov & O. I. Zaytseva, “Somatometric diagnostic of androgenic insufficiency and eunochoidism”. Modern research of social problems (electronic scientific journal), num 5 (49) (2015): 122–134. Retrieved 05.02.2018 from: <http://journals.org/index.php/sisp/issue/view/52015> y B. A. Nikityuk & A. I. Kozlov, “New technique of somatic typization”, Issues of sports and medical anthropology: Collection of scientific works, iss. 3, (1990): 121–141.

⁸ O. Yu. Rebrova, Statistical analysis of medical data. Using the STATISTICA software package (Moscow, MediaSfera, 2002).

⁹ A. I. Kliorin, “Somatic types and paradigms of individual constitutions. Development of a doctrine of a human constitution in Russian in the second half of the 20th century”, Physiologiical Journal named after Sechenov, num 3 (1996): 15–21.

The research of anthropometric and constitutional parameters of body, as well as somato-typological belonging at different age and ethnic groups, climatic-geographical zones¹⁰, remains topical due to its practical significance not only for pediatrics and hebiatrics¹¹, but is also actively applied in such spheres as dietology, sports and physical culture¹², anthropo-ethnology, ecology, hygiene¹³.

Anthropological data make it possible to trace the physical development of certain population groups, and in some cases, to diagnose diseases¹⁴. Earlier research focused of examining the physical development of different races, but not living on the same territory and under the same environmental conditions. Thus, a comparative analysis of anthropometric data of young men of different races, with different genotype and phenotype but living on the same territory, is timely and topical.

When analyzing the gravimetric indicators of Caucasoid and Mongoloid young men living in Khakass-Minusinsk Depression, it was found that these indicators are significantly lower in the Mongoloid young men (Table 1); in bodily form, the Mongoloid young men in general look smaller than the Caucasoid ones. For instance, the body mass of the Mongoloid young men is about 5 kg less, height is 6.5 cm less, chest circumference at rest (CCR) is 1.7 cm less, as well as transversal diameter of chest (TDC), length of legs and other, except the front-back diameter of chest (FBDC) which does not differ significantly between the two groups of young men, which testifies to the less wide chest in the Mongoloid young men and is confirmed by CWI.

The hand dynamometry in the Mongoloid young men shows greater strength of the right hand, while in the Caucasoid young men the hand dynamometry is equal for both hands, but the interquartile dispersion on the left hand is very large, which confirms the great

V. V. Yuryev; A. S. Samokhodskiy; N. N. Voronovich & M. M. Khomich, Growth and development of a child (Saint Petersburg: Piter, 2003)

¹⁰ A. A. Fomchenkova; A. I. Krayushkin & E. D. Lyutaya, "Constitutional features of young, mature and old residents of Kamchatka region", *Modern medicine: topical issues*, num 27 (2014) 107-113.

E. V. Chaplygina, "On the estimation of constitutional features of young men of military age in the Southern region of Russia", *Military-medical Journal*, num 5 (2007) y A. S. Pulikov; O. L. Moskalenko & O. I. Zaytseva, "Constitutional features of sexual dimorphism and physical development in young men of Central Siberia". *Yakut Medical Journal*, num 3 (2011): 7-9.

¹¹ A. A. Baranov; V. R. Kuchma; N. A. Skoblina et al., Physical development of children and adolescents in the Russian Federation (Moscow: Pediatr, 2013) y E. S. Elizarova; D. P. Osipov; S. I. Klimova; A. V. Markevich & A. A. Shvyrev, "Constitutional features of young men and women in Rostov-on-Don". *Scientific Bulletin. Medical Sciences*, num 1 (2015): 168-169.

¹² M. V. Panyukov; L. B. Andronova; V. P. Plotnikov et al. "Research of morpho-functional features of physical development and physical efficiency in students-athletes and professional athletes". *Curative gymnastics and sports medicine*, num 11 (2010): 19-22 y E. V. Kharlamov & E. M. Kalmykova, "Characteristic of the level of physical health and physical training in medical students depending on somatic types", *Medical Bulletin of the South of Russia*, (2011): 33-38.

¹³ V. A. Khoryakov "Estimation of physical development of young athletes from traditional and modern standpoint". *Pedagogics, psychology and medical-biological issues of physical education and sport*, num 12 (2012): 140-143 y V. A. Rodionov; N. A. Matveeva; N. N. Emelyanova et al., Physical development of rural schoolchildren in different environmental-biogeochemical zones. *Children's health in the territories of environmental-biogeochemical risk* (Cheboksary, 2006).

¹⁴ A. I. Klorin, "Somatic types and paradigms of individual constitutions. Development of a doctrine of a human constitution in Russian in the second half of the 20th century". *Physiological Journal named after Sechenov*, num 3 (1996): 15-21.

number of the Caucasoid young men with a stronger right hand. The dynamometric index (DI) of the right and left hand in the Mongoloid young men is equal to 60.82% and 57.5% respectively, and in the Caucasoid young men – 57.97% (the norm is 65–80%). This confirms that the functional status of the neuromuscular system in both cohorts of young men can be defined as under-satisfactory or poor, but better on the right hand in the Mongoloid young men. The ratio of legs length to torso length, manifesting the faster growth of a certain part of body during the youth period, shows that in the Caucasoid young men legs grow faster and outrun the growth of the torso.

No.	Indices	Young men				P<0.05
		Mongoloid young men		Caucasoid young men		
		Me	quartile 25–75	Me	quartile 25–75	
1	Body length, cm	172.3	167–176	179.0	174–183	*
2	Body mass, kg	63.96	57.93–67.23	69.1	62.9–77.2	*
3	Width of shoulders, cm	37.8	36.9–40.0	40.0	39.0–41.25	*
4	FBDC, cm	18.63	17.0–20.0	19.0	17.5–21.0	
5	TDC, cm	26.9	25.9–28.0	28.0	26.25–29.5	*
6	CCR, cm	87.3	83.0–91.88	89.0	84.0–94.5	*
7	Right hand dynamometry, kg	38.9	36.25–42.75	40.0	32.3–45.0	*
8	Left hand dynamometry, kg	36.78	33.0–41.1	40.0	30.0–46.2	*
9	Length of torso, cm	51.6	49.7–52.9	53.46	51.2–54.4	*
10	Length of leg, cm	89.0	86.1–91.0	93.0	90.1–96.1	*
11	Length of leg / Length of torso	1.72		1.74		*
12	Quetelet2 (BMI)	21.52	19.67–22.36	21.97	20.11–24.3	
a	chronic energy deficit (CED), %	7.95		7.86		
b	obesity, %	3.41		6.43		*
c	overweight, %	7.95		13.57		*
d	norm, %	80.68		72.14		*
13	Physical constitution (L. Rees – H.J. Eisenk)	106.47	101.67–112.71	107.19	100.76–112.58	
a	pyknic, %	7.04		9.7		
b	normosthenic, %	35.21		37.0		
c	asthenic, %	56.34		53.3		
14	Body density index (Rohrer index)	12.51	11.22–13.25	12.32	11.16–13.73	
15	Sexual dimorphism index (J. Tanner, 1968)	92.0	85.5–96.0	84.1	82.87–92.1–96.0	*
a	gynecomorphic, %	56.82		77.1		*
b	mesomorphic, %	22.73		15.0		*
c	andromorphic, %	20.45		8.05		*
16	Chest index	49.37	47.68–53.02	49.44	46.57–52.85	
a	brachimorphic, %	12.50		9.29		
b	dolichomorphic, %	53.41		61.43		*
c	mesomorphic, %	34.09		29.29		*
17	Erisman index	0.58	–2.4–+3.1	–1.0	–6.2–+5.0	*
a	normal chest, %	20.45		17.14		

b	narrow chest, %	52.27		57.86		*
c	broad chest, %	27.27		25.00		
18	Chest width index (V.N. Shevkunenko)	144	138–149	147	141–152	*
19	Shoulders width index	22.43	19.0–24.6	22.47	18.9–25.1	
a	dolichomorphic, %	36.36		32.86		
b	mesomorphic, %	63.64		67.14		
c	brachimorphic, %	0		0		
20	“Sthenia” index	0.81	0.77–0.85	0.79	0.73–0.85	
a	dolichomorphic, %	76.14		52.14		*
b	mesomorphic, %	12.50		30.71		*
c	brachimorphic, %	11.36		17.14		*
21	Hip-shoulder indicator (HSI)	72.1	68.3–75.1	70.65	67.4–74.7	*
22	Vegetative tonus	17.6		-5.9		*
a	sympathetic, %	69.32		45.90		*
b	parasympathetic, %	28.41		47.54		*
c	eutonic, %	2.27		6.56		*
23	Index of eunuchoidism	0.69	0.618–0.969	0.74	0.622–0.947	*
24	Level of health	1.71	1.53–2.39	2.32	-0.49–2.71	*
a	satisfactory, %	25.0		8.33		*
b	moderately low, %	72.73		91.67		*
c	low, %	2.27		0		

Table 1

Anthropometric data of the Caucasoid and Mongoloid young men (Me, quartile 25–75%)

It has been found that the key features of constitution are determined hereditarily — these are the longitudinal measures of the body and the prevalent type of metabolism; the latter is inherited only if 2–3 generations lived in the same territory. Combination of these features determines the level of similarity of many people with each other, which allows grouping them into 3–4 main constitutional types¹⁵.

Different types of relative indices make it possible to describe in more detail the main features and peculiarities (Table 1).

Thus, the body mass index (BMI, Quetelet 2), as an integral indicator of the body weight, shows the presence of normal young men in both cohorts (18.5–24.9 kg/m² according to WHO Memorandum), with uncertainly significant prevalence in the Caucasoid young men. However, BMI has specific features inside each of the cohorts: among the Caucasoid young men there are almost two times more of those with overweight and obesity compared to the Mongoloid young men, while chronic energy deficit (CED) (BMI < 18.5 kg/m²) is equally frequent. Rohrer index (body density index), as an integral indicator of the content of bone, fat and muscle mass in the body, also lies within the norm in both cohorts (11.6–13.0 kg/m³), but shows a certainly insignificantly higher body density in the Mongoloid young men.

According to Rees–Eisenk index, which characterizes the proportions and constitution of body, the young men of both cohorts belong to asthenic type by median (Me) and by interquartile interval. This is confirmed by the chest index (CI), “sthenia”, Erisman index, and is characterized by the prevailing length (or dolichomorphic type with a narrow

¹⁵ G. G. Avtandilov, Medical morphometry. Manual (Moscow: Medicine, 1990).

and disproportionally developed chest). However, certain indices, like the chest width index (CWI), shoulder width index (SWI), and Rees–Eisenk index, show that the young men belong to an intermediary type between asthenic and normosthenic, dolichomorphic and mesomorohic types (the young men with proportionally developed chest and shoulder width).

As for the physical constitution, the number of the young men within the cohorts is decreasing from asthenic to normosthenic and pyknic body types; though there are no reliable significance between the above types in the cohorts, the asthenic type is more numerous among the Mongoloid young men, and the normosthenic and pyknic types are more numerous among the Caucasoid young men. The share of the asthenic type in both cohorts is over 50%. The same regularity as with constitutional types (decrease in numbers from dolichomorphic to mesomorohic and brachimorphic types), we can observe with the “sthenia” indices (SI). Erisman index also shows very close results. At that, dolichomorphic type is more numerous among the Caucasoid young men according to Erisman index and SI, while “sthenias” are more numerous among the Mongoloid young men. Mesomorohic and brachimorphic types are more numerous among the Mongoloid young men. According to shoulder width index (SWI), chest width index (CWI), and hip-shoulder index (HSI), mesomorohic and brachimorphic types are more numerous among the Caucasoid young men. Determining the level of somatic sexual differentiation by J. Tanner index (1968) showed increased gynecomorphism in modern young men¹⁶, rather closely connected with hypodynamia, as the value of J. Tanner index in young men and the level of motion activity are equally dependent on each other¹⁷. According to the parameters characterizing the body width, the anthropometric gender features of gynecomorphic and mesomorohic young men show the reduction of the shoulder width, flattening of chest and growing of the pelvis width¹⁸. The recent researches testify to the finishing of the growth and development acceleration processes and the beginning of a trend towards body mass deficit in adolescents¹⁹. Compared to the data of the previous century, the number of young men with the features of asthenization, “gracilization”, obesity, and, especially, gynecomorphism has increased in urban areas²⁰.

¹⁶ A. S. Pulikov; O. L. Moskalenko & O. I. Zaytseva, “Features of adaptation of young men in age aspect under various environmental conditions”, In the World of Scientific Discoveries, num 5 (2011): 76-83 y S. Ya. Nadeina; O. V. Filatova; N. V. Kuzmina & D. M. Faleeva, “Populational research of anthropometric indicators of young residents of Barnaul”, Bulletin of Altay State University, num 3 (2008): 11–14.

¹⁷ S. Ya. Nadeina; K. A. Zhidkova & O. V. Filatova, “Features of somatic types’ distribution by sexual differentiation of body in groups of young men with different level of motion activity”, Bulletin of Altay State University, num 3-1 (2010): 44–47.

¹⁸ V. V. Yuryev; A. S. Samokhodskiy; N. N. Voronovich & M. M. Khomich, Growth and development of a child (Saint Petersburg: Piter, 2003)

A. S. Pulikov & O. L. Moskalenko “Male hypogonadism and its interrelation to physical development of young males in Central Siberia”. In the World of Scientific Discoveries, Series B, Vol: 1 num 1 (2013): 128–142.

¹⁹ A. A. Baranov; V. R. Kuchma; N. A. Skoblina et al., Physical development of children and adolescents in the Russian Federation (Moscow: Pediatr, 2013)

²⁰ A. S. Pulikov; O. L. Moskalenko & O. I. Zaytseva, “Constitutional features of sexual dimorphism and physical development in young men of Central Siberia”, Yakut Medical Journal, num 3 (2011): 7-9 y I. V. Sukhanova; A. L. Maksimov & S. I. Vdovenko “Features of physical development of military age young men in Magadan oblast”. Issues of social hygiene, healthcare and history of medicine, Vol: 23 num 4 (2015): 19–21.

Thus, it is not accidental that many researchers focus on physical development of adolescents and youths, as this is the period when the growing process finishes, the final sizes and proportions of the body are formed²¹. Apparently, the body development is greatly influenced by the status of sexual dimorphism, measured with Tanner index. According to this index, both the Mongoloid and Caucasoid young men were defined as mesomorphic type; within the cohorts, the number of young men decreases from gynecomorphic type to mesomorphic and andromorphic. The largest number of gynecomorphic body constitution is found among the Caucasoid young men (up to 77.0%), compared to just about 57.0% among the Mongoloid young men. However, the latter show more cases of meso-andromorphism, which is confirmed by the Hip-shoulder indicator (HSI) and the body constitution index of masculine or eunuchoid type; in general, this testifies to the larger number of the Mongoloid young men with masculine type of body constitution.

Formation of all adaptive types of body constitution under certain environmental conditions is closely connected with vegetative regulation. In the majority of the Mongoloid young men, it is under sympathetic influence, and in the Caucasoid young men – under mixed (sympathetic and parasympathetic) influence, which is confirmed by the minute volume of blood index (MVBI): parasympathetic innervation is found in 57.38% of the Caucasoid young men, and sympathetic innervation is found in 88.64%. The state of eutonia is found rarely, and more frequently among the Caucasoid young men. The whole complex of body interaction with the environment determines its health status, which is classified into several levels²². In general, the Mongoloid young men are healthier than the Caucasoid young men. Their level of health is more expressed: within the cohort, one fourth of the young men have satisfactory health level, almost three quarters have moderately low health level, and just about 2.5% have low health level. The majority of Caucasoid young men (over 90.0%) have low health level, and 8.33% – satisfactory health level.

Conclusion

As a result of a comprehensively study of the body constitution types, sexual dimorphism, body mass and density indices, many anthropometric indicators, vegetative status and somatic health level of young men with different genotypes (Mongoloid and Caucasoid) under the same climatic-geographical conditions, it has been stated that, over a long period of time, the same environmental conditions make the same influence on physical development and health status of young men with different genotypes. The genotype preserves the common features characteristic for both races under the same environmental conditions. Thus, the young men of different genotypes mostly have asthenic, dolichomorphic and gynecomorphic body types, with decrease to normosthenic and mesomorphic types and further to pyknic, brachymorphic and andromorphic body types. The dynamic index of the functional status of the neuromuscular system is also at the same (unsatisfactory or poor) level. The peculiar features of Caucasoid young men, related to the phenotype, are: higher gravimetric values, larger number of young men with overweight and obesity, faster growth of lower extremities compared to torso growth, mixed tonus of vegetative regulation with the predominance of parasympathetic part, broader and flatter chest, and weaker adaptation to environmental conditions and a resulting moderately weaker health.

²¹ A. A. Baranov; V. R. Kuchma; N. A. Skoblina et al., Physical development of children and adolescents in the Russian Federation (Moscow: Pediatr, 2013).

²² R. M. Bayevskiy, Forecasting of states at the verge of norm and pathology (Moscow: Medicine, 1979).

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