Physical education customizable to students' total body dimensions, functionality, physicality and physical activity

R.A. Gainullin[1]
Dr.Biol., Professor **A.P. Isaev**[2]
Associate Professor **R. Ya. Abzalilov**[1]
[1]Bashkir State Medical University, Russian Ministry of Health, Ufa
[2]South Ural State University (SRU), Chelyabinsk

Keywords: *physical fitness, functionality, total body dimensions, special health group, functionality tests, strength endurance.*

Introduction. When assessing the levels of man's overall physical fitness and physical health, it is quantitative indicators of aerobic endurance, characterized by minute blood volume and maximal oxygen consumption, that are of the greatest importance. The higher the maximal oxygen consumption value, the higher the levels of physical development and physical health [8].

The overall physiological orientation on health improvement during exercise consists in effective adaptation. In particular, the maximum capabilities of the body functional system are improved, tension in the work of the bodily organs and systems is reduced [4], efficiency and threshold value of motor activity increase in accordance with age, gender and adaptability.

Student age is a determining physiological age in realization of man's functional capabilities, improvement of work efficiency when reaching the training orientation threshold [3]. This becomes possible with a gradual (adequate) increase of loads of individual orientation [5] and focused development of local-regional muscle endurance.

Applicants to become medical university students are characterized by the low aerobic capabilities, low psychophysiological potential, low physical fitness level, and inadequate responses to the functional tests [11]. The special health group students' indicators help determine the morphological basis of a violation, effects of genetic factors, peculiarities of physique, physical development and muscular system that provides vital activity [6].

Objective of the study was to substantiate the possibility of using technologies that would develop local-regional muscle endurance in students with different levels of morphofunctional state and physical fitness.

Methods and structure of the study. Subject to the study were the university students with the body heights over 180 cm, 170-179 cm, 169 cm and under. The studied indicators are presented in Table 1.

The morphofunctional indicators and physical fitness level were determined by the generally accepted methods used in morphometry, theory and methodology of physical education [1, 9]. The data from the mass surveys of the students, conducted by the group of authors led by Professor A.P. Isaev [10], were used as the control.

Results and discussion. Analyzing the students' total body dimensions, one should note a significant decrease in the body weight relative to the body length ($p<0.05$-0.001). The variability of the indicators was predominantly stable. The body mass index (BMI) values were 21.89±0.19, 24.30±0.39, and 21.76±0.32 kg/m^2, respectively. It can be seen that the special health group students with the average total body dimensions had a supernutrition status. This required timely adjustments to their diet and motor activity. The systolic blood pressure values exceeded the reference limits or approached the upper normal ones. These data indicated intense myocardial functioning. At the same time, the diastolic blood pressure values were within the reference limits, thus characterizing the physiological range of vascular functioning. The orthostatic test results were within the upper reference limits for the tall subjects and those with the average height, the limits exceeded the normal range for the students of small stature.

It can be assumed that dysregulation and imbalance between HR and stroke volume were due to the orthostatic effects. The students' overall endurance depended on their total body dimensions.

The speed test (100 m run) revealed a tendency towards improvement of performance efficiency depending on the body length and weight.

To evaluate the cardiorespiratory system functionality, we calculated the Skibinski circulatory-respiratory coefficient, which increased with the increase in the total body dimensions ($p<0.01$-0.001) and was at the level of low ratings. These results allowed for the conclusion that the subjects' cardiopulmonary system reserves were insufficient and required the corrective and preventive treatment. The strength endurance values were relatively stable (six mixed

push-ups, abdominal crunches, pull-ups). The variability of physical fitness indicators was predominantly stable. This was evidenced by the hand dynamometry test rates displayed in the students with the high and average body length ($p<0.05$) as compared to the students of small stature ($p<0.01$).

The results of the study conducted in the main group are presented in Table 1.

The total body dimensions in three groups of students differed significantly ($p<0.01$). The systolic blood pressure was stable in all studied groups, while the diastolic one increased in the students with the average height and decreased in those of small stature ($p<0.01$). The orthostatic test rates were within the reference limits. The speed values did not differ significantly in all three groups, but their overall endurance improved statistically significantly with the decrease in the total body dimensions. The Skibinski index was significantly lower in the students of small stature and its values were below the reference limits. It can be assumed that dysregulation of the cardiopulmonary system was also characteristic of the main group students. The speed-strength test rates were low, while the strength endurance ones were high, although decreasing depending on the total body dimensions.

Table 1. *Physical fitness and functionality levels in MG students with different total body dimensions*

Statistics	Age, y.o.	Body weight, kg	Body length, cm	SBP, mmHg	DBP, mmHg	Orthostatic test, bpm	1000 m race, sec	100 m run, sec	Skibinski index, c.u.	Six mixed push-ups for 10 sec, reps	Sit-ups for 60 sec and pull-ups, sec	Hand dynamometry, kg	
												F (right)	F (left)
Physical fitness level (males with the height of 180 cm and taller, n=17)													
M	18,29	74,14	183,71	121,29	75,57	15,72	227,29	13,33	28,67	12,86	58,86	44,00	42,85
m	0,21	1,81	2,56	2,35	1,35	0,14	3,80	0,11	0,68	0,35	1,46	0,70	0,56
CV %	4,59	9,76	1,21	1,14	1,83	3,52	1,40	3,30	9,41	10,80	9,92	6,34	5,20
Physical fitness and functionality levels in students with the height of 170-179 cm, n=17													
M	17,50	66,83	175,83	121,33	78,00	14,32	223,33	13,52	29,83	12,83	51,83	44,00	43,00
m	0,24	0,56	0,28	0,42	0,35	0,24	3,28	0,08	1,11	0,07	1,18	0,56	0,50
CV %	1,60	3,33	0,63	1,37	1,78	6,70	0,50	2,29	14,95	2,18	9,14	5,06	4,65
Physical fitness and functionality levels in students under 170 cm tall, n=17													
M	17,50	61,50	165,00	121,00	72,50	15,02	216,50	13,35	26,00	16,00	45,00	42,83	37,50
m	0,24	0,48	1,23	1,32	0,56	0,22	3,27	0,05	0,28	0,29	1,10	0,42	0,35
CV %	1,60	3,17	0,59	1,05	3,17	5,85	0,46	1,42	4,26	17,25	9,77	3,89	3,70

The right and left hand strength values were lower than those obtained in the graduates of MEI [13]. BMI in the students with different total body dimensions equaled 21.97, 21.62, and 22.59 kg/m^2, respectively. All BMI values indicated the normal nutritional status of the examined students.

Table 2 presents the data obtained in the group of students attending 2 physical education classes per week. These classes were conducted alternately, and one training session in the strength training hall aimed to develop local-regional muscle endurance was carried out with the use of stretching exercises, game and cross-country motor activity. The comparative analysis conducted in May revealed some physiological changes in the body weight. Moreover, BMI in May amounted to 21.97, 22.33, and 21.76 kg/cm^2 in accordance with the total body dimensions. The data obtained indicated the normal nutritional status of the subjects. The HR responses to orthostasis were within the reference limits. The overall endurance indices increased significantly ($p<0.01$-0.001). The speed indicators in the students with the average and small body length had a tendency to change, so did Skibinski index ($p<0.05$) and stroke volume ($p<0.05$-0.01).

When comparing the hand dynamometry test data, the values obtained in the students with increased motor activity ($p<0.05$-0.01) were found to be significantly higher. The objective assessment of the effectiveness of physical education in MEI revealed the low and average levels of physical fitness, dysregulation of individual functions in the main group. We registered the low level of development of overall endurance, being the basis of wellness programs. However, physical exercises could be beneficial in terms of their scientifically substantiated and methodically correct use. Moreover, aerobic exercises that have a physiological impact on the level of physical fitness, physical development and functionality [2, 4, 8] are more effective.

Table 2. *Physical fitness, physical development, and functionality levels in MG students with different total body dimensions involved in intensive motor activity at the end of academic year*

Statistics	Age, y.o.	Body weight, kg	Body length, cm	SBP, mmHg	DBP, mmHg	Orthostatic test, bpm	1000 m race, sec	100 m run, sec	Skibinski index, c.u.	Six mixed push-ups for 10 sec, reps	Sit-ups for 60 sec and pull-ups, sec	Hand dynamometry, kg	
												F (right)	F (left)

Physical fitness level (males with the height of 180 cm and taller, n=17)													
M	18,00	76,60	184,80	121,20	76,60	15,00	209,20	13,21	28,12	15,98	69,60	52,60	51,20
m	0,27	0,97	2,95	2,35	0,77	0,14	3,95	0,07	0,86	0,26	1,74	0,84	0,63
CV %	6,00	5,10	2,05	1,14	3,99	3,73	1,81	2,11	12,26	6,56	10,08	6,34	4,90
Physical fitness, physical development, and functionality levels in students with the height of 170-179 cm, n=17													
M	18,10	68,00	174,50	119,90	72,50	14,50	207,50	13,05	34,30	19,50	72,50	51,00	49,00
m	0,24	0,61	0,45	0,15	0,58	0,15	0,96	0,10	0,74	0,25	1,16	0,56	0,71
CV %	5,30	4,45	1,30	0,63	5,21	5,24	1,85	3,90	8,62	5,12	8,01	5,45	7,22
Physical fitness, physical development, and functionality levels in students under 170 cm tall, n=17													
M	18,20	60,02	166,20	116,32	69,42	14,00	204,31	13,12	37,32	21,24	74,35	48,25	46,85
m	0,26	0,46	0,97	0,69	0,49	0,13	0,78	0,12	0,87	0,29	1,02	0,44	0,62
CV %	5,71	3,06	2,33	2,37	2,82	3,71	1,52	3,65	9,32	5,46	5,46	3,64	5,29

Conclusions. The data obtained in the special health group help determine the morphological basis of the shifts, influence of genetic factors, peculiarities of physique, physical development and muscular system providing vital activity We detected the imbalance in the functionality indicators, low level of physical fitness, inadequate reactions to the functional tests (orthostatic test, Skibinski index).

References

1. Avtandilov G.G. Meditsinskaya morfologiya [Medical morphology]. Moscow: Meditsina publ., 1990. 379 p.
2. Amosov N.M., Bendet A.Ya. Fizicheskaya aktivnost i serdtse [Physical activity and heart]. Kiev: Zdoroviya publ., 1989. 216.
3. Gainullin R.A. Integralnaya otsenka fizicheskoy podgotovlennosti i sostoyaniya studentov razlichnykh grupp zdorovya Bashkirskogo gosudarstvennogo meditsinskogo universiteta [Integrated assessment of physical fitness and state of students of various health groups of Bashkir State Medical University]. Perspektivnye issledovaniya v fizicheskoy kulture, sporte i turizme [Prospective studies in physical education, sports and tourism]. Proc. internat. res.-pract. conf., ISTiS, YuUrGU. Chelyabinsk, 2014. pp. 157-162.
4. Isaev A.P., Erlikh V.V. Polifunktsionalnaya mobilnost i variabelnost organizma sportsmenov olimpiyskogo rezerva v sisteme mnogoletney podgotovki [Polyfunctional mobility and variability of Olympic reserve athletes' body in long-term training system]. Chelyabinsk: SUSU publ, 2010. 502 p.
5. Isaev A.P., Rybakov V.V., Erlikh V.V. Individualizatsiya sportivnoy podgotovki: sostoyanie, problemy i perspektivnye resheniya [Personalization of sports training: state, problems and promising solutions]. Chelyabinsk: SUSU publ., 2016. 531 p.
6. Isaev A.P., Zalyapin V.I., Gainullin R.A., Korableva Yu.B. Dinamika pokazateley morfofunktsionalnogo sostoyaniya i fizicheskoy podgotovlennosti studentov [Dynamics of students' morphofunctional status and physical fitness indicators]. Vestnik VolGMU. Ser.: Ekologiya i prirodopolzovanie. 2016. v. 2. no, 1. pp. 160-171.
7. Cooper K. Aerobika dlya khoroshego samochuvstviya [Aerobics for well-being]. Moscow: Fizkultura i sport publ, 1987. 192 p.
8. Kulikov A.F. Pedagogicheskie tekhnologii zdravostroeniya i obrazovatelnoy deyatelnosti molodezhi [Educational technologies of health and educational activities of youth]. Kultura fizicheskaya i zdorovye. Voronezh, 2004. no. 1. pp. 53-56.
9. Landa B.H. Metodika kompleksnoy otsenki fizicheskogo razvitiya i fizicheskoy podgotovlennosti [Methods of integrated assessment of physical development and physical fitness]. Study guide. Moscow: Sovetskiy sport publ, 2006. 208 p.
10. Potapova T.V., Nenasheva A.V., Bykov E.V., Isaev A.P. [ed.]. Informatsionnoe prostranstvo zdravotvorchestva v individualno-differentsirovannom fizkulturnom obrazovanii uchashchikhsya 1-11 klassov [Information space of health creation in individually-differentiated physical education of 1-11 grade pupils]. Tyumen: MSU publ., 2008. 445 p.
11. Gainullin R.A., Isaev A.P., Zalyapin V.I., Korablyova Y.B. Statistical analysis of morphometric indicators and physical readiness variability of students. Fizicheskoe vospitanie studentov. 2017. no. 5. pp. 205-212.

Corresponding author: nullin@mail.ru

Abstract

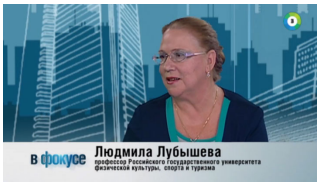
Modern physical education models customizable to the special requirements of medical university and students' anthropometric characteristics, functionality, physicality and physical activity give a special priority to the effective health protection and improvement and individualized physical education models. Systemic health tests are required to qualify students for different academic health groups and physical education service formats and control their progress in the academic physical education course. Many beginner students are attributed to the special health (SHG), main, preparatory and special groups for the classified academic physical education service. Studies and tests of the students' anthropometric characteristics and functionality are important for success of the physical education service as they expand and deepen our knowledge of the age physiology, physical education theory and practice and sport training systems; and the accumulated study data provide a basis for the regional physical education standards and physical developments statistics of the 17-19 year olds. The study data on the CVS and respiratory system development logics in the 17-19 year olds make it possible to effectively diagnose and prevent potential health disorders and identify the health risk groups in virtually healthy academic population, to offer the individualized health service and disease prevention formats. An efficient system of individual/ somatic health rating tests in the youth communities will help control the academic health situations and respond by the most efficient physical education and sport service models in the academic study period.

Гимн журнала

"Теория и практика физической культуры"

Стандарты и технологии спортизации физического воспитания студентов (круглый стол в Тюмени)

Обсуждение нового российского комплекса «Готов к труду и обороне» на телеканале МИР 24.



Будет ли польза от обновленной программы спортивной подготовки, телеканалу «МИР 24» рассказала доктор педагогических наук, профессор Людмила Лубышева

Интервью Тюменскому телевидению на тему доклада "Проектирование инновационных технологий в системе спортизированного физического воспитания"

Корзина

Ваша корзина пуста

Профиль

- Мой профиль
- Мои покупки
- Мои файлы
- Выйти

Новички

- Артем Манкис
- Роман Володин
- Валерий Кряжев
- Ольга Коротаева
- Стёпа Шабдаров

Поделиться

0

© Теория.ру (www.teoriya.ru) Все права на материалы принадлежат teoriya.ru
Копирование материалов запрещено.