

PECULIARITIES OF PHYSICAL FITNESS AND BODY COMPOSITION OF STUDENTS ENGAGED AND NOT ENGAGED IN SPORTS

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Annotation. Peculiarities of students' physical fitness and body composition were identified through an international research project including Lithuania, Poland and Belorussia. The article deals with the data of research carried out in Lithuania. The study included 207 students (aged 19.7 ± 1.3). It was established that students engaged in sports demonstrated higher results in speed and agility tests compared to their counterparts not engaged in sports ($p < 0.05$). Results of resistance and flexibility tests did not differ statistically significantly between male students engaged and not engaged in sports, but there were statistically significant differences in their endurance test results ($p < 0.05$). Female students engaged in sports showed significantly higher results ($p < 0.05-0.001$) in all physical fitness tests except for the handgrip dynamometry. Body composition characteristics did not significantly differ for students engaged and not engaged in sports.

Keywords: students, physical, fitness, body composition.

Introduction

In European document about policy of health «Health21: the health for all policy framework for the WHO European Region» [6] one of main aims of health policy is accentuated – health for all. Health program for 2008-2013, implemented by European Committee, is one of the most important measures for realization of health strategy. Basing on conducted scientific researches and projects, it is planned to increase level of population's physical and mental health, reduce inequality in the field of health of European community members. Especially actions, which are oriented on physical functioning, healthy life style, are supported. Main attention is paid to health of people of different age and different social groups; however it was noted that there are quite a little of researches devoted to healthy life style if students as well as to factors, which influence on their health in comparison with researches, devoted to pupils of schools and adult people. Though young people appraise their health positively, researches witness that in this age different health related risk factors are very frequent. New changes in society (impetuous globalization, changes in culture, policy, international economy and economy of the country) often are far from influencing positively on physical condition (body) of young people, on their thinking and mental development. Physically passive way of life continues to spread, health worsens, as well as physical potential of society members, including youth, behavior, which undermines health or facilitates its worsening becomes popular.

Researches, conducted in Lithuania [5, 7, 9, 10, 15] and in other countries [1, 2, 3, 8, 11, 14], in which students' way of life was analyzed, point at sharp reducing of motion functioning, physical fitness and still worsening physical health of students. Such researches are especially urgent; they help to understand deeper actions, connected with students' health. Scientists, analyzing students' way of life, their eating, stress that studying at university coincides with starting of independent life of youth and significantly differs from life in school period. Accelerated temp of life and education, financial problems change students' way of life, their eating that, in its turn, influences on their health [12]. I.M. Grigus and T.V. Kucher (2013) have noted that heavy and tensed mental activity during studying at HEE is fulfilled in conditions of time deficit against the background of sharp reduction of motion functioning [2].

Analyzing physical potentials of a personality, specialists mark out three kinds of measurements: organic (connected with body structure), cultural (system of values, views and behavior) and motor activity [4]. Role of motor activity is conditioned by psycho-motor abilities, which are required for mastering of movements, when improving movement skills, during fulfillment of exercises for motion. For evaluation of such kind different sets of tests are offered, which reflect characteristics of physical potentials and physical fitness. Tests are intended for estimation of general motion abilities that is why they can be applied both for sportsmen and for persons, who do not practice sports.

Lithuania, Poland and Byelorussia participating in international research project, carried out researches for determination of students' way of life and physical potentials. In fulfillment of this project single methodic of researches was used. In the present article the data of researches, which were carried out in Lithuania, have been analyzed.

The work has been fulfilled as per plan of scientific & research works of Lithuanian university of sports.

Purpose, tasks of the work, material and methods

The purpose of the work is to determine peculiarities of constitution and physical fitness's indicators of students-sportsmen and students, who do not practice sports.

For fulfillment of our research aim we formulated the following tasks: 1) to determine level and differences between development of different physical fitness's components of students-sportsmen and students, who do not practice sports; 2) determine differences between constitutions of students-sportsmen and students, who do not practice sports.

The methods of the research. Components of physical fitness of the tested were determined with *testing* method. Complex of tests was selected so as to correspond to health related dimensions of physical potentials and

characterize: 1) quickness and dexterity (50 meters run from high start (sec.); shuttle run 4x10 m (sec); 2) strength of skeleton muscles (long jump from the spot (cm); chin ups (q-ty of times) for boys and hanging on bar (sec.) for girls; test for "sit-lic" – in dynamic mode (q-ty of times for 30 seconds); hand strength – by pressing of hand gauge (kg); 3) flexibility (torso forward bending, standing on gymnastic bench (cm); 4) endurance (800 meters run (sec) for girls and 1000 meters – for boys (sec). For determination of constitution peculiarities, with the help of *anthropometric measurements*, we registered: weight, height, index of body mass (IBM). Quantity of fat was determined by two methods: 1) by weighing on "ANITA" balance – percentage of fat mass was determined; 2) with the help of caliper 4 fat folds of skin were measured (biceps, under-blade, above hip and thigh).

Mathematical statistics. Statistical analysis of the obtained data was fulfilled with the help of MS Excel. For comparison of results of different groups and determination of confidence of differences between mean groups' data we used *t* criterion of Student with level of statistical significance of $p < 0.05$.

The tested. The research covered 207 Lithuanian students (69 boys and 138 girls), from them 42 boys sportsmen and 32 girls – sportswomen. Average age of the tested was 19.7 ± 1.3 years old.

Results of the research

Results of the researches showed that students-sportsmen (boys and girls), covering 50 meters distance with maximal speed, are able to run from high start quicker than students, who do not practice sports. Difference between group results is statistically significant (for boys $p < 0.05$, for girls $p < 0.001$). From statistical point of view there is substantial difference between results of test for dexterity, i.e. shuttle run 4x10 m. Confidence of group results' difference between trained and not trained students is as follows: boys - $t = 3.26$; $p < 0.001$, girls - $t = 2.71$; $p < 0.05$.

Data of test "long jump from the spot", which determine component of legs' explosive strength, showed that results of not trained boys are insignificantly less than indicators of students-sportsmen ($t = 1.07$; $p > 0.05$). However, girls-sportswomen jump for longer distance than not trained girls ($t = 4.14$; $p < 0.001$). Results of test for power endurance of arm biceps and back muscles of not trained girls are significantly worse than results of girls-sportswomen ($t = 3.21$; $p < 0.001$). With chin ups, boys results had no differences ($t = 1.19$; $p > 0.05$).

Results of test "sit-lic", which determine strength of torso muscles and endurance, of not trained girls were significantly lower than sportswomen's results ($t = 6.35$; $p < 0.001$). In boys group we did not register any significant differences.

Analysis of hand strength showed that in both groups (boys and girl, trained and not trained) results were practically equal.

For evaluation of backbone and hip joints' flexibility the tested fulfilled forward bending, standing on gymnastic bench. Results of the tested groups showed that trained students were more flexible, than not trained, however statistically significant difference was registered only in girls' group ($t = 2.41$; $p < 0.05$). It should be noted that this test resulted in wide scattering of results. Coefficient of variation (VA%) in groups, varies from 50.83 to 88.04, and it means that independent on student's being trained or not, there is significant difference between indicators of individual flexibility.

For evaluation of students' endurance we chose distant run: for girls – 800 meters and for boys – 1000 meters. By its physiological method of energy supply and by duration of physical functioning this task characterizes mixed aerobic and anaerobic endurance. According to received data, trained girls cover distance of 800 meters in average for 235.47 sec., and not trained girls – for 257.29 sec. ($t = 2.64$; $p < 0.05$). Trained boys run 1000 meters in average for 238.79 sec, and not trained - for 256.49 sec. ($t = 2.11$; $p < 0.05$). There fore, sportsmen have more trained component of anaerobic-aerobic endurance.

Constitution characteristics of students were registered by height and body mass, by IBM, percentage of fat and sum of thickness of fat folds on shoulder biceps, under-blade area, above hip and thigh.

As per obtained data, students-sportsmen have higher height than their not trained peers: average height in group of sportsmen is 184.44 ± 1.22 cm, in group of not trained boys – 182.04 ± 1.33 cm; in group of sportswomen – 169.84 ± 1.08 cm, in group of not trained girls – 168.99 ± 0.56 cm. However this difference is not statistically significant. Analyzing indicators of body mass we registered that mass of body (81.29 ± 1.56 kg) of students-sportsmen is significantly higher ($p < 0.05$), than mass of not trained students (76.17 ± 2.66 kg). Concerning girls, though body mass of sportswomen (62.65 ± 1.55 kg), is higher than mass of not trained girl-students (61.55 ± 1.06 kg), however there is no significant difference between groups ($p > 0.05$).

Analysis of OBM indicators of trained and not trained students (girl-students) we did not registered any significant difference ($p > 0.05$). Mean IBM of students varies from 21.52 to 23.92 conv. units that show normal height-weight correlation of students'/girl-students' bodies. However analysis of individual IBM indicators showed that in boys group, independent on boys' being trained or not trained, there are students with excessive weight (20 – 24.4 %). In girls' group percentage of girl-students with excessive weight is less (9.5 – 9.7 %), but there are girls with too little mass of body (3.2 – 6.3 %). It is interesting that in group of not trained students there are also boys with insufficient mass of body (4 %). The data of our research comply with data of L. Škėmienė et al., 2007 [13], who, studying future medical workers of Lithuania, determined that 9.1% of third year girl-students and 14.5% of third year students have excessive weight.

Analyzing fat percentage of students/girl-students we registered that the following data: trained girls have 22.13 %, not trained girls - 23.66 %; this indicator is higher than the boys' one (trained boys have 11.51 %, not trained

students -12.81 %). Though fat percentage of sportsmen is less, we did not register statistically significant difference in this groups ($p > 0.05$).

Similar results were obtained with measuring of fat folds. Sum of four measured boys' folds is less than the same of girls, but in groups of trained students/girl-students and not trained ones there were registered no statistically significant difference. Nevertheless, it should be noted that in group of not trained girls fat folds of shoulder biceps and on abdomen were statistically significantly thicker. Probably, excessive fat in these places is connected with insufficient motion functioning.

Table 1

Indicators of boys' physical fitness ($X \pm SD$)

Indicators	Trained students	Not trained students	t	p
50 meters run, sec.	6.98±0.52	7.22±0.34	2.37	<0.05
Shuttle run 4 x 10 m, sec.	10.19±0.48	10.60±0.51	3.26	<0.001
Long jump from the spot, cm	247.86±20.44	242.44±20.70	1.07	
Chin ups, quantity	9.83±5.98	8.26±4.90	1.19	
Test –sit-lie” quantity for 30 sec.	32.88±4.03	31.81±5.69	0.85	
Dynamometry of right hand, kg	50.05±9.90	49.24±11.20	0.30	
Forward torso bending, from standing position, cm	9.69±6.70	8.80±6.87	0.53	
1000 meters run, sec.	238.79±36.82	256.49±29.65	2.11	<0.05

Table 2

Indicators of girls' physical fitness ($X \pm SD$)

Indicators	Trained girl-students	Not trained girl-students	t	p
50 meters run, sec.	8.30±0.65	8.82±0.62	3.98	<0.001
Shuttle run 4 x 10 m, sec.	11.17±1.22	11.86±1.29	2.71	<0.01
Long jump from the spot, cm	195.78±20.96	178.41±20.29	4,14	<0.001
Hanging on bar, sec.	17.47±11.59	10.23±9.77	3.21	<0.01
Test –sit-lie” quantity for 30 sec.	30.03±3.31	25.24±4.90	6.35	<0.001
Dynamometry of right hand, kg	28.10±5.10	26.59±5.60	1.40	
Forward torso bending, from standing position, cm	11.74±5.97	8.63±7.60	2.41	<0.05
800 meters run, sec.	235.47±38.49	257.29±33.31	2.89	<0.05

Conclusions:

1. Results of test for quickness, dexterity and endurance of trained students are higher than of not trained ones ($p < 0.05 - 0.001$). Components of physical fitness (strength and flexibility) of trained and not trained students had no statistically significant difference ($p > 0.05$). However, all results of trained girls' physical fitness were much higher than of not trained girl-students ($p < 0.05 - 0.001$), excluding hand dynamometry, where indicators were practically equal.
2. Analysis of body constitution of trained and not trained students/girl-students (height, weight, IBM, fat percentage and sum of values of measured fat folds) did not show any significant differences.

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