

ASSESSMENT OF SPEED AND POWER ABILITIES OF THE STUDENTS DURING THE WEEKLY TRAINING CYCLES

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Annotation. *Purpose:* summarizes the current scientific literature data on the physical condition of the students during the period of study in higher education establishment and also distinguished certain manifestations of physical performance level they had during the school week. *Material:* the study involved 205 students of 1-5 courses at the age of 16-22 years. The levels of physical performance on the test PWC170. *Results:* It was found that the dynamics of physical performance depends on the period and the period of a week of training students in the school. In the third year students of physical performance level at the beginning of the school week was recorded within 1235.4 kgm / min in men and 812.5 kgm / min in girls (evaluation - above average). *Conclusions:* during the school week changes the physical condition typical for students in the first and second courses. In the third year students dynamic performance curve has a descending character. Do senior students - ascending- descending.

Keywords: students, physical, performance, school, week.

Introduction

Approximately 50% of students of higher educational institutions have deviations in health condition; the real volume of motor activity of students does not provide their fully fledged development. The cause of sharp decline of students' health is considered to be first of all intensive educational activities which are characterized by high mental loads and nervous and emotional tension. And the tension has a progressing orientation in connection with the growing information flow and education computerization [1].

Rationalization of a student's work and a level of resistance to nervous and emotional tension is possible by optimization of functioning of the basic organism systems with consideration of their functional state before the beginning of work; rationalization is also connected with peculiarities of work, its organization as far as learning-and-labor activity and work capacity of students undergoes changes that are clearly observed during a day, a week, during every 6 months and an academic year in whole [2].

The dynamics of mental work capacity in a weekly training cycle of students is characterized by the gradual change of the period of warming-up at the beginning of a week (Monday), which is connected with the entry to a habitual schedule of work after a rest on a day off. In the middle of a week (Tuesday-Thursday) it is observed the period of stable and high work capacity. By the end of a week (Friday, Saturday) it is seen the process of its decrement. In some cases on Saturday it is observed the rise of work capacity which can be explained to be the phenomenon of the "end spurt". However, there are scientific messages about the fact that the typical curve of weekly work capacity of students can change if the factor of nervous and emotional tension comes into effect that accompanies activities during several weeks in succession [3, 9].

Assessment of students' work capacity during a semester and an academic year in whole shows that at the beginning of the academic year the process of fully fledged realization of learning-and-labor potential of students is delayed for 3-3.5 weeks and the so called warming-up period comes which is accompanied by gradual rise of the work capacity level. Further comes the period of stable work capacity that continues for 2.5 months. With the beginning of examinations, when on the background of continuing classes the students prepare for and take exams, the everyday load increases (on the average up to 11-13 hours in combination with worries) and the work capacity starts to decrease. In the period of examinations the decreasing of the curve of work capacity intensifies [5, 7].

The beginning of the second half of an academic year is also characterized by the warming-up period, however, its duration is not more than 1.5 weeks. Further changes of work capacity up to middle April are characterized by the high level of stability. In April there are observed signs of decrement of work capacity conditioned by a cumulative effect of many negative factors of students' vital activity that were accumulated during the academic year. During a test period and examinations the work capacity decrement manifests stronger than in the previous semester [6, 10].

At growing academic load the physical and mental work capacity decrease that affects physical development and health condition of students. This confirms the necessity to study functional capabilities of an organism at adaptation of students to the living and study conditions. Extension of the range of dexterity of students favors the improvement of adaptive capabilities of an organism to continuous intellectual loads by optimization of functioning of the basic systems of an organism which in the end will contribute to rationalization of a student's activities and the rise of the level of resistance to nervous and emotional tension. Dependence of students' physical condition and its variation during a training week and an academic year needs a detailed study of these changes in order to choose optimal methods and means of its correction [4, 8].

The work is performed according to the plan of the research activities of Vasyl Stefanyk Precarpathian National University and is a fragment of the complex scientific topic of the Department of Physical Rehabilitation of the Faculty of Physical Education and Sports "The use of non-drug means and natural factors to improve physical

development, functional and physical readiness of an organism”, state registration number 0110U001671.

Aim, tasks of the work, materials and methods.

The aim of the work: to assess changes of physical work capacity of students during a training week.

Tasks of the work: to study and generalize modern scientific literal data concerning physical condition of students during their study at a higher educational institution, to define the level of manifestation of indices of physical work capacity among students during a training week.

Materials and methods of the research. To determine the level of formation of the main physical qualities and physical condition of students it was conducted a pedagogic experiment (ascertaining experiment of the first order). It involved 205 students of Vasyl Stefanyk Precarpathian National University. Among them – 42 students of the first course (20 boys and 22 girls, average age – 17.5±0.4 years), 41 students of the second course (19 boys and 22 girls, average age – 18.7±0.6 years), 44 students of the third course (20 boys and 24 girls, average age – 19.7±0.4 years), 40 students of the fourth course (18 boys and 22 girls, average age – 20.6±0.4 years) and 38 students of the fifth course (18 boys and 20 girls, average age – 21.9±0.5 years).

For integral estimation of physical condition of the students which also reflects the condition of their health and complex estimation of functional condition of cardiovascular and respiratory systems there was determined the level of physical work capacity by the PWC₁₇₀ test.

Physical work capacity (PWC) was calculated by the formula suggested by V.L. Karpman and co-author (1974):

$$PWC_{170} = N_1 + (N_2 - N_1) \times (170 - P_1) / P_2 - P_1$$

where, N1 – intensity of the first load (Kg m/min),

N2 - intensity of the second load (Kg m/min),

P1 – heart rate at the first load,

P2 – heart rate at the second load.

To make the methods very close to the natural conditions there was applied the modification of a test suggested by G. Novozhylov and A. Lomov (1987); during that a stair climbing was used as graduated physical exercises. Assessment of the PWC at the given age group was performed by the recommendations of L.Ya. Ivashchenko, T.Yu. Krutsevych.

Results of the research.

Dynamics of the PWC indices during a training week is represented in the table.

Table 1

Quantity of Physical Working Capacity among Students during Weekly Training Cycle, M±m

Academic year (course)		Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		Physical Working Capacity Kg m/min					
I	B	947,1±5,1	924,3±7,8	897,7±6,4	862,4±4,3	815,1±7,2*	847,7±5,5
	G	725,6±4,4	684,7±5,2	622,4±7,6	601,5±6,3	501,2±4,7*	594,3±5,7
II	B	1121,1±11,5	973,4±8,2	882,8±6,7	826,4±5,6	794,8±4,5*	811,2±6,7
	G	712,9±5,2	651,6±4,6	598,3±6,4	553,2±4,7	512,7±5,2*	542,3±6,5
III	B	1235,4±14,1	1211,1±12,2	1203,7±11,7	1147,2±10,2	927,3±9,4*	1107,4±11,6
	G	812,5±7,2	804,3±8,5	796,7±6,6	703,4±5,4	574,1±4,7*	691,3±5,5
IV	B	803,4±7,2	947,6±8,3	1131,2±10,4*	952,7±9,5	861,1±7,6	742,1±6,5
	G	501,7±4,2	661,4±5,8	724,6±7,1*	647,5±4,8	562,1±6,9	443,7±5,5
V	B	794,8±6,4	911,4±7,3	1127,4±9,6*	921,3±8,5	857,7±6,7	721,5±6,6
	G	526,1±4,5	642,8±5,2	711,8±6,5*	631,8±6,7	522,9±4,6	468,3±4,7

Note: reliability of indices distinction as compared to such in the first day of a week (Monday): * -p<0.05

Assessment of PWC of students of the 1-5 courses during a weekly cycle showed that among the first-year students its level at the beginning of a week is assessed as an average one among boys as well as among girls. Further, during study it was observed the tendency to its deterioration and in the end of a training week it was registered a low level of it which reliably differed from such at the beginning of the week (815.1±7.2 Kg m/min to 947.1 ±5.1 Kg m/min, p<0.05 among boys and 501.7 ±4.7 Kg m/min to 725. ±4.4 Kg m/min, p<0.05 among girls) and was regarded to be under average one (table 1).

Among the students of the second course the dynamics of PWC during a training week had the same characteristics (table 1).

Among the students of the third course the level of PWC at the beginning of a training week was registered within the limits 1235.4 Kg m/min for boys and 812.5 Kg m/min for girls and was regarded to be above the average one which was reliably big of the level of PWC among students of the first and the second courses (P<0.05). In the period from Monday to Wednesday the variation of average values of PWC were statistically insignificant, i.e. the quantity of PWC was remaining on a fixed level; and starting with Thursday and up to Friday the level of PWC among boys as well

as among girls dramatically decreased and the registered index of PWC in the end of the week was reliably lower than such on Monday (927.3 ± 9.4 Kg m/min to 1235.4 ± 14.1 Kg m/min, $p < 0.05$ among boys and 574.1 ± 4.7 Kg m/min to 812.5 ± 7.2 Kg m/min, $p < 0.05$ among girls) and was regarded to be the average one (table 1).

The level of PWC at the beginning of a week among the students of the fourth course was registered within the limits of 803.4 Kg m/min for boys and 501.7 ± 4.2 Kg m/min for girls and was regarded to be below the average. Further, in the middle of the week (up to Wednesday) the average values of PWC among students of the 4th course were increasing (1131.2 ± 10.4 Kg m/min to 803.4 ± 7.2 Kg m/min, < 0.05 among boys and 711.8 ± 6.5 Kg m/min to 501.7 ± 4.2 Kg m/min, $p < 0.05$ among girls) and was regarded to be the average ones. And starting with Thursday and up to Saturday inclusive (a day off) the average values of PWC were decreasing and did not differ from the ones registered at the beginning of a training week (table 1).

Among the students of the fifth course the dynamics of PWC level during a training week was the same as for the fourth-year students (table 1).

Graphic presentation of the dynamics of PWC levels among the students of the 1-5 courses is presented in the picture 1. As the changes of average meanings of PWC during a week were typical for the students of the 1-2 courses and students of the 4-5 courses, in the picture there are presented average values of these indices.

As it can be seen from the picture 1 the curve of PWC among the students of the 1-2 courses has the evenly descending character (among boys as well as among girls) during a training week with the gradual rise on a day off (on Saturday).

Among the students of the 3rd course the curve of PWC dynamics in the first half of a week has a horizontal type, and further – descending up to the end of the week with the rise on Saturday (pic. 1).

Among the students of the 4-5 courses (boys and girls) the curve of PWC dynamics has the ascending type in the middle of a week, and further to the end of the week – the descending character including a day off (Saturday).

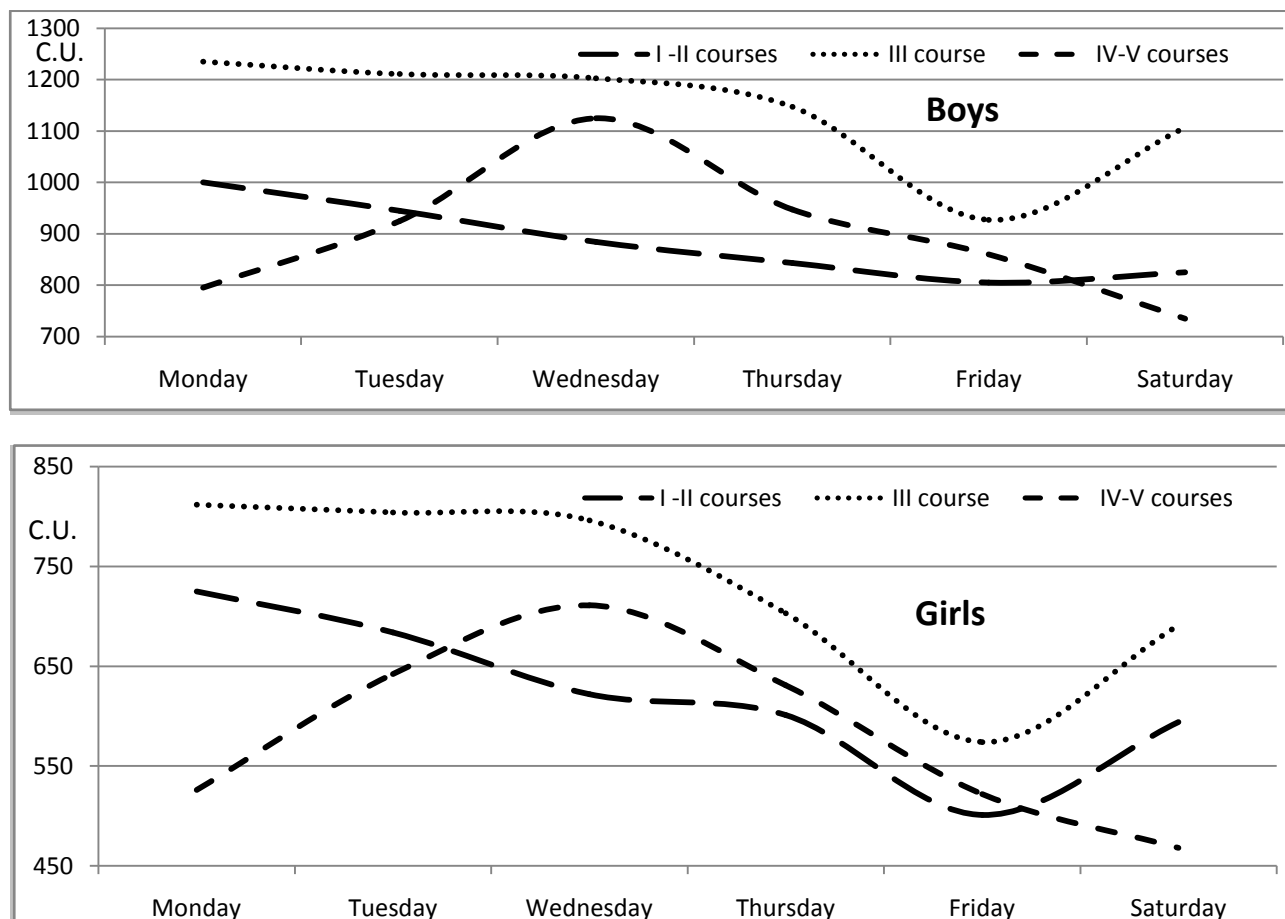


Fig. 1. The Dynamics of the level of manifestation of physical work capacity among students during a weekly training cycle.

Conclusions.

1. The analysis of the level of physical work capacity of students of 1-5 courses during a weekly training cycle showed that among the students of the 1-2 courses its value at the beginning of a week is regarded to be an average one, and further it gradually decreases and reaches a statistically distinctive result ($p < 0.05$) in the end of the week, for boys as well as for girls, reaching the level of the indices "below the average".
2. Among the students of the 3rd course the level of PWC which at the beginning of a training week was regarded

to be above the average remained such up to the middle of the week and further decreased to the end of the week, and the registered value of PWC on Friday reliably differ from such on Monday and are regarded to be “under average”.

3. Among the students of the 4-5 courses the level of PWC at the beginning of a week was regarded to be below the average, reliably ($p < 0.05$) increased up to the middle of the week to the level of average indices, and then decreased again up to Saturday with the preservation of the values on the “below the average” level.

References:

1. Bulatova M.M., Litvin O.T. *Teoriia i metodika fizichnogo vikhovannia i sportu* [Theory and methods of physical education and sport], 2004, vol.1, pp. 3-9.
2. Griban G.P. *Sportivnij visnik Pridniprov'ia* [Dnipro Sports Bulletin], 2004, vol.7, pp. 130-132.
3. Drachuk A. *Teoriia i metodika fizichnogo vikhovannia i sportu* [Theory and methods of physical education and sport], 2005, vol.4, pp. 84-86.
4. Karpman V.L., Belocerkovskij Z.B., Gudkov I.A. *Testirovanie v sportivnoj medicinie* [Testing in sports medicine], Moscow, Physical Culture and Sport, 1988, 208 p.
5. Kostiuuchenko V.F., Malysheva S.A. *Vestnik aspirantury i doktorantury* [Bulletin of postgraduate and doctoral], 2006, vol.1, pp. 35-43.
6. Rovnij A.S. *Pedagogika, psihologia ta mediko-biologicni problemi fizicnogo vikhovanna i sportu* [Pedagogics, psychology, medical-biological problems of physical training and sports], 2002, vol.27, pp. 82-86.
7. Krucevich T.Iu. *Teoriia i metodika fizicheskogo vospitaniia razlichnykh grupp naseleniia* [Theory and methods of physical education of different groups], Kiev, Olympic Literature, 2003, T.2, 209 p.
8. Delaney J.P., Brodie D.A. Effects of short-term psychological stress on the time and frequency domains of heart rate variability. *Perceptual & Motor Skills*, 2000, vol.91(2), pp. 515-524.
9. Belykh S.I. Dynamics of knowledge, skills and abilities in the process of personal physical education based university students. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2013, vol.8, pp. 3-11. doi:10.6084/m9.figshare.745776
10. Eween B., Jupien, *Stress: hormonal and neural aspects*. Encyclopedia of human brain: abstr. - Brooklin: Academic Press. 2002, pp. 463-474.
11. Iermakov S.S. Ivashchenko P.I. Guzov V.V. Features of motivation of students to application of individual programs of physical self-preparation. *Physical Education of Students*. 2012, vol.4, pp. 59 - 61.
12. Ivaskiene V., Skyriene V., Cepelioniene J. Analysis of physical activity and self-confidence of students of humanitarian faculties from Kaunas (Lithuania). *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2013, vol.8, pp. 21-25. doi:10.6084/m9.figshare.745779
13. Karasek R., Theoreil. T. *Healthy work: stress productivity and the reconstruction of working life*. N.Y.: Collins Publ. 1990, 381 p.
14. Prusik Krzysztof, Prusik Katarzyna, Kozina Zh.L., Iermakov S.S. Features of physical development, physical preparedness and functional state of boys and girls – students of Polish higher educational establishments. *Physical Education of Students*, 2013, vol.1, pp. 54-61. doi:10.6084/m9.figshare.96415
15. Sobyenin F.I., Dudkina S.G. About a competence and professional trade of specialists in the field of physical culture. *Physical Education of Students*, 2013, vol.1, pp. 68-73. doi:10.6084/m9.figshare.156361
16. Stankiewicz Blazej, Cieslicka Mirosława, Kortas Jakub, Iermakov S.S. Long-distance running as a social phenomenon. *Physical Education of Students*. 2012, vol.4, pp. 140 - 149.
17. Vovk V.M., Priymak A.Yu. Adaptation and patterns of its effects on the continuity of a healthy way of life of senior pupil and first-year students. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2013, vol.8, pp. 17-20. doi:10.6084/m9.figshare.745778

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