

METHODICAL FEATURES DISPENSING EXERCISE, USED IN EXTRACURRICULAR ACTIVITIES TO IMPROVE HEALTH STUDENTS

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Annotation. *Purpose:* to investigate theoretically substantiate experimentally verify technology aimed at improving the process of university students in extracurricular athletics. *Material:* the study involved 413 male students aged 21-23 years. Efficiency of impact studies using cross-country loads of aerobic and anaerobic focus on the physical health of men first mature age. *Results:* systematized and generalized materials literature. Developed programs for extracurricular classes jogging The level of aerobic and anaerobic productivity men first mature age. Experimentally substantiated health technologies for university students through the use of cross-country loads. The efficiency depends on the training mode and the energy consumption of energy. *Conclusions:* confirmed that aerobic and anaerobic capacity of the organism male students first mature age do not meet a certain level. These abilities require correction. This correction is more effective due to the development and implementation of health technologies, based on the use of extracurricular activities running exercises.

Keywords: aerobic, productivity, physical, health, jogging, exercise, anaerobic, lactate, productivity.

Introduction

Young people who enter higher educational institutions get under the pressure of unusual social factors associated with the necessity of creative mastering great amounts of information, and the need of formation of specific professional skills and practices, as well as novel conditions of students' life. First of all the feeling of discomfort appears with beginners. For convenience such phenomenon could be called inadaptability of young people for study at higher educational institutions that is connected with the reasons as follows [6]: difference between methods and organization of education typical for secondary school and those at higher educational institutions thus requiring additional self-determination in mastering material lectured; the lack of well-established interpersonal relations or in-team contact that is typical for any new team on the stage of its formation; destruction of earlier life pattern built during the years of school education together with formation of a new "higher school" pattern; troublesome entering a HEI associated with living in a students' hostel, leaving parents, and namely self-servicing, autonomous budget conduct, planning and arrangement of own study and leisure time, etc.

To overcome such "higher school" discomfort a young person has to spend much physical and psychic force. Physical training is designed to compensate such force losses, and to become an integral part of students' preparation to their future professional activity.

Purpose, tasks of the work, material and methods

Aim of the study includes theoretical substantiation and experimental verification of technologies directed to health improvement with university students in the course of extracurricular going in for light athletics.

Task of the study is to systematize and generalize information from sources, to develop the program of extracurricular training in health-improving recreational run, to investigate the level of aerobic and anaerobic productivity of organism among male students of the first mature age, and to provide experimental substantiation of health improving technologies for university students on the ground of run loads utilization.

Methods of the study: we investigated effectiveness of influence of training using run loads of aerobic and anaerobic direction upon physical health of male students of the first mature age, that is from 21 to 23 years old [13]. The choice of such cohort for study in run programs under investigation is explained by scientific information on the fact that the level of physical health with men of the given age established in accordance with relative index of maximal oxygen consumption ($VO_{2\max}$) in average meaning is much lower than with women. The average value of $VO_{2\max}$ with men is considerably lower than the safe health level while with women it substantially exceeds the one [1, 2].

Experimental and research work was conducted at Lugansk National University named after Taras Shevchenko Governmental Institution. The total number of 21-23 years old men students who took part in the study was 413, with 17 sports educators and doctors. In general, in the course of investigation we examined 413 male students of 21 to 23 years old of which 109 persons were going in for jogging during 24 weeks in accordance with programs developed. We totally used 7 programs their content being determined through training, conditions of energy supply of the work, and load level. Physical education of persons belonging to the eighth (reference) group was executed pursuant to educational program for HEIs of Ukraine including lessons according to curriculum twice a week plus an individual training. At the lessons we used exercises of light athletics, gymnastics, and sports and outdoor games. Examinations were conducted in stages: prior to training cycle, after 6, 12, 18, and 24 weeks from beginning as well as 6 and 12 weeks after termination. That allowed dynamics control in changes of data under investigation.

Results of the research

Taking into account insufficient level of physical health with male students of 21-23 years old we developed programs of extracurricular training using run exercises for the abovementioned cohort of people.

The run training programs used in the work were developed considering as follows:

1. Methodic principles of physical education
2. Age and sex of persons under study
3. Health conditions of persons under study
4. Functional readiness of their organisms for physical loads.

At the same time we took into account scientific information gained due to analysis of literature. In the course of the lessons we provided monitoring of functional state of the persons under study based on their oral interviewing, external evidences of tiredness, data of pulse measuring, and arterial tonometry.

The proposed programs of lessons differed from the majority of generally known ones in their complex approach to the problem solution of physical health improvement with male students of the first mature age due to the fact that they included means and methods of influence upon aerobic and anaerobic (lactate) organism productivity [11, 12] that is well-known integral indices of the organism's functional state. Besides, the programs utilization excluded any possibility of health deterioration occurring because we considered functional readiness of any person under study to the programs execution.

Preliminary substantiation of expediency of the author's programs implementation was conditioned by:

- Determination of rational directivity of selected means of influence on people's physical health;
- Regulation of run loads in intensity and duration;
- Mode of energy supply of the run work;
- Training method;
- Periodicity of lessons;
- Determination of effectiveness of their influence on physical health.

Determination of rational directivity of selected means of influence and their regulation is conditioned by functional peculiarities of an organism and the level of physical health among male representatives of the first mature age.

Selection of mode of energy supply of run loads, training methods and periodicity of the lessons was done on the ground of analysis of special scientific literature and basic provisions of theory and methods of physical education.

The distinctive feature of the proposed programs was that they were executed in the zone of optimal range of inner work content depending on functional readiness of an organism to their execution [5]. The head form of health correction with male students of the first mature age was training lessons in run.

The lessons were conducted according to seven programs developed. The total duration of the whole training cycle comprised 24 weeks. Regardless of the program the structure of any lesson included as follows: a warming-up, a main part, and a conclusive part. The content of both the warming-up and the conclusive part was similar regardless of the program.

The warming-up 10 to 12 minutes long included breathing exercises and those of general development while the conclusive part up to 3 minutes long contained walking, breathing and muscle relaxation exercises. The essence of the main part of the lessons was run load.

Each program of run training was unique in the intensity of run load and training method that determined stimulation degree of aerobic and anaerobic processes of energy supply of muscle work.

An outer level of run loads was individual for each person under study as it was dependent on his organism's functional state especially on absolute value of maximal oxygen consumption ($VO_{2 \max \text{ abs.}}$).

Irrespective of the program implemented the lessons periodicity was three times a week.

Beginning from the first lessons the outer level of run loads was continually growing during two weeks to reach the minimal value of the inner level (44 per cent of E_{\max} for each individual).

Mutual relation between aerobic and anaerobic processes of energy supply during the run is determined by the work intensity: with higher intensity the share of anaerobic component is growing while that of aerobic is getting lower. Thus, depending on the program, persons under study were given intensity of run work expressed in per cent related to the absolute value of maximal oxygen ($VO_{2 \max \text{ abs.}}$) consumption.

One of factors specifying effectiveness of physical training is rational dosing of loads [14, 15]. First of all, the values of physical loads must correspond to functional potential of an organism.

As a rule, an effectiveness index of health improving training is aerobic productivity of an organism for which correction we use to introduce cyclic exercises including run.

Optimal effectiveness of such training related to aerobic productivity is manifested for the work intensity on the level of PANO (threshold of anaerobic metabolism) where according to M.L. Pollock [8] and K.J. Shephard [9] the duration of such work is to be 10 to 12 minutes.

A.A. Viru with coauthors [3] proposes, regardless of organism's functional state, to establish mutual relation between intensity and duration of health improving training by means of special diagram (Fig. 1).

In this case the lessons' periodicity must comprise 3-5 times a week. O.A. Pirogova with coauthors [4] proposes graphical method for determination of optimal work duration depending of its intensity taking into account the level of a person's physical state that corresponds to the level of the organism's aerobic productivity (Fig. 2).

However, we think that with such method application relative values of maximal oxygen consumption ($VO_{2\max}$) characterizing the level of physical state have sufficiently wide range, so they fail to consider the whole individual functional potential of an organism.

In this connection we believe it would be expedient to determine the inner volume of physical load based on parameters of optimal energy consumption range considering aerobic productivity of an organism using the method developed by Yu.M. Furman [5] (Fig. 3).

Intensity of work, beat-min⁻¹

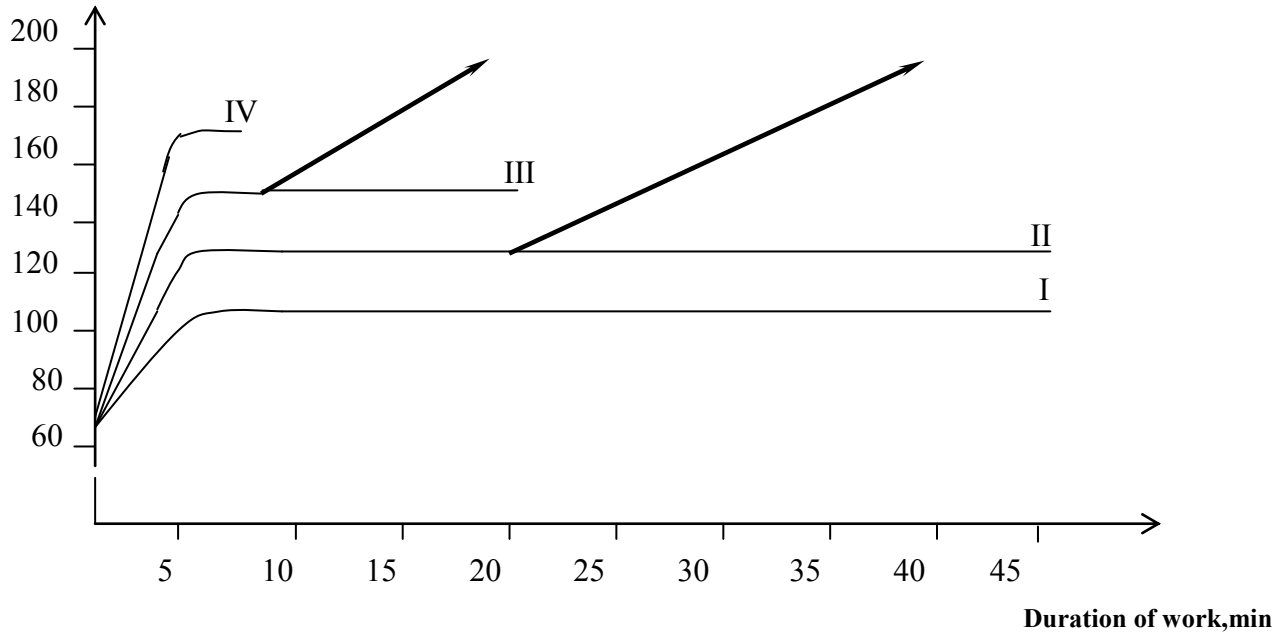


Fig. 1. Relation between the training effect of load and its intensity and duration

- I – low load when the training effect is not demonstrated;
- II – moderate load when the training effect (see an arrow) appears after 20 minutes of work to increase with its duration;
- III – intensive load when the training effect appears after 8 minutes of work to increase with its duration;
- IV – very intensive load when tiredness appears prior to the training effect.

This method is based on theoretical provisions on excitation physiology according to which functional potential of a human organism is determined by the manner it reacts on an irritant's activity. If we recognize the training load to be an irritant then depending on its value functional changes in organism are manifested in various manners.

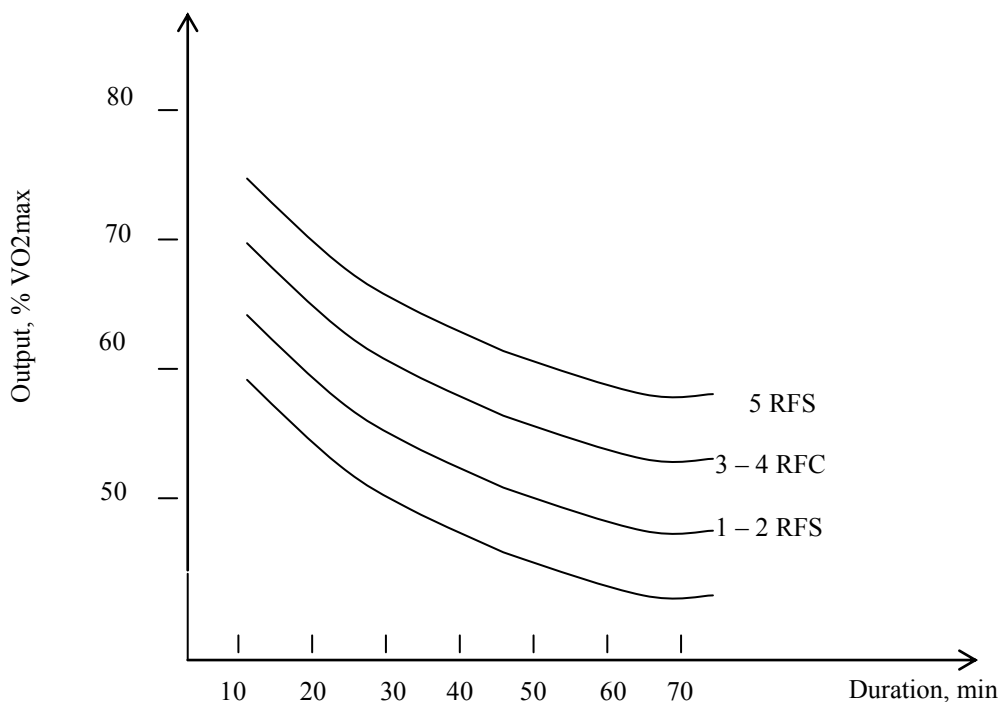


Fig. 2. Diagram for determination of physical load level values

A pre-threshold physical load application does not bring any training effect while excessive physical load can lead to negative changes in an organism. So, the value of physical load must be positioned within the optimal range between a minimal (threshold) and maximal allowable value. Minimal and maximal allowable value of physical load is determined by functional readiness of an organism to their execution, and the objective criterion of the readiness can be aerobic productivity that integrates functioning of such systems of organism as cardiovascular, respiratory, blood and others.

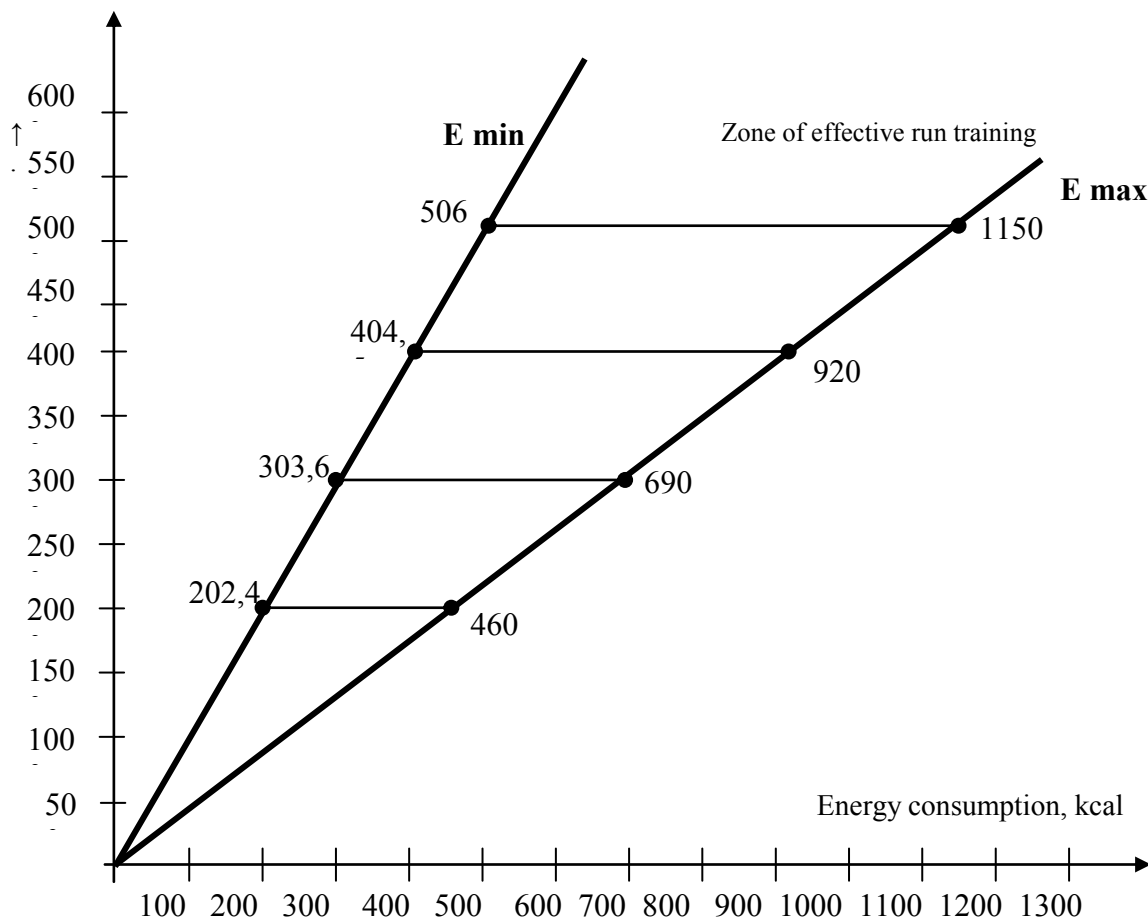


Fig. 3. Optimal range of energy consumption depending upon the value of maximal oxygen consumption ($VO_{2\max}$)

E_{\min} is the line of minimal energy consumption
 E_{\max} is the line of maximal energy consumption

The higher level of aerobic productivity the larger minimal value of physical load required for its support and elimination of detraining phenomena, and the bigger maximal allowable loads that can be executed by a person without initiating negative changes in his organism. Thus the growth of functional potential for the sake of its further development requires the growth of physical load in the optimal range.

The value of physical load is proportional to its volume and intensity. The physical load value indices are divided into two groups: outer and inner. Outer ones characterize its work in outward expressed dimensions while inner ones characterize correspondent reaction of an organism related to the work. When we speak of run loads then their outer volume is measured with such indices as duration of run work or its distance length. At the same time the inner volume is characterized by summarized energy consumption for the period of the work execution.

As for intensity of run load its outer index is run speed, and inner one is heart rate or energy consumption per a time unit. Thus, it is understood that inner volume and intensity demonstrate individual functional readiness of an organism for execution of loads of certain outer volume and intensity. So, executing loads similar in outer volume and intensity (for example, running same distance with same speed) different people demonstrate different inner volume and work intensity depending on their individual functional state. For persons with better functional state the inner volume (that is total energy consumption) and intensity (that is energy consumption per a time unit) is lower. And on the contrary, less trained people with poorer functional state have to execute larger inner volume of work. In this connection such load becomes a lower irritant for person with better functional state, and training effect can be absent.

That is why to provide the training effect with the growth of functional readiness of an organism we should increase the volume of minimal (threshold) load. Such increase can be achieved due to the work duration not changing

its intensity, or due to the work intensity not changing its duration, or due to the growth of both duration and intensity. In this case the maximal allowable volume of load is growing correspondingly.

However dependence of the training effect on energy consumption is general rule operating related to a certain intensity range because when we alter the latter thus the mode of energy supply we can influence the specifics of the training effect.

It is established that to increase the level of aerobic productivity of an organism with lessons' periodicity of three times a week the minimal (threshold) value of energy consumption (E_{\min}) must comprise about 44.0 per cent of the maximal allowable value of energy consumption (E_{\max}). We calculate the latter using formula $E_{\max} = 0.23 \cdot VO_{2\max}$.

Such calculation of the optimal range of energy consumption must be done for each individual under study to provide the same value of physical load inner volume for each person within the zone of optimal range. Using information by L. Brouha [7] on energy consumption for various heart rates we can monitor compliance with requirement of run load within the zone of the optimal range.

One should state that energy consumption connected with execution of physical work is conditioned by the level of aerobic and anaerobic metabolism during its execution as well as aerobic metabolism directed to elimination of oxygen debt after the load termination. Here the more intensive work the higher speed of oxygen consumption with oxygen debt formation with its execution, and oxygen consumption after its termination. Thus for continuous method of training the energy consumption is identical to intensity and value of the outer volume.

When we use recurrent and interval method with higher work intensity then energy consumption is not identical with the value of outer volume, but it exceeds. It can be explained by substantial energy consumption not only during the work but in rest intervals conditioned by liquidation of oxygen debt. So this factor is to be taken into account determining values of the work inner volume provided recurrent and interval method of training is used.

To make determination of energy consumption optimal range for run training easier and more convenient we use a graphical method according to which the values of energy consumption correspond to those developed through calculation method [5] (see Fig. 3). As we can notice on the diagram the energy consumption is shown on abscissa axis while the absolute value $VO_{2\max}$ is shown on ordinate axis. As soon as we know the $VO_{2\max}$ absolute value we build a direct line parallel to the axle of energy consumption to get a segment limited with minimal (E_{\min}) and maximal allowable (E_{\max}) value of energy consumption.

Conclusions

Based upon experimental study and generalization of advanced experience by experts we developed the programs I to VII of extracurricular lessons including run exercises to provide fundamental data improvement of students' physical health. In accordance with intention we introduced run exercises to the background of programs I, III, and V for aerobic potential development while the background of programs II, IV, VI and VII contained exercises for primary stimulation of anaerobic-aerobic mechanisms. In the course of the programs development we took into account the following factors: methodic principles of physical education, age and sex peculiarities as well as health conditions of persons under study, functional readiness of their organisms for execution of physical loading, run loads' volume and intensity, the mode of energy supply of the run work, method of training, periodicity of lessons, and effectiveness of their influence upon physical health. The characteristic feature of the programs proposed for extracurricular lessons is that the volume of physical load was individually established for each person under study considering functional readiness of his organism to their execution. However we excluded any possibility of the overdose of the physical work. We found out that the purposeful influence on aerobic and anaerobic processes of energy supply depend on the content of lessons determined by means of training, and intensity and volume value of the work executed. The programs developed were taken as a formation principle of universal health improving technologies.

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