

## AEROBICS HEALTH AS MEANS OF INCREASING SOMATIC HEALTH OF STUDENTS OF SPECIAL MEDICAL GROUP

Pivneva M.M., Rumba O.G.

Belgorod State National Research University

Institute of Socialization and Education of Russian Academy of Education

**Annotation.** We prove the feasibility of employment by improving aerobic low intensity (LowImpact - heart rate in the range 128-140 beats / min, or 60-74% of HR max) with students of special medical groups with disabilities cardiovascular system. The choice of three varieties of improving aerobics - classical, dance, tap dance - and with the help of laboratory experiment investigated the specificity of their effects on the physical health of students. According to the results of laboratory studies developed two versions of the author's method of application for improving aerobic physical education classes with students with disabilities but cardiac-vascular system, the main difference between them lies in the relationship and the manner of the classical sequence of exercises, dance, step aerobics. By comparing the results of educational experiments proved that both variants techniques contribute significantly improved key indicators of physical health subjects and thus are fairly equal in the nature of exposure.

**Keywords:** special, medical, group, students, cardiovascular system, physical education, wellness, aerobics.

### Introduction

In opinion of many specialists in the field of students' physical education [17, 15, 6, 5], recent years specificity of teaching of discipline "Physical culture" in HEE is characterized by desire to develop and implement new means of health improving influence on trainees that is conditioned by increasing of quantity of students with weakened health, who attend physical culture classes as members of special health groups (SHG). With it, if teaching of physical culture at main groups is carried out in compliance with approximate program for HEE, for special health groups such program is absent and it forces HEE departments to independently develop program materials. In some HEE such situation gives birth to practice of mastering this discipline by writing essays [27].

By the data of G.F. Zhovan, O.G. Rumba [16], in 2012-13 the quantity of DHG students in HEEs of Russian Federation was about 35-40%. From them up to 30-60% have problems, connected with cardio-vascular system (CVS). These problems are, mainly, vegetative disorders, arrhythmia, tachycardia, instability of BP, dyspnea, low level of physical workability and general endurance. The enumerated symptoms are characteristic, nowadays, already for people of student age; in the future they, as a rule, result in hyper tension, arteriosclerosis, coronary disease, cardiac infarction [25, 3].

Main reason of cardio vascular abnormalities, in the opinion of medical workers, [32, 2, 31], is low level of motion activity, which is accompanied by reduction of heart size, decreasing of stroke and minute blood volume, pulse rising, reducing of mass of circulating blood, resulted in quicker wear and aging of heart. For example, by the data of O.G. Rumba, with biological norm 14-19 thousand of locomotion per 24 hours, students with CVS problems fulfill in average 5.5 – 6.5 locomotion and it is practically three times less than it is required. Alongside with it, exactly optimal motion activity is the main mean of training and strengthening of CVS, and it has a lot of competent evidences and experimental proofs [1, 12, 9, 14, 4]. With it physical load of aerobic character has the most of health improving effect fro CVS that is proved by having extremely positive reputation aerobic system by Kenneth Cooper.

Nowadays "aerobics" is understood as a synthesis of rendering general development gymnastic and dance exercises, which are carried out to rhythmic music in continuous way [19]. Including of aerobics in curriculum physical culture classes at HEEs has already being wide spread and is very popular among students, especially girl-student. By the words of G.A. Zaytseva, O.A. Medvedieva [18], such trainings are good owing to their emotionality (due to musical accompaniment and specific instructor's comments) and high motor density (due to continuous way of their conducting). They promote complex development of all physical qualities, improvement of physical and functional state, that condition general strengthening of health. One of key features of aerobics is possibility to exactly dose intensity of load within one training (owing to one or another pulse regime), and it is the main condition of building of health related trainings of persons, who have CVS problems.

However, in spite of all pluses of aerobics, it is mainly used in trainings of health students and it is substantially scientifically grounded in large number of dissertations [7, 24, 21]. Concerning the students of special health groups, there are some works, devoted to them, [26, 28, 15], but they, mainly, do not touch on students with CVS problems.

The absence of scientifically grounded methodic of health related aerobics' (and its kinds) application at physical culture classes with SHG students, having CVS problems, conditioned the problem of our research. We consider evident the presence of preconditions to somatic health improvement of the students of this nosological group as a result of systemic health related aerobics' trainings of low impact.

The article has been prepared by the results of work at project No. 6.2093.2011 "Kinesio-therapy in the system of HEE students' health improvement", which was carried out in the frames of State task of Ministry of education of Russia, issued to subordinated HEEs for fulfillment of НИОКР.

### **Purpose, tasks of the work, material and methods**

The problem's urgency and necessity in searching of the ways of its solution conditioned our working hypothesis, which was built on assumption that health related low impact aerobics (Low Impact – HBF within 128-140 b.p.m., or 60-74% from HBF max) in physical culture trainings of students with CVS problems is purposeful. With it dosing of aerobic load shall be executed by means of optimal correlation and alternating of classic, dancing and step-aerobics that will create favorable conditions for increasing of general workability and development of aerobic endurance of the trainees. Besides, it is purposeful to include power exercises, facilitating blood circulation improvement, including owing to expansion of capillary vessels' net in skeleton and heart muscles. All these together will permit to correct functional state of CVS and improve general level of students' somatic health.

*The purpose of the work* is to scientifically ground methodic of health related aerobics' application at physical culture classes with SHG students, who have CVS disabilities.

*The tasks of the work:*

- 1) To study peculiarities of construction of SHG students', with CVS problems, physical education classes;
- 2) To study peculiarities of motion activity and self-feeling specificities of SHG students, who have CVS problems;
- 3) To determine effectiveness of including of aerobics' different kinds into content of physical culture classes with SHG students, who have CVS problems;
- 4) To work out methodic of application of health related aerobics at physical culture classes with SHG students, who have CVS problems and estimate its effectiveness.

*The methods of the research:* theoretical analysis and generalization of special literature data; questioning and talks; step-metering; pulse-metering; pedagogic observation; anthropometric examinations; testing of physical conditions; testing of functional level; testing of self-feeling, activity, mood; method of indices; laboratory experiment; pedagogical experiment; methods of mathematical statistics.

### **Results of the researches**

Analytical studies showed that in all HEEs of Russian Federation students with CVS problems and other health disorders are arranged in SNG for physical culture trainings. In connection with increasing of SNG quantity, great number of specialists deals with scientific foundation of content and orientation of physical culture classes at special academic department (SAD). Most of them mark out three key components, which influence on efficiency of physical education process at SHG: principles of formation of academic groups; selection of effective physical culture means; formation of motivation for active physical culture activity [17, 27, 30].

The problem of choosing principles of academic groups' formation from SHG students was comprehensively studied by Ye.N. Kopeykina [22]. The author pointed to six main approaches: formation by nosological principle, considering physical conditions; considering functional abilities; on the base of counter-indications to physical load; on the base of individual-differentiated approach; by gender factors. With it, as the author marks, most specialists admit that nosological principle of SHG formation is the most purposeful [22].

Concerning selection of effective physical culture means for SHG student, we can conclude that most of researchers relate to them gymnastics and its kinds (yoga, health related aerobics, exercises of Pilates's system, breathing exercises and so on) with compulsory differentiated approach [29, 20]. Regarding the problem of degree and dosing of physical load for SHG students separately, specialists do not come to unanimous opinion, concerning its digital value. But they point, that it is important for instructor to adequately evaluate purposefulness of one or another physical culture mean's application, to regulate load in compliance with students' self-feeling, to consider their interests and wishes [8].

Concerning persons with CVS problems, they are recommended mainly to practice different kinds of gymnastics, aerobic cyclic exercises, outdoor games. In the question of physical load specialists, in general, are of the same opinion, videlicet in the following parameters: HBF – 55-75% from maximal, duration of training – up to 60 minutes, regularity – 3-5 times a week [10, 13].

The problem of application of health related aerobics (HRA) at physical culture classes in educational establishments has been studied rather in detail; efficiency of such classes is estimated positively. Many authors point at possibility of HRA inclusion in content of physical culture trainings of SNG students [26, 28, 15, 33, 34]. With it, practically all researchers, whose works were analyzed, note, that increasing of general workability of the trainees is achieved with continuous load of aerobic character (duration not less than 20-60 minutes), with participation of large muscular groups; general duration of classes, showing noticeable training effect, is 10-16 weeks. Besides, training load shall be in certain compliance with current functional abilities of every student and it shall be increased gradually.

Results of carried out by us monitoring of CVS problems of NRU «BelGU» students in 2008-13, presented in fig.1 and table 1, witness, that annually, in average, about 30-40% of University students are joint to SAD of physical education department owing to different health abnormalities. Form them about 30% have CVS abnormalities, the most frequent of which is vegeto-vascular dystonia (about 50%).

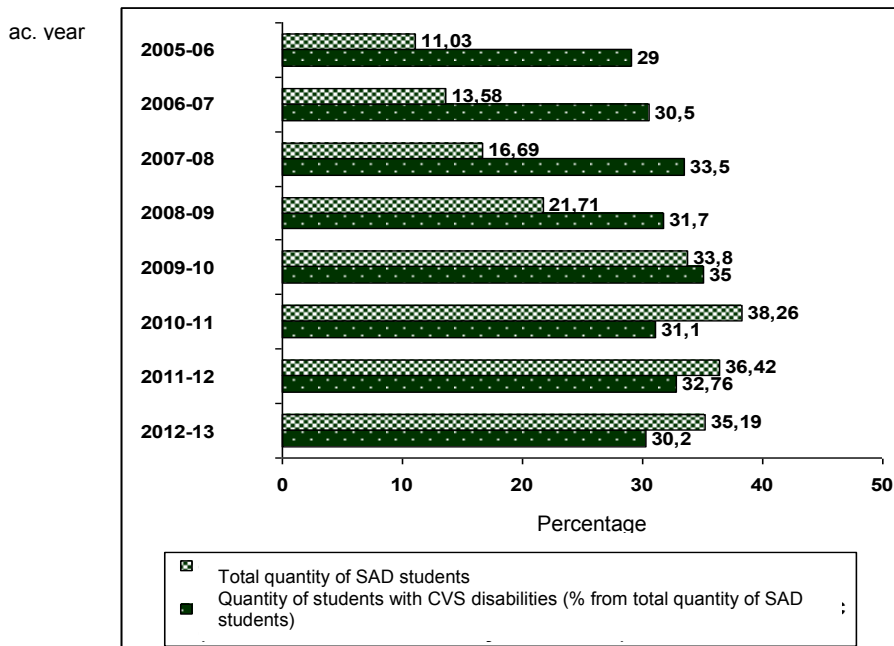


Fig.1. Data about quantity of HHV «BelGU» students, reckoned in SAD in 2005-13, and about percentage of students with CVS disabilities at SAD

General picture of CVS abnormalities among SAD students, witnesses that great majority of young people are not exempted from practical physical culture trainings and attend them as members of SHG groups. The presented figures in general are in compliance with analogous data of the country.

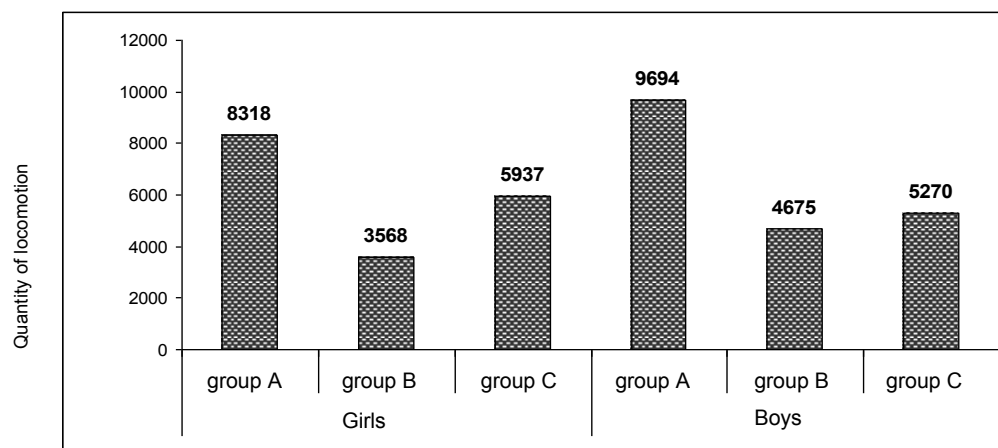
Table 1

Data of CVS abnormalities' character of NRU "BelGU" in 2008-13

Character of CVS abnormalities	Distribution of indicators (%)				
	2008-09 Ac. year	2009-10 Ac. year	2010-11 Ac. year	2011-12 Ac. year	2012-13 Ac. year
Arrhythmia	3.6	5.7	4.7	4.5	5.1
Brachycardia	0	0	0.1	0.1	0
Varix dilatation	2.7	1.8	0.5	1.3	1.1
Vegeto-vascular dystonia (VVD)	51.5	48.0	44.0	52.7	52.2
Intracranial pressure (IP)	0.9	3.9	7.8	4,8	4.3
Hypertension	2.2	8.7	8.2	7.7	8.1
Hypotension	1.3	2.6	3.6	3.1	2.8
Cardiopathy	3.6	3.5	3.1	2.8	2.4
Neurocirculatory dystonia (NCD))	14.6	8.7	2.6	5.3	7.5
Cerebral circulatory insufficiency	0.9	0	3.1	2.2	1.7
Valvular defect	0.9	0.9	2.6	1.7	1.5
Mitral valve prolapsed (MVP)	12.0	7.4	11.9	8.2	7.8
Cardiac failure	0.9	0.9	0.5	0.6	0.8
Tachycardia	4.0	5.7	7.3	4.6	4.2
Cardiac murmurs	0.9	1.3	0	0.4	0.5

For describing of scope and character of SHG students' with CVS problems motion activity we used methods of step-metering and questioning. All tested were conventionally divided into three groups, each containing 30 girls and 30 boys for step-metering and, accordingly, 50 girls and 50 boys for questioning:

- Group A- students of main group, who had no noticeable health abnormalities;
- Group B students of SHG, having CVS problems;
- Group C – SHG students, having different health abnormalities, except CVS.



*Fig.2. Average daily motion activity of students of different health groups*

The obtained data permitted to state, that with biological norm of 14-19 daily locomotion, students of group A fulfill in average 9 thousand locomotion; students of group B – in average 4.1 thousand locomotion ; students of group C – in average 5.6 thousand locomotion that is lower than standard correspondingly 1.5, 4 and 3 times. With it, it was found that in groups A and B average daily scope of boys' motion activity is higher than the girls' one. In group C, on the contrary, girls' indicators were higher than boys' ones. In general it can be concluded that motion activity scope of NRU "BelGU" students is lower than standard, independent on health group. With it, the lowest indicators of average daily and average weekly locomotion belong to SHG students, who have CVS problems.

Results of questioning witness, that most of group B girls, considering their motion activity sufficient, mainly go home from place of study and back by transport (60%) and prefer passive kinds of leisure (51%). Only 24% of them practice regularly some physical exercises except curriculum physical culture classes at HEE and 50% do it periodically; with it, most of them practice independently, in average 1-4 hours a week, health related walking or dances. The most interesting kinds of motion activity, which attract attention of girls, are: yoga (40%), bicycle (40%), health related swimming (32%), dancing (30%), aqua-aerobics (22%), aerobics (16%).

Most of group B boys also ion general go to university and back home by transport (46%) and prefer passive kinds of leisure (74%). About 80% of them practice additionally some physical exercises: 40% regularly and 48% - periodically; with it, most of them practice independently, in average 1-3 hours a week, athletic gymnastics and health related run. The most interesting for them kinds of motion activity, which they would like to practice, are: bicycle (34%), health related swimming (34%), athletic gymnastics (22%), health related run (18%), yoga (14%), dances (14%).

In the whole, studying of motion activity of SHG students with CVS problems witnesses about passivity of most of the tested, about absence of interest to physical culture trainings, about significant deficit of age locomotion standard – and all these against the background of their inadequate evaluation of own motion activity.

Specificity of self feeling of SNG students with CVS problems was studied in order to determine character of CVS abnormalities' demonstration, in case of their presence, to analyze possible interconnection between motion activity scope and students' self-feeling as well as to give further foundation of value and character of motion loads, which would be optimal for the tested category of students. The study was carried out by mean of questioning, in which the same 300 hundred students (groups A, B, C), as in the previous examination, took part.

The obtained data permitted to state, that most of SNG students with CVS problems often feel pain in chest and heart area, heavy breathing, extremities coldness, podedema and ankle swelling, dizziness, syncope, attacks of frequent heart rhythm and suffer from hypertension or hypotension. Many of them have inherited aptitude to CVS problems.

Generalization of results of research of SHG students' with CVS problems self-feeling specificities and motion activity peculiarities permitted to assume, that when selecting means of health related physical culture, it is necessary to consider the following conditions:

- the used means shall substantially increase the quantity of average daily locomotion, fulfilled by a trainee;
- the used means shall ensure possibility of durable work in aerobic regime of intensity;
- the used means shall be interesting for students and increase their interest to active physical culture activity;

- the used means shall be sufficiently various by their forms and content in order to ensure steady students' interest to trainings.

Orientating of the listed conditions and the data of special literature, we chose health related aerobics (HRA) as a key method of functional training of SHG students, having CVS problems. At present, there is a great variety of its kinds, among which are: classic (basic), dancing, step-, slide-, aqua-, pump-aerobics; aerobics with elements of martial arts, cycling, tracking, fit-ball-aerobics and other. For our research we selected three, widely spread nowadays, kinds:

- Classic (basic) aerobics (CA) is a synthesis of gymnastic exercises of general development, which are fulfilled to rhythmic music, on the spot, with movements forward-backward, from side to side. Main physiological orientation – development of endurance, rising of functional level of cardio-respiratory system. In specialists' opinion CA is not only basic, but also the most spread and established kind of HRA. Main CA steps and their modifications are used in different ways in all kinds of HRA. In this connection, knowing of terminology, basic techniques and skills of main CA steps is a key factor with training of any other HRA kind;
- Dancing aerobics (DA) implies using of different dance movements and combinations, which stylistically correspond to one or another dance (hip-hop, jazz, tango, samba and etc.), in combination with different steps, jumps, gymnastic exercises. This kind of HRA is an effective mean of cardio-training, as far as owing to high emotionality of exercises, trainees bear physical load much easier. Besides, DA facilitates development of coordination, trains to move beautifully, dance, releases from complexes that is important for young people of 17-19 years old age;
- Step-aerobics (SA) implies fulfillment of exercises of different HRA styles (mainly of basic style), but with application of special step-platform (bench with adjustable height, from 10 to 30 cm), which permits to fulfill different steps on the bench, from it and over it in different directions. This kind of HRA is physiologically more difficult than the previous two and renders the most noticeable influence of the state of cardio-respiratory system. Specialists define SA as the most accessible and effective kinds of HRA.

In HRA intensity of load is determined by amplitude and rate of movements' fulfillment as well as by application (or absence of application) of different weights and jumps. Depending on the mentioned factors aerobic training can be conducted at different levels of load's intensity [23, 19, 11]:

1. low intensity (Low Impact): is characterized by fulfillment of movements with low amplitude, little resistance and at extremely low strike load; as a rule, rather simple by coordination low-amplitude movements are used (side step, open, cross steps, steps Mambo, overflowing steps, lunges, rising legs by 45°, jumps from foot to foot and etc.), working HBF is within 128-140 b.p.m. (60-74% from HBF max.);
2. middle intensity (Mix Impact): movements are fulfilled with low amplitude but at high strike load, or with high amplitude - at low strike load; as a rule jumps and running, alternating by walking, are used; complexes are worked out for functionally prepared trainees – working HBF in average 136-168 b.p.m. (68-84% from HBF max);
3. high intensity (High Impact): is characterized by fulfillment of movements with high amplitude and big resistance, or at high speed and high strike load; as a rule, different weights or apparatuses are applied with great number of run and jump movements – working HBF increases up to 154-200 b.p.m. (77-100% from HBF max).

Orientating on main principles of theory of load's dosing (M.I. Fonariov, L.P. Matveyev, F.Z. Meyerson, N.M. Amosov, I.V. Muravov, Ya.N. Vienbaum, V.N. Platonov) and experience of American Association of Cardiologists' specialists [1], from all presented above variants of load intensity, we regarded the first one (Low Impact) as the main content component. With it, considering physiological curve of health related aerobics' training, HBF 128-140 b.p.m. was regarded as aerobics' peak [11].

In specialists' opinion [19, 18], optimal structure of HRA training is commonly adopted three-parts structure, consisting of warming up, main and final parts that completely complies with requirements of approximate program for HEEs on discipline "Physical culture" (2000). The content of these parts is recommended to be built in the following way:

- warming up part: warming up and stretching;
- main part: aerobics and power training;
- final part: post-stretching (exercises for stretching and relaxing after power training).

Physiological curve of HRA envisages smooth increasing of HBF up to values, corresponding to aerobic phase in the process of aerobic warming up; further – increasing of load to aerobic peak in the process of aerobic training; further reducing of HBF to values of aerobic warming up; further – insignificant increasing of HBF in the process of power training; further – smooth reducing of HBF to rest values in the process of post-stretching [11].

The mentioned recommendations to building of HRA trainings were fully observed in the course of laboratory researches devoted to problem of inclusion of classic (CA) aerobics, dancing (DA), step-aerobics (SA) in content of physical culture classes with SHG students, having CVS problems.

Laboratory experiment was carried out at department of physical education No.1 of NRU "BelGU" in 2<sup>nd</sup> semester of 2007-2008 academic year (January-June 2008). In the experiment 162 students of 1-2 years of study took part; these students were the members of SHG by the following CVS abnormalities: VVD, NCD, IP, MVP, hypertension, arrhythmia, tachycardia, cardiac murmurs. We formed four groups, without considering sex: three experimental groups (EG1 -16 boys, 25 girls; EG2 – 18 boys, 23 girls; EG3- 18 boys, 23 girls) and one control group (CG – 17 boys, 22 girls). In EG1 at academic classes (ATC) on physical culture, in experimental block of main part of

the training basic steps and complexes of classic aerobics (CA) were used, in EG2 – dancing aerobics (DA), in EG3 – step-aerobics (SA). The content of ATC main part in CG corresponded to working program of physical education department No.1 of NRU “BelGU”, which was created by instructors for all students with health problems without considering their nosology. This program is a simplified variant of approximate program on discipline “Physical culture” (2000) for healthy students of main health group. Warming up and final parts of trainings in all four groups were the same. Training load was regulated, considering disease, current self-feeling, sex. ATCs on physical culture were carried out in compliance with time-table for Academic groups, twice a week; duration of each training was 90 minutes. Total scope of classes in every group was 68 hours.

Content of experimental trainings was determined, considering commonly adopted three-part structure of a training (see fig. 3).

In every part of training, for self-control, students measured HBF by palpation. Maximal values were in aerobic block– 130-140 b.p.m. that complied with recommended values for persons with limited CVS indicators.

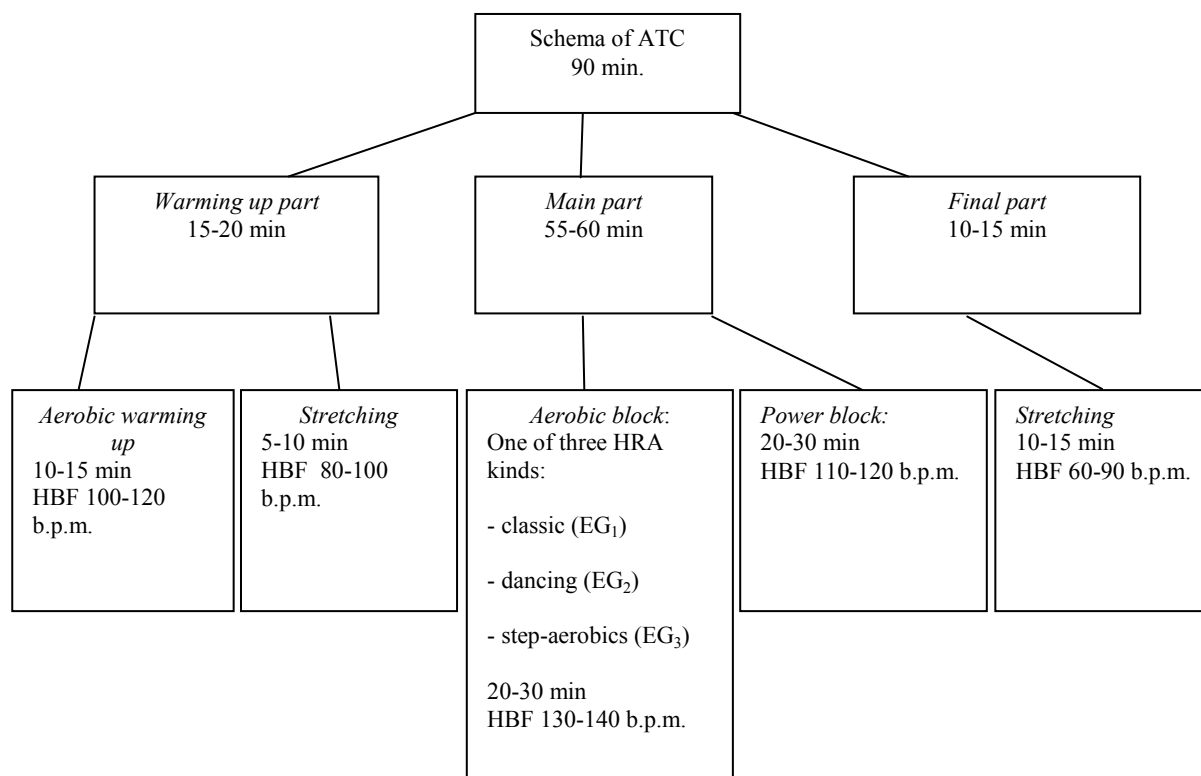


Fig. 3. Physical culture ATC structure in EG1, EG2, EG3 in laboratory experiment

In table 2 the steps, which were mastered by EG students, are specified as well as the order of their mastering in semester cycle of trainings.

Table 2

Content of main ATC part's aerobic block in laboratory experiment

	EG <sub>1</sub> , classic aerobics	EG <sub>2</sub> , dancing aerobics	EG <sub>3</sub> , step-aerobics
№ of training	Mr, B, V, Mb, Pt, Bs, Sc, Kbc, St, Ku, Cu, K, CCC, Os, L, Gv, Cmb b, Cmb f	Mr, V, Mb, Pt, Bs, Sc, Kbc, St, Ku, K, CCC, Os, Gv, Cmb b, Cmb f	B, V, Mb, LMb, Pt, Sc, Kbc, Ku, Cu, K, CCC, L, Gv, Cmb b, Cmb f
2-10	Mastering of basic steps		
11-22	Combination of basic steps		
23-33	Complicated combination of basic steps		

In EG1 (CA) basic steps and their combinations were fulfilled on the floor, without flight phase, hands working below heart level. In EG2 (DA) basic steps were also fulfilled on the floor, but some of them were modified (V-step,

Mambo, Step-cross, Grapevine and other) and they could have flight phase (Step-cross, Kneepand other), working of hands above heart level was admitted. In EG3 (SA) basic steps were fulfilled on the floor with application of special step-platform of  $\approx 15$  cm height, flight phase was excluded, hands' work – below heart level.

Generalization of results of laboratory researches permitted to conclude that inclusion of HRA in content of physical culture trainings of SHG students, who have CVS problems, influences favorably on their functional state, facilitates rising of their somatic health's level and conditions increasing of motion activity. With it, rising of functional level is noticeable, first of all, as increasing of general (cardio-respiratory) endurance, as increasing of aerobic abilities of organism, as economizing of myocardium's functioning, increasing of physical workability and, as a result, as improvement of general state of cardio-respiratory system. Influence of HRA on physical conditions and physical level of the trainees manifested in increasing of respiratory excursion and improvement of coordination.

Appraising direct influence of every kind from the studied kinds of HRA, we may conclude, that the most effective influence on key health indicators was rendered by step-aerobics' trainings. However it should be noted, that there was substantial increment of a number of coordination abilities of the students, who were trained dancing aerobics.

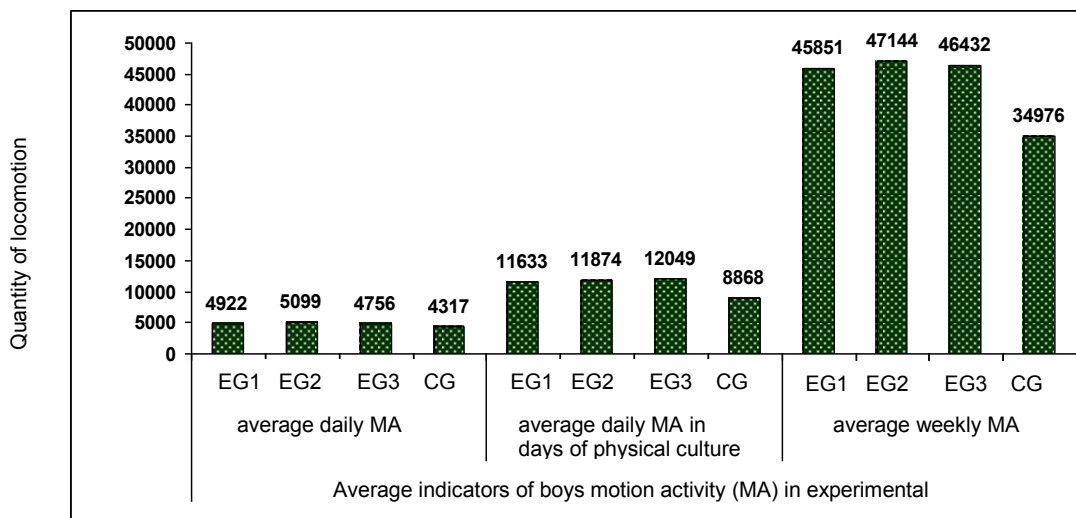


Fig.4. Generalized data of boys' motion activity in the period of laboratory experiment (January-June 2008)

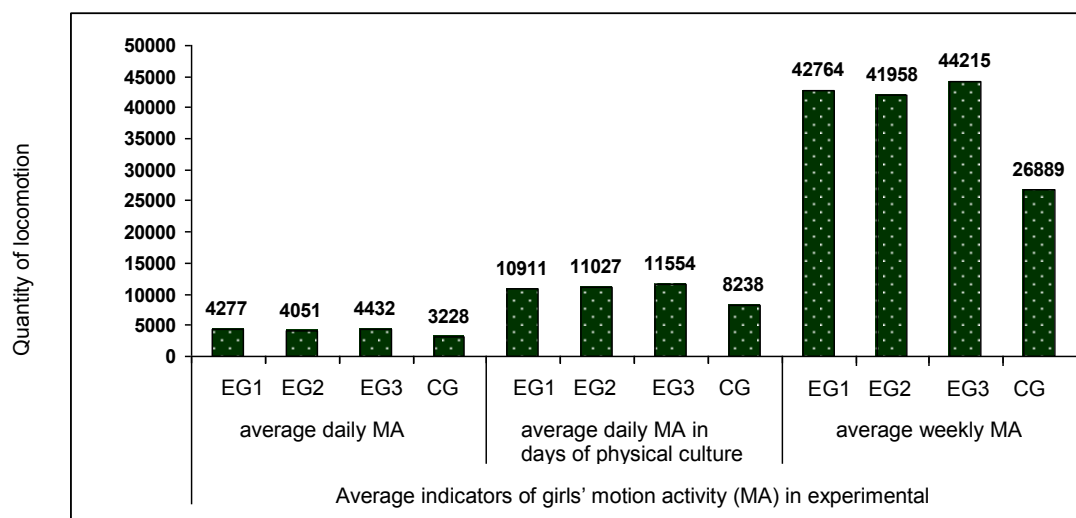


Fig.5. Generalized data of girls' motion activity in the period of laboratory experiment (January-June 2008)

Comparing efficiency of experimental trainings with consideration of sex, we could conclude that biggest amount of positive changes was registered in boys' groups. This factor can be connected with novelty of HRA influence, as far as, as questioning has showed, nearly all tested boys had never practiced this kind of motion activity, while for most of girls it was, to some extent, familiar.

In general, the carried out researches showed, that inclusion of HRA in content of physical culture trainings of SHG students, having CVS problems, is purposeful and perspective, independent on the sex of the trainees. With it, all

three studied HRA kinds – classic, dancing and step-aerobics, are effective. However the just step-aerobics has the highest potential of influence on functional status of the trainees.

By the results of laboratory researches we carried out analytical work in order to create the author's methodic of health related aerobics at physical culture trainings of SHG students, having CVS problems. The methodic was developed in compliance with approved approximate program for HEEs on discipline "Physical culture" (2000), with annual planning, according to which 136hours a year are assigned for physical culture (68 classes – 68 hours (34 classes) in every semester). Organizationally, every ATC is determined by commonly adopted three - parts' structure (see fig.3).

Exercises of classic, dancing and step-aerobics were the main training mean of health related orientation in the developed methodic. With it, considering the revealed difference of their influence, it was decided to include in content of trainings all mentioned kinds of HRA. However, orienting on results of laboratory experiment, we could not come to unanimous conclusion concerning correlation of the studied HRA kinds in experimental trainings. On the one hand, we proved purposefulness of application of every of them, but, on the other hand, the most noticeable positive influence on the trainees' physical conditions was rendered by step-aerobics in the course of laboratory experiment. In this connection we developed two variants of experimental methodic, with main difference among them being correlation and alternating order of the regarded HRA kinds. In particular, variant No.1 implied domination of step-aerobics against the background of alternation of HRA kinds at every ATC; variant No. 2 implied equal correlation of all HRA kinds against the background of successive mastering of each of them in the 1<sup>st</sup> semester and strict their alternating at every ATC in the 2<sup>nd</sup> semester (see tables 3-4).

Table 3

*Order of HRA kinds' application in main part of ATC (variant No.1)*

HRA kind	Number of training	
	I semester	II semester
Classic aerobics	2,4,6,8,10,12,14,16	1,5,9,13,17,21,25,29,33
Step aerobics	3,5,7,9,11,13,15, 17,19,21,23,25,27,29,31,33	2,4,6,8,10,12,14,16,18, 20,22,24,26,28,30,32
Dancing aerobics	18,20,22,24,26,28,30,32,34	3,7,11,15,19,23,27,31,

Table 4

*Order of HRA kinds' application in main part of ATC (variant No.2)*

HRA kind	Number of training	
	I semester	II semester
Classic aerobics	2-12	1,4,7,10,13,16,19,22,25,28,31
Step aerobics	13-23	2,5,8,11,14,17,20,23,26,29,32
Dancing aerobics	24-34	3,6,9,12,15,18,21,24,27,30,33

Pedagogical experiments on testing of efficiency of the developed methodic variants were carried out from September 2008 to May 2010: in 2008-2009 academic year the first variant of the methodic was tested; in 2009-2010 ac. Year – the second variant. Three groups of students were formed: two experimental groups (EG1 and EG2) and one control (CG). CG students (n=45: 29 girls and 16 boys) were trained by curriculum program of physical education department No.1 of NRU "BelGU", which was created by department's instructors for all SHG students, without consideration of their nosological types. In program of EG we included developed variants of experimental methodic: EG1 students (n=45: 29girls and 16boys) tested variant No.1, EG2 students (n=44: 28girls and 16 boys) – variant No.2. All students - participants of experiments – were the members of SHG owing to their health problems with CVS, among which: VVD, NCD, IP, MVP of 1<sup>st</sup> degree without regurgitation, hypotension, hypertension, arrhythmia, tachycardia.

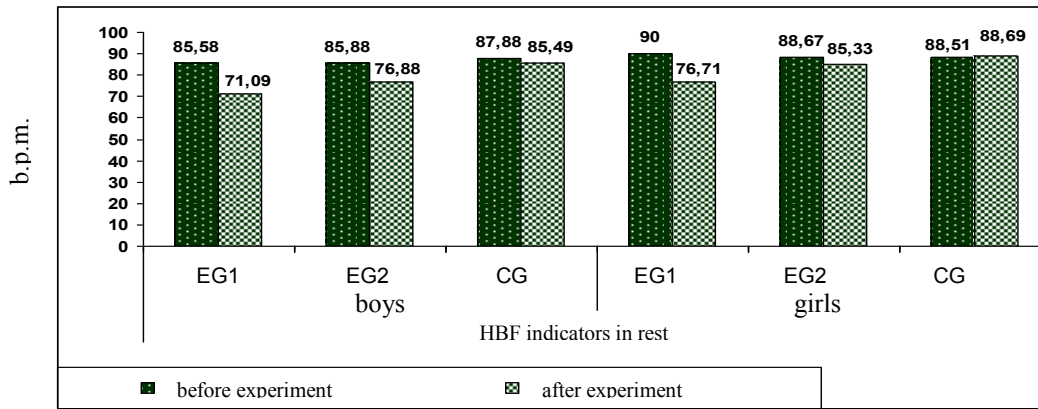


Fig.6. HBF indicators in rest of EG1, EG2, CG students before and after pedagogical experiments

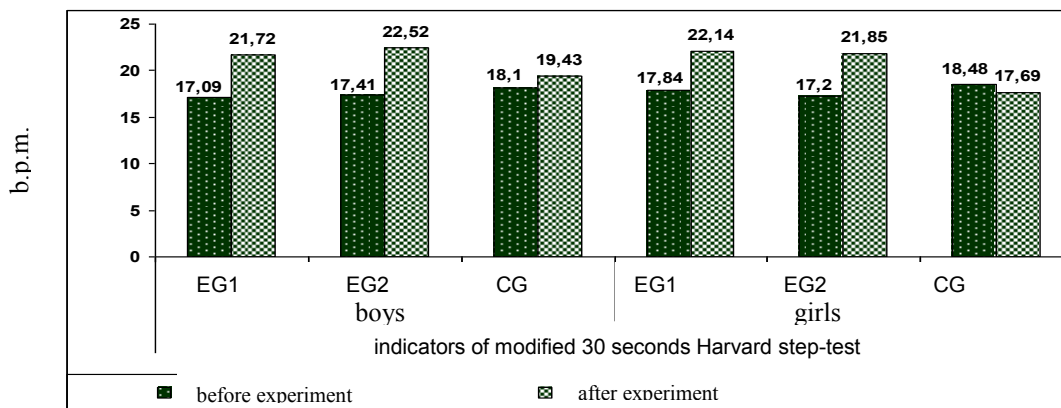


Fig.7. Indicators of modified 30 seconds Harvard step-test of EG1, EG2 and CG students before and after pedagogical experiments

Comparing results of all groups (EG1, EG2, CG) students we could conclude that both variants of experimental methodic rendered more noticeable positive influence on key indicators on students' CVS functional state in comparison with acting unified for all nosological groups, working program of department. In particular, boys and girls of both EG demonstrated ( $p \leq 0,05$ ) economizing of myocardium's work, increasing of physical workability, rising of general endurance, improvement of general state of cardio-respiratory system. In the aspect of influence on physical level and physical conditions of the tested more positive influence of both variants of methodic ( $p \leq 0,05$ ) on chest mobility, strength and coordination was registered. ( $p \leq 0,05$ ).

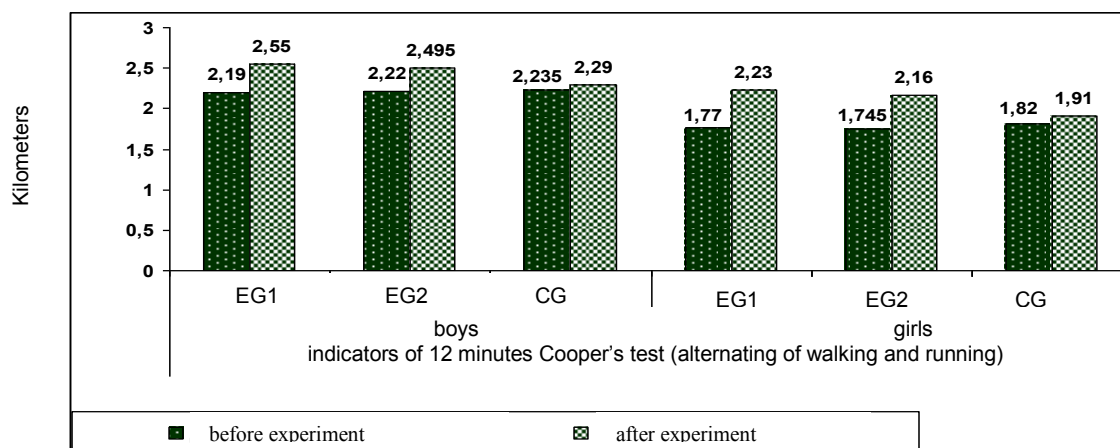


Fig.8. Indicators of 12 minutes Cooper's test of EG1, EG2 and CG students before and after pedagogical experiments

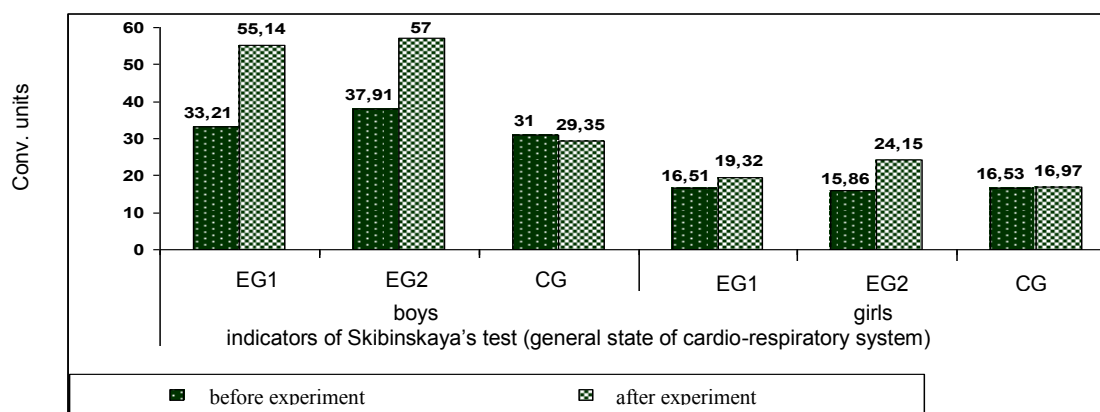


Fig.9. Indicators of Skibinskaya's test of EG1, EG2 and CG students before and after pedagogical experiments

Comparative analysis of EG1 and EG2 results witnesses that application of the first variant of the methodic facilitated arising of more expressed positive dynamics ( $p \leq 0.05$ ) in indicators of economizing of myocardium functioning and vegetative regulation of CVS functioning of both girls and boys. Application of the second variant facilitated more expressed ( $p \leq 0.05$ ) increasing of physical workability, improvement of general state of cardio-respiratory system (as per Skibinskaya's index – in girls group) and coordination.

Comparing of summarizing indicators of EG1 and EG2 students' somatic health, which were calculated by methodic of Apanasenko, witnesses that as a result of experiment EG1 boys showed more favorable values of Robinson's index; EG2 girls – more favorable values of HBF restoration time after moderate physical load and total sum of all indicators. This, in particular, points, that the first variant of the methodic facilitated more expressed aerobic abilities of boys; the second variant – more expressed increasing of physical; workability and general level of girls' health.

Comparing results of all three groups (EG1, EG2, CG) students we can conclude that both variants of experimental methodic rendered more noticeable influence on most of health indicators, involved in methodic of Apanasenko, in comparison with working program of the department. In particular, the tested manifested increasing of aerobic abilities of organism, physical workability, strength, general level of health. With it, the first variant of the methodic influenced on strength abilities of the trainees a little bit stronger, while the second variant – influenced on aerobic ones.

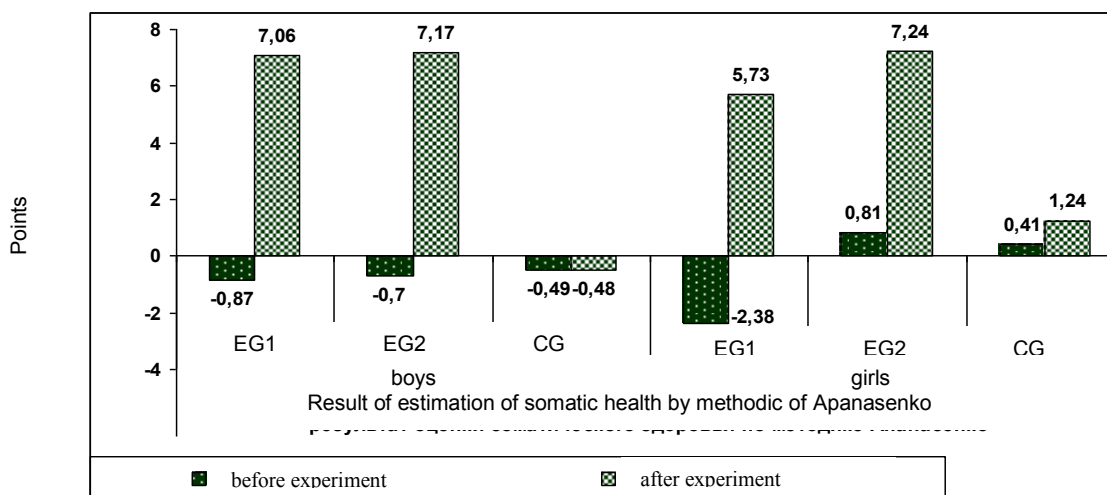


Fig. 10. Result of estimation of somatic health of EG1, EG2 and CG students before and after pedagogical experiments (by methodic of Apanasenko)

In total, the changes, which occurred, conditioned confident increasing of somatic health level of both EG students. For example, in EG1 the boys' health level raised from "low" to "middle" and the girls' – up to level "below middle". In EG2 health level of both girls and boys raised from "low" to "middle".

Thus, the conducted researches confirmed our hypothesis and proved that it is purposeful to use Low Impact health related aerobics in academic process on discipline "Physical culture" in order to improve SHG students' (who have CVS problems) somatic health. Both variants of experimental methodic are highly effective and, with it, they are rather equal by the character of their influence. Alongside with it, it should be noted that variant No.1 rendered more

noticeable positive influence on economizing of myocardium functioning, vegetative indicators, power abilities of boys and girls. Variant No.2 rendered more noticeable influence on organism's aerobic abilities and coordination of girls and boys, as well as on physical workability and general state of cardio-respiratory system of girls.

### Summary

1. Nowadays, up to 35-40% of students of Russian Federation are members of SHG for physical culture training; from them about 30-60% owing to CVS problems. In specialists' opinion with carrying out of health related physical culture trainings with such category of students it is purposeful: 1) to form academic groups, considering nosology; 2) apply gymnastic, aerobic cyclic, breathing and game exercises; 3) to observe the following load parameters: HBF– 55-75% from max, duration of a training up to 60 min, regularity– 3-5 times a week.
2. SHG students', having CVS abnormalities, motion activity is characterized by not-objective self-appraisal of fulfilled locomotion's quantity, against the background of biological norm's deficit (3-4 times lower) and absence of interest to active physical culture activity. In particular, with age standard 14-19 thousand of daily locomotion, SHG boys fulfill in average 4,7 thousand locomotion and girls — 3,6 thousand. More than 50% go home from the place of study and back by transport and prefer passive leisure. Only 15-20% practice additionally physical exercises 5-6 hours a week.
3. Self-feeling of students with CVS problems is characterized mainly by frequent pains in area of heart and chest, heavy breathing, extremes coldness, swelling of feet and ankles, dizziness, syncope, attacks of sudden HBF rising, non-stable BP. Many of them have inherited aptitude to cardio-vascular diseases.
4. Inclusion of Low Impact classic, dancing and step-aerobics in content of SHG students' physical culture trainings favorably influences on functional state of the trainees, facilitates rising of somatic health's general level and conditions increasing of motion activity. Rising of the trainees' functional level is expressed in increasing of general (cardio-respiratory) endurance ( $p \leq 0.05$ ), in increasing of aerobic abilities ( $p \leq 0.05$ ), economizing of myocardium functioning ( $p \leq 0.05$ ), improvement of physical workability ( $p \leq 0.05$ ), raising of cardio-respiratory system's general level ( $p \leq 0.05$ ). Influence of the listed above kinds of health related aerobics on physical level and physical conditions mainly is expressed in increasing of chest excursion ( $p \leq 0.05$ ) and improvement of coordination ( $p \leq 0.05$ ). Average daily scope of motion activity of the tested increased by 141% for boys and by 163% for girls; average weekly scope of motion activity – by 33% for boys and by 60% for girls.
5. From three tested kinds of health related aerobics the most powerful positive effect on key indicators of girls' health (those, who have CVS problems) was rendered by step-aerobics trainings. Experimental trainings in this kind of aerobics with girl students resulted in more positive HBF indicators in rest ( $p \leq 0.05$ ), shortening of HBF restoration time after moderate physical load ( $p \leq 0.05$ ), Robinson's ( $p \leq 0.05$ ) and Skibinskaya's indices ( $p \leq 0.05$ ), general level of health ( $p \leq 0.05$ ), than in group, which was trained classic aerobics. In final value of Robinson's index, confident differences ( $p \leq 0.05$ ) were also found with comparing with group, which trained dancing aerobics. Trainings of dancing aerobics rendered more noticeable positive influence on coordination of the tested in comparison with classic aerobics' trainings: boys demonstrated more favorable results of Romberg's test ( $p \leq 0.05$ ) and Firiliova's test ( $p \leq 0.05$ ); girls demonstrated improvement by Yarotskiy's test ( $p \leq 0.05$ ) and Firikiova's test ( $p \leq 0.05$ ). Besides, girls, who trained dancing aerobics, demonstrated finally higher level of somatic health ( $p \leq 0.05$ ), than the girls, who trained classic aerobics.
6. Two variants of experimental methodic of Low Impact health related aerobics' application at physical culture classes with SHG students, who have CVS problems, are highly effective and, with it, rather equal by character of impact, that witnesses that correlation and order of exercises alternating of classic, dancing and step-aerobics are not critically important in the aspect of influencing on somatic health of the tested students' category. Most of them demonstrated confident ( $p \leq 0.05$ ) improvement of this indicator, which expressed in economizing of myocardium functioning ( $p \leq 0.05$ ), increasing of organism's aerobic abilities ( $p \leq 0.05$ ), stabilizing of vegetative indicators ( $p \leq 0.05$ ), increasing of physical workability ( $p \leq 0.05$ ), general endurance ( $p \leq 0.05$ ), improvement of cardio-respiratory system's general state ( $p \leq 0.05$ ) and psycho-emotional state (by results of CAH test). Besides, we registered positive influence of both variants of the methodic on mobility of chest ( $p \leq 0.05$ ), strength ( $p \leq 0.05$ ), coordination ( $p \leq 0.05$ ).
7. The first variant of experimental methodic, which is characterized by domination of step-aerobics' exercises, rendered more positive influence on economizing of myocardium functioning ( $p \leq 0.05$ ), vegetative indicators ( $p \leq 0.05$ ), power abilities ( $p \leq 0.05$ ) of boys and girls. The second variant of experimental methodic, which is characterized by equal correlation of classic, dancing and step-aerobics, rendered more positive influence on organism's aerobic abilities ( $p \leq 0.05$ ) and coordination ( $p \leq 0.05$ ) of both girls and boys as well as on physical workability ( $p \leq 0.05$ ) and general state of girls' cardio-respiratory system ( $p \leq 0.05$ ).

### References:

- 1 *Amerikanskaia Associaciia Kardiologov. Progulki i zdorovoe serdce* [The American Heart Association. Walking and Heart Health], Moscow, Eastern Book Company, 1997, 208 p.
- 2 Amosov N.M., Bendet Ia.A. *Fizicheskaia aktivnost' i serdce* [Physical activity and heart], Kiev, Health, 1989, 216 p.
- 3 Artamonova L.L., Panfilov O.P., Borisova V.V. *Lechebnaia i adaptivno-ozdorovitel'naia fizicheskaia kul'tura* [Medical and adaptive physical education and health improvement], Moscow, Vldos-Press, 2010, 389 p.
- 4 Balysheva N.V. *Ukreplenie zdorov'ia studentok, imeiushchikh narusheniia serdechno-sosudistoj sistemy, sredstvami dozirovannoj ozdorovitel'noj khod'by i bega* [Health promotion of female students who have disorders of the cardiovascular system, by means of a dosage recreational walking and running], Cand. Diss., Belgorod, 2010, 234 p.
- 5 Belikova Zh.A. *Uprazhneniia khatka-jogi kak sredstvo korrekcii deformacii pozvonocznika studentov special'nykh medicinskikh grupp s narusheniami osanki* [Exercises of hatha yoga as means of correction of spinal deformity students of special medical groups with impaired postural], Cand. Diss., Belgorod, 2012, 22 p.
- 6 Bogoeva M.D. *Postroenie processa fizicheskogo vospitaniia studentov special'noj medicinskoj gruppy s ogranichennymi vozmozhnostiami serdechno-sosudistoj sistemy* [The construction process of physical education students of special medical group with disabilities cardiovascular system], Cand. Diss., Sankt Petersburg, 2011, 253 p.
- 7 Bondarenko E.V. *Teoriia i praktika fizicheskoi kul'tury* [Theory and practice of physical culture], 2008, vol.7, C. 33-36.
- 8 Volkov A.G. *Teoriia i praktika fizicheskoi kul'tury* [Theory and practice of physical culture], 1997, vol.4, pp. 14-16.
- 9 Gorelov A.A., Rumba O.G., Kondakov V.L. *Teoreticheskie osnovy fizicheskoi kul'tury* [Theoretical foundations of physical education], Belgorod, LitKaraVan, 2009, 124 p.
- 10 Gurevich E.B. *Issledovanie effektivnosti sredstv, rezhimov i metodov fizicheskogo vospitaniia v sisteme zaniatij so studentami special'nykh medicinskikh grupp, imeiushchimi zabolevaniia serdechno-sosudistoj sistemy* [Study the effectiveness of modes and methods of physical education in the classes with students of special medical groups that have cardio-vascular system], Cand. Diss., Moscow, 1977, 262 p.
- 11 Davidenko D.N., Grigor'ev V.I. *Fiziologicheskie i metodicheskie osnovy ozdorovitel'noj aerobiki* [Physiological and methodological foundations of improving aerobics], Sankt Petersburg, SPSUEPC Publ., 2009, 40 p.
- 12 Davidenko D.N., Zorin A.I., Borilkevich V.E. *Social'nye i biologicheskie osnovy fizicheskoi kul'tury* [Social and biological foundations of physical education], Sankt Petersburg, SPSU Publ., 2001, 208 p.
- 13 Davidenko E.V., Chudnaia R.V. *Teoriia ta metodika fizicheskogo vikhovannia* [Theory and methods of physical education], 2003, vol.2, pp. 113-166.
- 14 Divajn Dzhoun G. *Programma dejstvii pri povyshennom arterial'nom davlenii* [The programme of action for high blood pressure], Kiev, Olympic Literature, 160 p.
- 15 Zhmykhova A.Iu. *Korrekcionnaia napravlenost' fizicheskoi podgotovki studentov special'noj medicinskoj gruppy na osnove ikh morfofunkcional'nykh vozmozhnostej* [Correctional orientation of physical fitness of students of special medical group based on their morphological and functional features], Cand. Diss., Moscow, 2010, 24 p.
- 16 Zhovan G.F., Rumba O.G. *O neobkhodimosti popolneniia professional'nykh znaniy prepodavatelej fizicheskoi kul'tury, rabotaiushchikh so studentami special'nykh medicinskikh grupp* [On the need to replenish the professional knowledge of teachers of physical training, working with students of special medical groups]. *Sovershenstvovanie uchebnogo processa po discipline «Fizicheskaia kul'tura» v usloviiakh sovremennogo vuza* [Improving the educational process in the discipline "Physical Culture" in a modern high school], Belgorod, 2013, pp. 124-129.
- 17 Zagrevskaia A.I. *Teoriia i praktika fizicheskoi kul'tury* [Theory and practice of physical culture], 2008, vol.10, pp. 21-25.
- 18 Zajceva G.A., Medvedeva O.A. *Ozdorovitel'naia aerobika v vysshikh uchebnykh zavedeniiakh* [Improving aerobics in higher education], Moscow, Physical Culture and Sport, 2007, 104 p.
- 19 Ivlev M.P., Kotov P.I., Levchenkova T.V. *Aerobika* [Aerobics], Moscow, TVT Division, 2006, 304 p.
- 20 Kovaleva M.V., Rumba O.G. *Primenenie podvizhnykh i elementov sportivnykh igr na zaniatiiakh so studentami s ogranichennymi vozmozhnostiami serdechno-sosudistoj sistemy: monografiia* [The use of mobile and elements of sports games in the classroom with students with disabilities cardiovascular system], Belgorod, Politerra, 2012, 170 p.
- 21 Kovshura T.E. *Soderzhanie i napravlenost' sportivnoj aerobiki v fizicheskom vospitanii studentov vuzov* [The content and direction of sports aerobics in the physical education of university students], Cand. Diss., Sankt Petersburg, 2012, 25 p.
- 22 Kopejkina E.N. *Postroenie processa fizicheskogo vospitaniia studentok s narusheniami v sostoianii dykhatel'noj sistemy* [The construction process of physical education of students with disabilities in the respiratory system], Cand. Diss., Belgorod, 2010, 239 p.
- 23 Lisickaia T.S., Sidneva L.V. *Aerobika* [Aerobics], Moscow, Aerobics Russian Federation, 2002, 232 p.

- 24 Nikiforova S.A. *Integrativnye zaniatiia aerobikoj kak sredstvo formirovaniia zdorovogo stilia zhizni studencheskoj molodezhi* [Integrative aerobic exercise as a means of healthy lifestyles of students], Cand. Diss., Tumen, 2008, 23 p.
- 25 Pollok M.L., Shmidt D.Kh. *Zabolevaniia serdca i reabilitaciia* [Heart disease and rehabilitation ], Kiev, Olympic Literature, 2000, 407 p.
- 26 Romanchenko S.A. *Korrekciiia sostoianiiia zdorov'ia studentov v processe zaniatij fizicheskoi kul'turoj* [Correction of the health of students in the physical training], Cand. Diss., Sankt Petersburg, 2006, 20 p.
- 27 Rumba O.G. *Sistema pedagogicheskogo regulirovaniia dvigatel'noj aktivnosti studentov special'nykh medicinskih grupp* [Pedagogical system of regulation of motor activity of students of special medical groups], Dokt. Diss., Sankt Petersburg, 2011, 498 p.
- 28 Skliarenko A.V. *Fizicheskoe vospitanie studentok special'nykh medicinskih grupp srednego professional'nogo obrazovatel'nogo uchrezhdeniia na osnove kompleksnogo ispol'zovaniia ozdorovitel'nykh gimnasticheskikh system* [Physical education students of special medical groups of vocational educational institutions on the basis of the integrated use of gymnastic health systems], Cand. Diss., Khabarovsk, 2006, 25 p.
- 29 Skuratovich M.N. *Metodika zaniatij po fizicheskomu vospitaniiu vuzov so studentkami special'noj medicinskoj gruppy s razlichnymi variantami vegetativnoj disfunkcii* [Teaching methods in physical education schools with students of special medical group with various autonomic dysfunction], Cand. Diss., Omsk, 2006, 23 p.
- 30 Fediakin A.A., Tumasian Iu.A., Fediakina L.K. *Adaptivnaia fizicheskaia kul'tura* [Adaptive physical education], 2005, vol.3(23), pp.25-28.
- 31 Chazov E.I. *Bolezni organov krovoobrashcheniia* [Diseases of the circulatory system], Moscow, Medicine, 1997, 832 p.
- 32 Chogovadze A.V. *Vliianie razlichnykh fizicheskikh nagruzok na formirovanie makromorfologicheskikh i funkcional'nykh priznakov u zanimaiushchikhsia fizicheskoi kul'turoj i sportom* [The effect of different physical activities on the formation macromorphological and functional traits in engaging in physical culture and sports], Dokt. Diss., Ryazan, 1970, 379 p.
- 33 Cieslicka Mirosława, Napierala Marek, Pilewska Wiesława, Iermakov Sergii. *Pedagogika, psihologia ta mediko-biologicni problemi fizicnogo viovanna i sportu* [Pedagogics, psychology, medical-biological problems of physical training and sports], 2012, 10, C. 96-104.
- 34 Edwards S. Physical Exercise and Psychological Wellness. *International Journal of Mental Health Promotion*, 2002, vol. 4(2), pp. 40–46.

---

**Information about the authors:**

**Pivneva M.M.:** pivneva@bsu.edu.ru; Belgorod State National Research University; Pobedi Str., 85, Belgorod, 308015, Russia

**Rumba O.G.:** RumbaOlga@yandex.ru; Institute of Socialization and Education of Russian Academy of Education; Pogodinskaya Str., 8, Moscow, 119121, Russia

---

**Cite this article as:** Pivneva M.M., Rumba O.G. Aerobics health as means of increasing somatic health of students of special medical group. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2013, vol.8, pp. 74-87. doi:10.6084/m9.figshare.747477

The electronic version of this article is the complete one and can be found online at: <http://www.sportpedagogy.org.ua/html/arhive-e.html>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited (<http://creativecommons.org/licenses/by/3.0/deed.en>).

---

Received: 24.06.2013  
Published: 30.08.2013