

PHYSICAL DEVELOPMENT AND PHYSICAL PREPAREDNESS OF STUDENTS OF SPECIAL MEDICAL GROUP WITH THE DISEASE OF VEGETATIVE-VASCULAR DYSTONIA OF MIXED TYPE

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Annotation. *Purpose:* theoretically and experimentally substantiate the effect of the author's physical rehabilitation program to the level of physical development and physical fitness of students. *Material:* the study involved 40 students. Conducted teacher testing: sprinting, flexion and extension arms in emphasis lying on the floor, the rise in the saddle for 1 min., long jump from their seats, jump up from their seats, shuttle run (4 x 9 meters), torso forward from position sitting. *Results:* author's physical rehabilitation program includes physiotherapy, therapeutic massage, aqua gym, fitball gymnastics, acupressure and health food. The educational process is aimed at: the normalization of blood pressure and heart rate; balance of excitation and inhibition in the central nervous system; reducing the number of relapses; prevention of complications and hardening of the body; increase the level of physical fitness and health; acquire the necessary professional for students of applied skills. At the workshops, special attention is paid to the medical control, self-control and physical exercise techniques, taking into account contraindications. General and professionally applied physical preparation is carried out taking into account the features of students. *Conclusions:* It is recommended to attract students to self-realization of physical rehabilitation at home.

Keywords: vegetative-vascular dystonia, students, special medical groups, physical training, physical development.

Introduction

Recent years, in Ukraine there has been observed steady trend to increasing of morbidity of vascular system – from 2512.2 cases per 100 000 persons in 1991 to 4972.0 in 2013, i.e. twice; while prevalence of these diseases increased three times: from 19 607.5 to 58 429.0 cases per 100 000 persons [3, pg. 8–9]. Morbidity of vascular system and prevalence of these diseases take first place in structure of diseases. During 2005–2013 such kind of nosology increased by 12.2% in Sumskay region [4, c. 69–72].

Vegetative vascular dystonia (VVD) is most widely spread pathology, which repeats in population with frequency from 4.8 to 29.1 %. According to medical statistic of Ministry of health protection (MHP) of Ukraine, as on to day 631 thousand of patients with such pathology have been registered. Every year from 1500 to 1700 new cases of this disease are registered. It includes up to 15–20 % – of functional disorders of cardio vascular system. Among youth about 30 % of patients have VVD. It is considered that this disease is unpredictable by variety of its manifestations and after effects [6, pg. 102–105; 19, pg. 19–22]. This disease can progress, facilitating such heavy somatic diseases as ischemia of heart, hyper tonic disease, bronchial asthma, ulcer of stomach and so on. Correction of such disorders in due time permits to preserve health and prevent from progressing of other diseases [2, pg. 9; 16, pg. 139–146; 17, pg. 17–20]. Main factors, which cause appearing of VVD, are: hereditary-constitutional features of vegetative nervous system's functioning (автосомно- dominant type of inheritance); diseases of endocrine glands (thyroid gland, adrenal glands, sex glands); endocrine reconstruction of organism [18, pg. 442–449; 20, pg. 208–225]. Often VVD is the most expressing in periods of hormonal reconstruction, for example in period of puberty. Besides, it is manifested: with stresses, neurosis, psycho-emotional tension, infections (tonsillitis, caries, sinusitis and so on). Besides, mental and physical overtiredness, inadequate physical loads, hyper dynamia can facilitate VVD. All mentioned result in sharp weakening of tolerance during dynamic loads. The other reasons of VVD can be the following: scoliosis, cervical osteochondrosis; disorders in mineral metabolism (especially Ca and Mg); unfavorable weather conditions, excessive mass of body, spending too much time to TV and PC [2, pg. 9–10; 14, pg. 17–34; 15, pg. 119–130].

Recent time percentage of youth, who are members of special health groups (SHG), has been increasing. Some authors Ye.V. Bismak and O.V. Peshkov (2012) note that 60% of students can be related to main health group, 12–30% - preparatory group and 20–45% of students - to SHG. With it the problem of SHG completing has been still unsolved. Some authors (N.I. Shlyk, 1991; V.I. Dubrovskiy 1998) Offer to divide students by kinds of morbidity. They prove their position by the fact that indications and counter indications differ depending on character of morbidity [1, pg. 89–93; 13, pg. 36–40]. In opinion of other authors principles of students' distribution by medical groups shall include morbidity, level of physical fitness and physical workability, functional state of all organism's systems [5, pg. 29–32; 12, pg. 3–5].

Alongside with it problem of SHG completing is still an urgent one. Besides, here exists the problem of rational approach to physical culture classes in combination with physical rehabilitation means. All these are required for quicker rehabilitation of organism's functions, health improvement and increasing of physical and mental workability of SHG students. That is why working out and implementation of complex program of SHG students' physical rehabilitation, considering functional state of VS is an important scientific problem of to day.

The work has been fulfilled as per plan of scientific research works of Department of human health and physical rehabilitation of Sumy state pedagogic university named after A.S. Makarenko, of Ministry of education and

science of Ukraine by topic: "Theoretical methodological and organizational methodic problems of health, physical rehabilitation and correcting pedagogic" (state registration No, 0107U002826).

Purpose, tasks of the work, material and methods

The purpose of the research – prove theoretically and experimentally influence of author's physical rehabilitation program on physical condition and physical fitness of SHG students with VVD of mixed type.

The tasks: analysis of author's physical rehabilitation program; determination of physical condition levels and physical fitness.

The methods of the research: theoretical analysis and generalization of scientific literature; analysis of medical records; pedagogic observation; pedagogic testing (sprinter run, pressing ups in lying position, rising in sitting position during 1 minute. Long jump from the spot, high jump from the spot, shuttle run (4 x (meters); forward torso bending from sitting position); methods of mathematical statistics.

The research was conducted on the base of Ukrainian bank academy of National bank of Ukraine (UBA NBU). In the research students – members of SNG, who had VVD of mixed type participated. We formed two homogeneous groups: main (MG) and control group (CG); each group consisted of 20 persons.

Main group was trained by author's physical rehabilitation program (PR), which included therapeutic gymnastics, therapeutic massage, aqua gymnastic, point massage, fit ball and health related eating. CH as trained as per traditional for SHG students' with cardio vascular diseases program.

Training process was oriented on the following: normalization of BP and pulse; balancing of excitation and inhibition processes in nervous system; reduction of repeated diseases; prevention from complications and hardening of organism; increase of physical fitness and workability; acquiring of important for students professional applied skills. At practical classes special attention was paid to medical control, self control and methodic of physical exercises, considering counter indications. General and professional-applied physical trainings were fulfilled considering students; functional potentials.

In MG trainings were conducted in individual or in small group method. Every class was built on the following principles: accessibility (selection of exercises and methods in compliance with students' self-feeling), gradual character (from simple to complex), repeated and systemic character – three times a week.

Results of the research

Methodic of application of *therapeutic gymnastic* with VVD in different periods of rehabilitation envisaged usage of special physical exercises: static, speed-power, power, isometric, breathing and coordination exercises. They facilitated normalizing of BP, increase of chest's mobility and breathing rhythm, recreation of vestibular system's functioning, working out of correct stereotype of posture. The most favorable for organism were isometric exercises of little, middle and high intensity of 5-60 seconds' duration. Maximal vegetative effect was registered after 1-3 minutes after finishing of isometric exercises (phenomenon of Leonardo). Total duration of static exercises' fulfillment was determined by functional state of patient, period of rehabilitation, condition of muscular groups. Isometric exercises were alternated with breathing and relaxation exercises. For increasing of workability we used aerobic cyclic loads: dozed walking, run [8, pg. 54–56].

Fit ball gymnastic helped to balance excitation and inhibition processes in CNS, increase its controlling role in coordination of main organs and systems' functioning. Under influence of dozed physical exercises of fit ball gymnastic indicators of lipid metabolism are normalized, compensatory adapting potentials of vascular system. Trainings improve mood, reduce headache, giddiness, feeling of heaviness in heart. Training was started from therapeutic gymnastic (10-15 min.). Main part (40–45 min.) included fit ball gymnastic at middle rate (90–120 b.p.m.). Finalizing part included breathing exercises with fit ball and without it and breathing gymnastic by A.N. Strelnikova (15–20 min.). Fit ball gymnastic was arid out 2 times with quantity of repetitions of every exercises – 6-8 times with 1-3 starts. At first stage (September) we solved the following theoretical and practical tasks: formation of knowledge about fit ball and mechanism of its influence on organism; we trained under water exercises without ball; learned main initial positions on ball: sitting, lying, lying on abdomen. Heart rate of exercises' fulfillment was 90–120 b.p.m. At second stage (October – November) we formed knowledge of correct initial positions on ball in combination with upper limbs' movements, as well as exercises of different orientation and breathing exercises by A.N. Strelnikova. Every training had musical accompaniment, which also considered taste and interests of students. When training complex of exercises we used middle heat rate (123–126 b.p.m.). At third stage (December – May) we formed theoretical knowledge about improvement of motion functioning in fit ball and effectiveness of exercises. We included power exercises for different muscular groups, exercises for flexibility and coordination [10, pg. 288–296].

Main tasks of *therapeutic massage* are: prevention from relapse; normalization of BP; weakening of headache; improvement of psycho- emotional state. Methodic of therapeutic massage includes massage of upper part of back, neck, back of head and its part, covered with hairs. Besides, it includes massage of acupuncture points. We used stroking, rubbing, kneading, vibration, pats and "cutting". The course of massage includes 10-12 sessions with pauses of 3-4 months between course [8, pg. 54–56].

Point massage was fulfilled as tone up (influencing on every point -0,5–1 min.) and as a relaxing one (influencing on every point – 4–5 min.). The course of massage consists of 12 sessions, which are conducted through the day. If required this course can be repeated, but not earlier than after one week. Students were trained at the end of every class 304 points every training. We recommended to students practicing of point massage independently in domestic conditions after 3-4 months or use it as emergency aid with vegetative crisis [7, pg. 15–23].

Aqua gymnastic trains heart muscle, vessels, stabilize BP, increase organism's adaptation to environment and to external irritators. In water exercises increase gas exchange and saturation of blood with oxygen; they gradually strengthen muscles, which stimulate work of heart-vascular and respiratory systems, the gastrointestinal tract and facilitate improvement of psycho-emotional state. Aqua gymnastic trainings were conducted in SHG 1-2 times a week (1training – 1 hour). Practical swimming training is composed of three parts: preparatory, main and finalizing [11, 289–293].

Program of swimming trainings in special health groups of HEE takes 9 months and is divided in 3 periods: 1) preparatory period (September–November). It is oriented on improvement of physical condition, acquiring of main motion skills, improvement of functional fitness; 2) main period (December– February). It is oriented on mastering of special exercises; 3) finalizing period (March – May). It is oriented on steady fixing of physical rehabilitation results, self analysis of therapeutic effect, objective analysis of functional fitness's changes, preparation of methodic recommendations and plans for aqua gymnastic for such contingent.

Health related eating is most important element of complex rehabilitation. When determining eating therapy we considered stage of disease's progress, state of digestion, presence of accompanying diseases or complications. We recommended for students to eat food, containing salts of magnesium, which have vessels' expanding, anti spastic effect, increase inhibition processes in brain, remove spasms of smooth muscles and vessels. They are cereals: wheat, buckwheat, oats; nuts, beans, carrot, parsley, dill. We also recommend to exclude from everyday eating pickles, marinade; to restrict taking salt up to 4,5 g per day, restrict usage of strong tea, coffee, chocolate, which excite central nervous system [9, pg. 66–70].

So, modern model of health related eating is of pyramid-like form. Basing on it and considering recommendations of health related eating we worked out diet for every student. The basis of this pyramid is bread, cereals and pasta, rice and potato (6-11 units a day). Source of energy, carbohydrates, fiber, vitamins of group B, iron is 1 unit (1 piece of bread, 150–200 g of porridge, 300–400 g of potato, 300–400 g of soup. Next level of our pyramid is: vegetables and fruits (5-8 units a day). They are source of fiber, vitamins and minerals. The more various vegetable and fruits are used (not less than 400 units a day) the better eating is balanced. 1 unit is 1 vegetable or fruit of middle size. 300–400 g of boiled or uncooked vegetables, 300–400 g of vegetable soup, 150 g of fruit juice. At next stage we recommend to eat chicken and fish, beans, eggs, nuts (2 – 3 units a day). Meat with fat we replaced by beans or by meat without fat. 1 unit is 85–90 g of meat, 0.5 of chicken breast, 300 g of sliced fish, 300 g of beans, 0.5 of egg, 2 spoons of nuts. The next go milk food (milk, kefir, yogurt, curd and cheese). This level of pyramid is a source of proteins and calcium. We recommend to use milk and milk food with low content of fats and salt. 1 unit is 250 ml of 1-% milk or yogurt, 30 g of cheese with fat not less than 20%. At the top of pyramid there are fat, oils, butter (rather seldom 2 – 3 units a day). They are source of vitamins A, E, D, K.

Pedagogic testing of physical fitness was conducted twice: at the beginning and at the end of every academic year. Working out of physical fitness's system envisages: determination of informational meaning of test; testing in group, homogeneous by sex, age and fitness.

So, MG students were offered complex program of physical rehabilitation, which includes all required elements of health improvement and is oriented on improvement of morphological functional and physical condition of such contingent.

Dynamic of physical condition progress (PCP): comparing PCP after PR course showed high level of 19 MG students (95%) and 1 student (5%) – had level above middle. Mean indicator of group was 0.730 ± 0.08 conv. un. (by Shapiro –Wilka – 0.904 ± 0.05). In CG mean indicator was 0.664 ± 0.08 conv. un. (by Shapiro –Wilka – 0.970 ± 0.77). 3 CG students (15%) had this indicator above middle and 17 students (85%) - high PCP (see table 1).

Table1

Dynamic of PCP indicator in period from 2011 to 2014

Mean indicator $\bar{x} \pm S$	MG			CG		
	1	2	3	1	2	3
2011–2012	0.612±0.1	0.681±0.1	0.714±0.1	0.551±0.1	0.625±0.1	0,632±0,1
Criterion of Shapiro – Wilka (W±p)	0.825±0.04	0.945±0.6	0.800±0.02	0.916±0.5	0.896±0.3	0,986±0,9
2012–2013	0.630±0.1	0.670±0.1	0.713±0.1	0.528±0.1	0.567±0.1	0,604±0,1
Criterion of Shapiro – Wilka (W±p)	0.917±0.3	0.906±0.2	0.951±0.6	0.948±0.6	0.892±0.1	0,932±0,4
2013–2014	0.622±0.1	0.709±0.1	0.727±0.1	0.561±0.1	0.620±0.1	0.659±0.1
Criterion of Shapiro – Wilka (W±p)	0.907±0.2	0.905±0.2	0.873±0.1	0.935±0.3	0.961±0.7	0.914±0.2

During 2011–2012 mean indicator of MG increased from 0.612 ± 0.1 conv.un. to 0.714 ± 0.1 conv.un. At the same time PCP increased by 22.2%. By the end of year PCP has become 100%. In control group this indicator changed only in one student (20%) and reached high PCP. 4 students (80%) showed no changes (1 students with middle and 3 students with high PCP). Mean indicator increased a little – 0.551 ± 0.1 – 0.632 ± 0.1 conv. un.

1 student of MG (10%) improved PCP to 90% – high and 10% above middle PCP. Mean indicator increased by 0.616 ± 0.1 – 0.713 ± 0.1 conv.un. In 2012–2013 CG students showed the following improvement: quantity of students with high PCP – by 30%, mean indicator of group increased to 0.542 ± 0.1 – 0.611 ± 0.1 y.o.

In MG changes took place in 2013–2014: quantity of students with high PCP increased by 27.2% (total quantity - 10 students). Only 1 student (9.1%) showed above middle indicator of physical condition. Mean indicator of group changed to 0.62 ± 0.1 – 0.87 ± 0.1 . PCP of CG students changed indicator “above middle” by 15.4% in 2013–2014. At the end of this period PCP was the following: 3 students (23%) – “above middle” and 10 students (77%) – high PCP. In CG we registered no middle level.

Having analyzed dynamic of PCP change in 2011–2014 of MG students, we came to conclusion that “high level” indicator increased by 20%. Indicator “above middle” reduced by 10%. Such levels as below middle and middle were not registered at all. In CG, in the same period indicator “high” level was 85%, “above middle” – reduced by 15%. Such levels as below middle and middle were not registered at all. So, the received results witness about improvement of PCP in both groups but with MG domination (see fig.1).

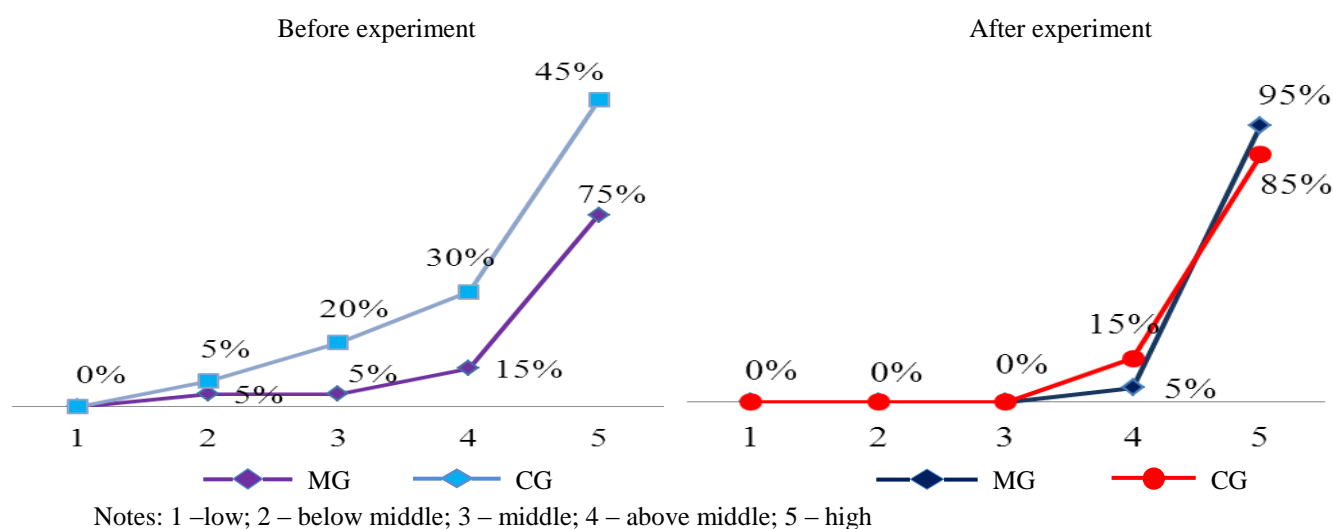


Fig.1. Dynamic of changes of physical condition's levels during experiment

Physical fitness of special health group students: 2 times a year we conducted pedagogic testing and estimated influence of PR program, worked out by us, on development of speed-power qualities of SHG students with VVD of mixed type (see table 2 and table 3).

Table 2

Dynamic of main group students' physical fitness for 2011–2014

№/№	Indicators	2011–2012 n=9 $\bar{x} \pm S$		2012–2013 n=10 $\bar{x} \pm S$		2013–2014 n=11 $\bar{x} \pm S$	
		1	2	1	2	1	2
1.	100 meters' sprinter run (sec.)	21.7±0.55	21.4±0.5	21.9±0.5	21.5±0.6	21.9±0.4	21.6±0.5
2.	Pressing ups in lying position (times)	18±3.0	21.0±3.3	17.8±2.0	19.0±1.8	24.8±1.8	29.9±2.1
3.	Torso lifting from lying position in sitting one during 1 min. (times)	21.7±1.4	24.0±1.7	27.2±1.2	22.0±3.1	28.3±1.4	32.0±1.4
4.	Long jump from the spot (cm)	152±3.7	155±3.7	165±4.2	160±3.6	166±4.3	169±4.3

5.	High jump from the spot (cm)	25.0±1.4	29.0±1.4	28.2±1.6	27.0±2.2	29.1±1.9	34.9±1.3
6.	Shuttle run (4x9 meters), sec.	12.9±0.1	12.6±0.1	11.9±0.2	11.8±0.3	12.0±0.2	11.7±0.2
7.	Forward torso bending from sitting position, cm.	14.4±2.3	20.2±2.5	21.0±2.5	17.8±1.9	22.9±2.3	26.8±2.7

Pedagogic testing included: 100 meters' sprinter run, pressing ups in lying position, torso lifting from lying position in sitting one during 1 min, long jump from the spot, high jump from the spot, shuttle run (4x9 meters) and forward torso bending from sitting position.

Table 3

*Dynamic of control group students' physical fitness for
2011–2014*

№/№	Indicators	2011–2012 n=9 $\bar{x} \pm S$		2012–2013 n=10 $\bar{x} \pm S$		2013–2014 n=11 $\bar{x} \pm S$	
		1	2	1	2	1	2
1.	100 meters' sprinter run (sec.)	22.0±0.5	21.5±0.6	21.3±0.4	41.9±19.9	20.3±0.6	20.4±0.3
2.	Pressing ups in lying position (times)	16.0±1.7	19.0±1.8	21.3±1.8	26.3±2.0	25.8±1.3	31.1±1.3
3.	Torso lifting from lying position in sitting one during 1 min. (times)	15.6±3.0	22.0±3.1	24.9±2.1	29.5±1.5	27.8±1.3	31.3±1.5
4.	Long jump from the spot (cm)	157±3.4	160±3.6	165±4.0	168±4.5	169±5.9	176±7.0
5.	High jump from the spot (cm)	23±1.5	27±2.2	24±1.6	27±1.3	28±0.7	50±18.9
6.	Shuttle run (4x9 meters), sec.	12.4±0.3	11.8±0.3	12.0±0.2	11.6±0.2	11.9±0.1	11,6±0.1
7.	Forward torso bending from sitting position, cm.	13.8±1.9	17.8±1.9	20.7±1.2	23.9±1.5	20.6±2.2	24.8±2.6

Comparing results of sprinter run we came to conclusion that this indicator remained unchanged in both groups. In MG mean indicator was 21.4±1.5 sec (0.88±0.01 by Shapiro Wilka) and in CG – 20.5±1.3 sec. (0.83±0.002 by Shapiro-Wilka). Pressing ups in lying position improved in both groups in average by 6±0.1 times. In MG mean indicator was 26.1±9.2 times (0.93±0.15 by Shapiro-Wilka) and in CG – 28.6±7.1 times (0.91±0.09 by Shapiro-Wilka).

Torso lifting from lying position in sitting one during 1 min. in MG: improvement happened at the end of PR course in average by 3.5 times. Mean indicator was 28.9±6.1 times (0.94±0.27 by Shapiro-Wilka). In CG this indicator increased, in average, by 6.5 times. Mean indicator was 30.7±5.3 times (0.97±0.85 by Shapiro-Wilka).

After PR course long jump from the spot of MG students increased by 4.4 cm. Mean indicator was 163.1±14.3 cm (0.95±0.39 by Shapiro-Wilka). In CG this indicator increased at the end in average by 9.7 cm. Mean indicator was 172.2±21.6 cm (0.82±0.002 by Shapiro-Wilka).

High jump from the spot in MG increased, in average, by 6.6 cm and by 4.5 cm in CG. Mean indicator, accordingly, was 32.7±4.9 cm (0.95±0.49 by Shapiro-Wilka) and 29.6±3.8 cm (0.96±0.64 by Shapiro-Wilka).

Indicator of shuttle run (4 x 9 meters) in MG and CG remained unchanged and was 12.1±0.8 sec. (0.96±0.64 by Shapiro-Wilka) and accordingly 11.5±0.6 sec. in CG (0.90±0.05 by Shapiro-Wilka).

Forward torso bending from sitting position increased in average by 4.1 cm in MG and by 4.2 cm in CG. Mean indicator was 23.8±9.0 cm (0.95±0.43 by Shapiro-Wilka) and, accordingly, by 22.9±8.9 cm (0.95±0.42 by Shapiro-Wilka).

After PR course level of MG students' physical fitness was: 7 students (35%) had low level and 13 students (65%) – below middle. There happened improvement in 1 student (5%), which reached below middle level of physical fitness. In CG: 25% (5 students) had low and 75% (15 students) – below middle level of physical fitness.

Discussion

Having analyzed dynamic of PCP changes in MG in period 2011–2014 we came to conclusion: indicator “high level” increased by 20%, “above middle” – reduced by 10%. Such levels as “below middle” and “middle” were not registered at all. There happened changes in following indicators: pressing ups in lying position increased by 6 times; torso lifting from lying position in sitting one during 1 min. improved by 3.5 times; long jump from the spot improved by 4.4 cm; high jump from the spot – by 6.6 cm; стрибок у довжину з місця збільшився на 4,4 см; стрибок вгору з місця на 6,6 см; forward torso bending from sitting position improved by 4.1 cm; shuttle and sprinter run remained unchanged. Physical fitness level in this group changed only in 1 student (5%), which reached below middle level.

In CG in the same period PCP was high in 85% of students, indicator “above middle” reduced by 15%. Such levels as “below middle” and “middle” were not registered at all. Improvements were in the following indicators of physical fitness: pressing ups in lying position improved by 6 times; torso lifting from lying position in sitting one during 1 min – by 6.5 times; long jump from the spot increased by 9.7 cm; high jump from the spot – by 4.5 cm; forward torso bending from sitting position improved by 4.2 cm; shuttle and sprinter run remained unchanged. Level of physical fitness was perfected by 2 students (10%), who reached below middle level.

Theoretical analysis and generalization of special scientific and methodic literature sources [1-7, 17-20] showed that in the most often cases VVD appears under influence of mental over tension, hereditary factors and wrongly organized regiment of studying and rest. The mentioned above has been proved by conducted by us researches.

So we grounded, for the first time, and tested new complex program of physical rehabilitation for SHG students with VVD of mixed type. The program corresponds to modern principles of physical rehabilitation, considering previous achievements in this field. The worked out by us complex program is oriented on the following: overcoming of VVD symptoms in period of remission; normalization of BP and pulse; general hardening of organism, reduction of duration and quantity of disease’s recurrence; improvement of physical fitness and physical condition indicators; involvement of students in self realization of physical rehabilitation in domestic conditions.

We have proved that worked out by us complex physical rehabilitation program for SHG students with VVD of mixed type is effective and purposeful at different stages of physical rehabilitation. The program contains modern approaches to physical rehabilitation of such contingent and combines traditional and non-traditional means of health’s recreation.

Conclusions:

In the course of our researches we proved that it is necessary to work out health related rehabilitation program for special health group students, who have vegetative vascular dystonia of mixed type, in connection with deficit of programs for such contingent of persons.

We proved that quantity of persons with vegetative vascular dystonia of mixed type is increasing.

We have practically tested effectiveness of author’s program for SHG students with VVD of mixed type and recommend them to move in main group.

The prospects of further researches imply perfection and implementation of author’s program of physical rehabilitation for special health group students with vegetative vascular dystonia of mixed type in higher educational establishments.

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Cite this article as: Olchovik A. V. Physical development and physical preparedness of students of special medical group with the disease of vegetative-vascular dystonia of mixed type. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2015, no.3, pp. 38-45. <http://dx.doi.org/10.15561/18189172.2015.0306>

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

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Received: 17.01.2015

Accepted: 17.02.2015; Published: 23.02.2015