

THE WAYS OF TEACHING PROCESS OPTIMIZATION IN PHYSICAL EDUCATION OF THE STUDENTS' SPECIAL MEDICAL GROUP

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Annotation. Purpose – to identify the effectiveness of the use of innovative approaches in physical education teaching process of special medical group students. The study involved 15 boys aged 13-14 years. The lesson include exercises consisting of the elements of Pilates, yoga and static body-oriented therapy. The proposed program of physical exercises performed by students in the main part of the lesson and took the volume to 80% of the time. Set to increase the functionality of the skeletal muscles, the adaptive capacity of cardio-respiratory system, the health and strength of the nervous system, optimization of anthropometric indices, improved spinal mobility. A high degree of efficiency in the learning process of innovation of general preventive and therapeutic intervention is identified. Proposed to use in the educational process modern methods of prevention and correction.

Key words: physical education, special, medical group, innovative, approach.

Introduction

The problem of health support of rising generation seems to be of the first priority in the system of school education in connection with increasing of quantity of children, who have steady abnormalities in morphologic-functional status, which result in pathologic organism's changes. As it follows from statistical data in 2011 sickness rate of children and teenagers in Crimea Autonomic Republic was 1275.11 persons per 10 thousand of children population, that exceeds the indicators of 2010 by 6.9% [10]. In the structure of nosological forms of pathology, the diseases of respiratory system dominate, that is 40.7% from the total quantity of sick children. The percentage of pupils with excessive mass of body, abnormalities of posture and supporting motor system, distortions of nervous and psychic system. All these factors result in increasing of quantity of pupils, who shall be related to special health groups by the state of their health. Teaching process organization in physical education of such children category requires solution of a number of tasks, connected, first of all, with the necessity of realization of most important school physical education branch – health-improving, preventive and correcting. In this connection, it should be noted that mastering different kinds of sports by children is stipulated by educational program as the main material, with it, this educational material is strictly regulated by a certain scope of hours [2]. As far as realization of specific preventive and correction methods concerns, up to 30-35 minutes of every lesson are devoted to it by educational program. Thus, main lesson time shall be used for practical application of health correction methods, considering specificity of disease child's functional state. However educational program practically lacks of methodological recommendations, which could assist teacher to solve specific tasks. Besides, realization of individualization principle is hindered because of groups' numerical strength and variety of children's functional abnormalities. In this connection, it is obviously necessary to give preference to the methods, which have general preventive and therapeutic effect. In our opinion application of modern preventive and correction methods, which proved their efficiency in practice, within the frames of physical education process of special health group children, will permit to solve a number of problems.

The work has been fulfilled as per plan of scientific & research works of Tavrisheskiy national university, named after V.I. Vernadskiy.

Purpose, tasks of the work, material and methods

The purpose of the work was to find out efficiency of innovative approaches' application in teaching process on physical education of special health group pupils.

Organization of the researches. In the researches 15 boys of 13-14 years old age, related to special health group by their state of health, took part. The classes by the developed program were conducted during first semester of academic year in accordance with curriculum time-table. The lessons on physical education contained physical exercises, which were consisted of Pilates's system elements, static yoga and Body-oriented therapy [7, 8]. The offered program of physical exercises were fulfilled by pupils in main part of lesson and took up to 80.0% of time scope. Evaluation of innovative approach efficiency in organization of educational process was conducted on the base of determination of pupils' physical development parameters, which included estimation of body size, its proportions, muscular strength and workability. With this purpose height, weight chest circumference were measured, Kettle's II index, Erisman,s index, Piniet,s indicator, vital index were calculated. Functional state of backbone was evaluated by the results of Shober's and Otto's tests' execution and determination of backbone index [4]. The level of strength abilities' development was evaluated by the indicators of static endurance of prelum abdominale and back muscles, hand dynamometry. Functional researches included breath holding tests (Stange,, Genchy), determination of vital lung volume, vital index, Rufiet's index, index of double product, Shapovalova's index [8]. The power of nervous processes was studied with the help of tapping test [7]. The obtained results were processed with the help of parametric Student's criterion and non parametric Manna-Witny's criterion.

Results of the researches

Organization of educational process of special health group pupils' physical education envisages realization of a number of specific tasks, oriented on general health improvement, diseases preventing, correction of physical development level and functional state of child's main physiological systems. In this connection, considering the complexity of group with homogeneous health abnormalities formation, it is purposeful to use means, having no contra-indications for different somatic deviations. In our researches, from 15 pupils ten showed distortions of posture, the other had domination of respiratory pathologies. Lesson contained exercises, directed to creation of muscular tension with following relaxation of working muscles. The correcting exercises, permitting to compensate body structure with the help of concentration of attention at sense of gravity effect, ability to keep structure integrity in motion and balance. Active and passive breathing exercises ensured strengthening of diaphragmatic breathing and involving both respiratory and auxiliary breathing muscles in work. In the process of realization of the offered educational material the dynamics of children's physical and functional state as well as typological peculiarities of nervous system functioning.

Evaluation of physical state is an important aspect of objective characteristic of child's organism potential capabilities. As it follows from the presented results, the examined children had low parameters of supporting motor system (table 1). Index Kettle II as indicator of proportional physical development, in average was $21,6 \pm 0,5 \text{ kg/m}^2$, that corresponds to 90 cental value and can witness about excessive body mass. Against the background of boys body mass increasing, restrictions of motor abilities were marked. Reduction of backbone index up to 26.0 cm permits to conclude that backbone mobility is insufficient. In its turn, the found changes, probably, were the factors, which limited opportunities for overall development of children's supporting motor system.. So, evaluation of dynamic and statistic endurance of main muscular groups witnessed about sharp reduction of skeleton muscles contraction, which ensure the necessary level of strength, as integral characteristics of nervous-muscular coordination. Low values of power index of hand flexor muscles within 39.0% was, besides, an illustration of disharmony between body mass and strength characteristics of muscular system.

Using of tendon gymnastics, which includes static and static-dynamic exercises as well as training of relaxation through concentration at physical education classes, stimulated activity of tissue metabolism. Activation of muscular metabolism favorably reflected in their functional characteristics.

Table 1

Indicators of special health group pupils' physical state
($X \pm Sx$; $n=15$)

№	Indicators	Initial	At the end of semester	p
1	Kettle's index II kg/m^2	$21,6 \pm 0,3$	$20,6 \pm 0,4$	$<0,05$
2	Respiratory excursion, cm.	$4,35 \pm 0,16$	$5,35 \pm 0,13$	$<0,01$
3	Backbone index, cm.	$26,4 \pm 0,7$	$32,2 \pm 0,8$	$<0,01$
4	Power index, %	39,0	41,4	$<0,05^*$
5	Bents per 1 min., q-ty	$22,8 \pm 0,4$	$27,4 \pm 0,6$	$<0,01$
6	Squatting per 30 sec., q-ty.	$19,8 \pm 0,4$	$23,1 \pm 0,4$	$<0,01$
7	Static endurance of back muscles, sec.	$27,7 \pm 0,6$	$36,9 \pm 0,7$	$<0,01$
8	Static endurance of prelum abdominale muscles, sec.	$19,9 \pm 0,2$	$30,1 \pm 0,7$	$<0,001$
9	Static endurance of hip muscles, sec.	$15,0 \pm 0,3$	$19,1 \pm 0,3$	$<0,01$

* validity of differences by no T-criterion of Manna-Witny.

Indicators of back, prelum abdominale and back of hip muscles' static endurance increased by 27,0 - 58,0 %, ($p < 0,001$). Dynamic strength increased approximately by 18,0%, ($p < 0,01$). Correcting effect was also witnessed by reducing of Kettle's II index up to $20,6 \text{ kg/m}^2$, ($p < 0,05$), that corresponds to 75 centale and can be interpreted as the absence of excessive body mass signs. Improvement of backbone mobility, (backbone index increased by 5,8 cm, ($p < 0,01$), as a result of exercises for stretching of connective tissues and muscles, was determined by the increase of elasticity of para-vertebral muscles and the strength of antagonistic muscles.

Evaluation of initial level of pupils' functional possibilities witnessed about the presence of significant deviations in adapting reserves of main physiological systems. So, the values of breath holding tests, which were integral parameters of cardio-respiratory system and characterized hypoxic stability, were on low level. The reserves of ventilating function of external respiration system, which are determined by value LVC (lung vital capacity), were by 25.0% lower that appropriate values ($p < 0,01$). There were registered rather high energetic losses of myocardium, connected with heart pumping functioning. With it, low reserves of heart muscle limited adapting possibilities of children's organisms that was shown by high value of Rufiet's index.

Introduction of the developed physical exercises into curriculum, ensured growth of cardio-respiratory system' functional capacity and pupils' physical workability (see table 2).

Increase of breath holding time both in position of maximal inhale (by 35.0% ($p < 0,01$) and ordinary exhale (by 42,2 %, ($p < 0,01$), permits to affirm that cardio-respiratory system passes to higher stationary level, which is

characterized by the growth of adapting possibilities. The reserves of external respiratory system increased owing to the increasing of static volumes, that facilitated the growth of life index in average by 9,0 %, ($p < 0,05$).

Against the background of functional shifts in external respiratory system the effect of heart activity optimizing was registered, that was illustrated by the reduction of double product index nearly by 20,0%, ($p < 0,01$).

The found out functional shifts ensured increase of pupils physical workability level. Refiet's index reduced approximately by 25,0 %, ($p < 0,01$).

Table 2

Indicators of special health group pupils' physical state
($\bar{X} \pm Sx$; $n=15$)

№	Indicators	Initial	At the end of semester	p
1	Shtange's tes, sec.	35,0±2,1	47,3±2,3	<0,01
2	Genchy's test, sec.	19,9±1,8	28,3±1,9	<0,01
3	Lung vital capacity (LVC), l.	2,20±0,36	2,36±0,36	<0,05
4	Life index, ml/kg	42,0	45,6	<0,05*
5	Rufiet's index, conv. units	7,5	6,0	<0,01*
6	Ribinson's index, conv. units	89,2	81,2	<0,01*
7	Shapovalova's index, conv. units	128,8	150,8	<0,01*

* - validity of differences by π T-criterion of Manna-Witny.

Besides, the training effect of the used physical loads facilitated the growth of muscular system's power, that was reflected by the increase of Shapovalova's index more that by 17,9 %, ($p < 0,01$).

The study of special group pupils' nervous system peculiarities in the process of training program realization was also rather important. Determination of nervous system strength was conducted with the help of tapping test. At the beginning of semester all children showed low indicators of endurance, specific for weal nervous system. With executing of physical exercises complexes special attention was paid to arbitrary concentration of attention on senses, connected with the processes, which occurred in organism. Such concentration of attention ensured the growth of nerve cells' workability and nervous system's strength, that was reflected in increasing of the pace of the work, fulfilled by left hand by 24.2%, ($p < 0,01$), and by right hand – by 11,9 %, ($p < 0,01$).

Thus, application of Pilates's exercises, static yoga and body-oriented therapy in academic process of special health group pupils, promotes harmonization of physical development, increasing of general adapting activity and formation of motivation to health improvement.

Summary

1. Application of general preventive and therapeutic innovative means in academic process on physical education of special health group pupils manifests clear stimulating effect, which is connected with correction of physical development and functional possibilities of children's organisms.

2. The offered program of physical exercises facilitated development of children's supporting motor system and optimization of anthropometric parameters. The growth of skeleton muscles possibilities was followed by reduction of Kettle's II index up to 75 centale.

3. Regular fulfillment of physical exercises complexes, which include active and passive breathing exercises, correcting exercises, ensured transition of cardio-respiratory system to new functional level, which is characterized by the growth of adapting abilities. The growth of nerve cells' workability and nervous system's strength has also been fixed.

The further researches implicate introduction of the offered program of physical exercises in academic process of physical education of different age groups' pupils.

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