Original Article

Use of volleyball elements in PE classes for special medical group students

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Abstract

The article deals with the methodology of physical training with volleyball elements adequate for students with health restrictions included in special medical groups (SMG). During 2016-2018 102 students of various faculties of South Ural State University at the age of 16-21 years were examined. The article is aimed at substantiating the effective volleyball-based program for SMG students. The tendencies typical for volleyball classes are discussed, the content of which can vary due to the nosological heterogeneity of the groups. However, as a rule, such classes include game exercises that do not provoke a sudden change in heart rate.

Keywords: training technique, volleyball, heart rate, health restrictions, students.

Introduction

Currently, teachers working with students with disabilities have a cautious attitude to game exercises, in particular volleyball (Gilev, 2014). This can be explained by the difficulty of calculating physical activity due to high emotionality.

According to the results of medical examinations, the ratio of students was changing but at least 25% of them annually belonged to a special medical group and more than 30.8% of students had two or more health deviations. Students in the main and preparatory groups are considered “relatively healthy” (Viktorov, 2018). This trend significantly increases the importance of developing educational and methodological support of Physical Education for students from various medical groups. The discipline structure should be aimed at solving all the basic tasks of physical education in special medical groups (SMG), and meet their personal preferences and interests (Cherepov E.A., Eganov A.V., Aminova A.S., Savinykh E.Yu, 2019).

G.A. Mysina writes that such students usually demonstrate weak development of the basic motor qualities - endurance, strength, speed, which entails extremely low working capacity. Such students are not adapted to the specific loads associated with attending lectures, seminars and laboratory classes. The arising deficit of proprioceptive sensitivity reduces the ability of internal organs and systems to adapt their reactivity to external stimuli. Thus, additional prerequisites for repeated and concomitant diseases are created.

S.P. Evseeva writes that work with this category of students is concentrated in the field of adaptive physical education (APE), the main purpose of which is to ensure that students master the theoretical knowledge that underlies general and professional competencies. In practice, APE is characterized by poorly developed concepts and methods that do not correspond to working with students from SMG, since the main focus of APE is working with people with disabilities. SMG are intended for those who have health deviations subject to correction and even elimination.

Many authors consider it possible to organize the educational process based on sports specializations. The progressive mastery of skills in a particular sport encourages students to pursue independent studies for further performance enhancement, which is almost impossible to achieve if the only goal is to promote health.

In general, an analysis of the specialized literature shows that elements of team sports are widely used in recreational activities with people with disabilities (Poperekov, Buldakova, Bandakov, 2018). According to regulatory documents, game exercises are obligatory for PE classes. Moreover, their use for students with disabilities is provided by the departments of physical education taking into account the indications and contraindications for SMG students. However, there is a cautious attitude to the use of sports games in physical education classes with SMG students due to the game activity associated with the emotional component.

There are works that present research results confirming the positive impact of sports games on students with disabilities (Vishnevsky A.M., Dubrovsky V.I., Dembo A.G.). Outdoor games allow combining various components, change their conditions, etc.

In our opinion, the positive aspects of specialized education are connected with the fact that different facilities of various universities allow organizing classes at one or another sport at a more or less high level. However, there are some negative features of this approach. When choosing a specialty for a particular student, the student's desire and the absence of contraindications should be taken into account. Nevertheless, most

students are so poorly educated in physical education issues that they often cannot make their choice correctly, and after six months or a year they are disappointed, their interest in classes decreases, etc. (D.V. Viktorov, 2011).

However, none of the sources studied provided a specific methodology for the use of sports games for SMG students. At the same time, there are a large number of game exercises that can be used for SMG students to introduce diversity into such classes and increase the interest of students.

Repeated physical activity is the most typical for SMG students as it causes an increase in heart rate to an average of 110 bpm, which is 50% of the maximum heart rate instead of 75% recommended by experts. These figures are closely related to the development of such an important quality as endurance. Moreover, there are no fundamental objections to the development of this quality among SMG students due to the key role of physical activity in ensuring the effective functioning of body systems.

Material & methods

When studying the somatic status of SMG students, it was found that dysfunction of various systems was manifested in a decrease in physical performance and functional abilities, which affected well-being according to a number of subjective symptoms (Fyodorov AI, Erlikh VV, Khafizova A, Bendikova E., 2019). Therefore, the following measurements were used and indicators were calculated (Apanasenko, 1985):

1. Body Mass Index (BMI) allows assessing the correspondence between a person's body height and body weight and thereby indirectly assess whether the mass is insufficient, normal or excess. The greater the body weight of a person, the more the heart must work to provide all its tissues with the necessary amount of oxygenated blood both at rest and in stress conditions.

2. The vital index is calculated as $VC (ml)/m(kg)$. Vital capacity (VC) is the maximum amount of air that can be exhaled after a maximum inhalation. This indicator reflects the reserve capabilities of the respiratory system and its lability arising from the performance of various intensity. The ratio of VC to body weight shows the extent to which the lungs can provide oxygen to the whole body during exercise.

3. Strength index (dynamometry) is needed for a qualitative assessment of muscle strength. It is calculated as $F(kg)/m(kg) * 100\%$. Muscle strength is understood as the ability of muscles to overcome external resistance or to counteract it due to muscle effort. Muscle strength manifests itself in three main forms: maximum muscle strength (depends on the number and thickness of muscle fibers), speed strength and strength endurance.

4. Double product - $HR \times (AP_{syst}/100)$. The cardiovascular system (CVS) is the main physiological system of the body ensuring the maintenance of homeostasis and the delivery of nutrients and oxygen to all organs and tissues. At rest, the CVS works in its defined moderate mode satisfying the needs of the whole organism. With an increase in these needs an increase in heart performance is required.

5. Systolic blood pressure. This indicator depends on the following parameters: heart rate, changes in stroke volume, changes in the tone and resistance of peripheral vessels. With an increase in heart rate and SV, an increase in blood pressure occurs. As for peripheral vascular resistance: in energy-consuming tissues (muscle system), oxidation products accumulate and lead to vasodilation for greater blood flow.

6. Martine-Kushelevsky test (HR recovery time after 20 squats in 30 sec.). Under load the heart provides the necessary amount of blood to the required tissues due to an increase in heart rate. After load, the activity of the heart should return to its original level. The duration of recovery after increased heart function indicates cardiovascular performance reserve. The higher this reserve, the less time it takes the heart to restore the initial rhythm after an increased load.

The methodological support included the main techniques such as:

- reducing the duration of the game;
- introducing breaks in the game;
- reducing the dimensions of the playground;
- changing the number of participants in the game;
- modifying the conditions of the game in accordance with the players' health (changing the main player, finishing the game without achieving the final result if its duration exceeds the planned one, etc.);
- replacing game-related movements with less active ones;
- excluding short-term energy-consuming movements;
- the optimal amount of physical activity corresponded to 60-75% of the maximum heart rate.

In the autumn and spring periods, a quantitative calculation of the health indicators of SMG students was performed taking into account the reference values and deviations from them. The median value corresponds to 10 points. The formula for converting the measured values to a ten-point scale is as follows: $Oc = V - (((z - N) * 2.5) / R)$, where Oc is the value calculated using the formula. The calculated parameter already belongs to a ten-point scale. V is the upper limit of the interval in which the measured parameter belongs to a ten-point scale. Z is the measured parameter during the examination. N is the lower limit of the interval to which the measured parameter belongs. R is the difference between the upper and lower limits of the interval to which the measured parameter belongs. Calculation of these indicators allows the subject to establish the current health status: low

(I), below average (II), medium (III), above average (IV), high (V). The health status is determined by the sum of the points (Lobygina, 2017).

Participants

The study included 102 students with health restrictions of various faculties of South Ural State University at the age of 16-21 years and was carried out to study the specifics of physical education in practice. Classes with SMG students were carried out according to a phased structure, two lessons per week, regardless of the nosological diagnosis, which allowed to reduce the period of adaptation to physical activity and, thus, increase physical fitness. Game exercises that alter students' heart rate above 130 bpm were excluded.

Results

Research results for the autumn semester (health groups): I - 11%, II - 43%, III - 31%, IV - 15%, there were no students with a high level of health (Fig.).

In general, such an assessment showed an overall low level and similarity of the somatic status, which allowed us to conclude that the participants can be combined into one group to implement targeted nosological correction.

The results for the spring semester are significantly different from the first results (health groups): I - 9%, II - 23%, III - 34%, IV - 18%, V - 16%.

Fig. SMG students' level of health

According to the results obtained, a recommended heart rate under load not exceeds 110 bpm, which is 25% of the functional reserve of the heart. Permissible heart rate under long-term loads is 130 bpm, under short-term and intense loads - 150-160 bpm.

It is not recommended for students with disabilities to train aerobic and anaerobic mechanisms (heart rate 151-180 bpm) in the heart rate range from 130 to 150 bpm.

The nature of heart rate in students is directly dependent on diseases and changes in the following way: the highest heart rate is observed in a group of students with cardiovascular diseases, gastrointestinal tract diseases, the disorders of the musculoskeletal system, kidney, etc., and the lowest heart rate is typical for students with myopia.

Discussion

The data presented allow us to make an unambiguous conclusion that it is advisable to associate adaptation to the load not with supercompensation that requires at least three to four lessons per week but the mechanism of adaptive improvement of professionally important qualities. The study showed that improving the functional status of SMG students occurs most effectively during games of average intensity, which is consistent with the well-known position that the intensity of muscular work is at the level of 130-140 bpm is optimal for people with health restrictions. To improve the functional status of the body, the volume and intensity of physical activity for athletes should correspond to a heart rate of 150-170 bpm and for untrained persons - 130-150 bpm for 15-20 minutes. Such a pulse mode is most useful as it is the threshold of anaerobic metabolism while the accumulation of lactic acid in the body has not yet occurred.

Such power of muscular work contributes most to the increase in external respiration, blood circulation, blood oxygen capacity, etc.

In volleyball for SMG students it is recommended to focus on objective and informative criteria for assessing the response of the cardiovascular system to physical activity: if the pulse increased by 25 beats

compared to heart rate at rest it means that the work performed is of low intensity, by 45 beats - of medium, and by 75 beats - of high intensity.

Thus, the teacher must take into account not only the motor activity of the students but also monitor their well-being in terms of heart rate and individual features associated with a certain disease. This study provides a clear scheme for the use of specific forms (volleyball) of PE classes in the educational and everyday life of students.

Conclusions

Based on the proposed criteria, it is possible to develop training programs using sports games of various intensities (low, medium, high).

Students with health restrictions, especially when it comes to the diseases of the cardiovascular system, as well as those who missed practical classes for various reasons should assist classes of low intensity suitable for people characterized by significant mental and physical fatigue.

A gradual increase or decrease in load in the main part of the lesson is ensured by the following scheme: a game of medium intensity, followed by the game of high intensity, and then medium or high intensity, depending on the objectives of the lesson.

As observations show, these games cause a feeling of fear and insecurity when conducted for the first time. Therefore, it is not recommended to start a lesson with such games, especially in poorly prepared groups. First of all, games characterized by the absence of continuous physical activity should be mastered, since they are useful for students without progressive myopia, impaired motor skills or heart defects.

Games of high intensity can be offered to students with good physical fitness and diseases in remission. For such students active movements are not contraindicated, they can strengthen the cardiovascular and respiratory systems, and have a beneficial effect on the nervous system.

According to the results of the experiment, it is advisable to regularly use volleyball elements in the framework of physical education classes with SMG students in order to provide a positive effect on their somatic status, health, activity and mood.

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