Development of Methods for Performing a Set of Athletic Gymnastics Exercises for Engineering Students

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ABSTRACT

In the article the author deals with the problem of student youth rehabilitation suffering from postural disorders associated with insufficiently developed back muscles. The author offers a set of exercises in a gym and develops a methodology for performing this type of exercise for students. The results of the work were reflected in the methodological recommendations for students for practical exercises for 3rd year students of all areas of full-time training. This set of exercises is implemented on the basis of the sports complex “Neftyanik” in physical education classes at Surgut Branch of Tyumen Industrial University. Experiment participants - 3rd year students (2017-2018), direction “Oil and gas business”.

Keywords: PE, exercises, training, gym.

Introduction

The relevance of the topic of rehabilitation of youth by means of physical culture lies in the fact that in modern conditions more and more adolescents and young people are faced with the problem of deteriorating health: deterioration of vision, posture, vegetative-vascular system, etc. In this regard, the incidence of sickness not only among students, but also among young people employed in labor is sharply increasing.

The reasons for the deterioration of health are an insufficiently mobile lifestyle, underdevelopment of certain muscles of the back and abdomen, etc. (Melnikova & Lomakina, 2016; Demyanova, 2020).

All types and forms of diseases arise and develop in young people with poor health.

Rehabilitation of many diseases by means of physical culture has been devoted to many works of doctors, teachers, scientists. Gretz G.N. describes the method of physical rehabilitation of persons with disabilities and disabled people based on the use of physical culture and specialized training devices (Grets, 2008).

Narzulaev, S.B., Safroanova, I.N., & Petukhov, N.A. suggest in their work ways of social adaptation of persons with disabilities by means of physical culture and sports (Narzulaev et al, 2012).

Batyrev E.M. & Dorontsev A.V. proposed means of assessing the formation of skills in the prevention of morbidity by means of physical culture and sports among students of a medical university (Batyrev & Dorontsev, 2009).


Teachers pay special attention to the rehabilitation of young people with scoliosis. Scoliosis is one of the unresolved problems among young people.
Hristova T.E. and Fazulyanova M.V., & Pyagay L.P. offer a number of measures aimed at using physical culture means in the rehabilitation of children with scoliosis (Hristova, 2013; Fazulyanova, et al, 2019).

Shklyarenko A.P. theoretically substantiated the use of physical culture means for scoliotic disease in children and adolescents, based on the principles of mobilizing their own adaptive, protective and compensatory properties of a growing organism (Shklyarenko, 2017).


Such a multitude of works devoted to health rehabilitation with the help of physical education suggests that only medicine is powerless in the field of strengthening and preventing the health of the population, since the main link is the desire to lead a healthy lifestyle, its way (style) of life. Therefore, the problem of rehabilitation and prevention of youth health with the help of physical education goes beyond medical science and moves into the educational plane. We believe that the institute of higher education is a connecting and main link in physical education both in methodological and practical terms. One of the means of strengthening the back muscles and preventing scoliosis is athletic gymnastics (Novichkov & Sorokin, 2018; Ermakova & Pryanishnikova, 2020).

We believe strength training in a gym can achieve several goals. Under certain conditions, strength training will:
- to maximize the prevention of posture disorders, improve the functioning of internal organs, positively influence the state of the neuroendocrine and immune systems, and ensure the normalization of body weight;
- to increase muscle strength for its own sake, build muscle mass, improve body proportions. As a result, muscles increase their strength and volume, and the capabilities of the neuroendocrine and immune systems increase.

The relevance of the study allowed us to formulate the goal of the study - to develop a methodology for performing a preventive complex of athletic gymnastics exercises, strengthening back muscles in conditions of physical culture and sports classes at the TIU branch in Surgut.

**Methodology**

The prophylactic athletic set of exercises developed by us was introduced into the educational process of the TIU branch in Surgut. The participants in the experimental research work were 3-year students of the direction “Oil and Gas Business”, “Operation of Transport Technological Machines and Complexes”, the classes were held in the “Neftyanik” fitness and health complex during the 2017-2018 academic year. Classes were held 2 times a week, classes outside school hours, once a week in their free time and independent studies at home.

The proposed prophylactic set of exercises, the sequence of the implementation method was determined by the level of posture disorder, the general condition of the student.

Having analyzed the types of posture correction classifications, we identified the following groups:
- a system of physical exercises for the prevention of posture defects;
- exercises to improve the development of motor abilities in order to strengthen the muscle corset;
- exercises for the formation of correct posture.

**Results**

The prophylactic complex of athletics gymnastics we offer is used in strength training with or without shells, the main requirements are:
- weight of burden (or degree of muscle tension) - no more than 60-75% of the maximum;
- the speed and pace of movements are not limiting.

At the same time, the effectiveness of the development of strength abilities decreases but this is not a significant drawback, since the task of such classes is not the maximum development of strength abilities, but the improvement of the physical condition of the trainees.

In order to improve the efficiency of work with students, we have drawn up methodological recommendations (Ivanova, 2018) on the implementation of this type of set of exercises:

During the exercise, attention should be concentrated as much as possible on the working muscle group.
Breathing during the entire complex is performed strictly through the nose, deeply, without delay, with the maximum use of the muscles of the diaphragm (breathing “belly”). When lifting the projectile, exhale, when lowering, inhale.

Stretching the muscles in the form of stretching is performed, as a rule, before working out the muscles (to warm up and increase their elasticity, increase joint mobility). The use of stretching immediately after working out this muscle group is not recommended (so as not to increase muscle microtrauma). This recommendation does not apply to post-workout relaxation.
At the beginning of the lesson, it is more often recommended to use exercises for large muscle groups - the so-called basic exercises (for example, squats with a barbell, deadlift, bench press, exercises on the press and back, etc.), and at the end - local in which small muscle groups are involved.

Give preference to more natural exercise. For example, pull-ups on the bar, and not the isolated study of the biceps and broadest muscles on simulators; squatting with a barbell, and not extending the legs on a block trainer, etc.

The training effect is not the number of repetitions and the weight of the apparatus, but metabolic changes in the muscles and the nervous system during exercise, which are most directly related to the amount of voluntary tension and the degree of muscle fatigue. Therefore, the ability of trainees to independently manage the load based on their own feelings (the amount of voluntary stress, the degree of muscle fatigue) is a fundamentally important component of their physical culture education, which remains the property of a person for life.

In accordance with these recommendations, we offer students the following preventive complex of athletic gymnastics in order to improve the posture of students in the gym (Ivanova, 2018). Within the framework of this article, it is impossible to cover the entire range of exercises and describe the methodology for performing each exercise, therefore we offer one type of exercise for each muscle group.

**Table 1. A set of athletic gymnastics exercises. Exercise technique**

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<thead>
<tr>
<th>Type</th>
<th>Title</th>
<th>Exercise technique</th>
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<tr>
<td>Exercises for chest muscles</td>
<td>Dumbbell press on a bench with an upward slope</td>
<td>A dumbbell bench press from an upward bend develops the top and inner edge of the pectoralis major muscle, a shaping exercise, thickens and shapes the upper chest. Raise the bench back 30-45° from the horizontal. Lie on a bench, place your feet wider than your shoulders and rest them on the floor. Hips, shoulders and head are pressed against the bench. Take the dumbbells with an overhead grip and lift them to shoulder level (closer to the deltas). Throughout the exercise, your palms should look in the same direction as your gaze - straight up. This is the starting position (bottom point). Take a deep breath and, holding your breath, squeeze the dumbbells up so that at the top point they are exactly over the shoulders. The elbows move strictly in the plane of the shoulders and are always directed to the sides. After overcoming the most difficult part of the climb, exhale. At the top, the arms are fully extended, and the dumbbells are located strictly above the shoulders. Pause and tighten your chest muscles even more. Then take a deep breath and, holding your breath, lower the dumbbells to your shoulders. As soon as the dumbbells reach shoulder level, without stopping, immediately change the direction of movement and squeeze the dumbbells up again.</td>
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<td>Exercises for biceps and forearms</td>
<td>Dumbbell biceps curl on Scott’s bench</td>
<td>The Scott Bench Dumbbell Curl develops the mid and low biceps, an isolation exercise that lengthens the bottom and raises the peak of the biceps. You can perform the exercise both sitting and standing. The main thing is to adjust the height of the music stand (an inclined rest for the upper arms) so that when the barbell is lifted, the torso is always straightened, and the torso is in an upright and stable position. Take an EZ barbell (its neck resembles the letter Z) or a dumbbell with a bottom grip. Sit on the Scott bench press and press your upper arms (triceps) firmly against the music stand. Lower the barbell and bend your elbows slightly. The elbows are placed on the music rest, closer to the bottom edge and should always remain motionless. Take a deep breath and hold your breath. Tighten your biceps and lift the bar up. As soon as your forearms are upright, exhale, stop for a moment, and tighten your biceps even more. Smoothly lower the barbell until your arms are almost fully extended. Pause briefly and start the next repetition.</td>
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<td>Triceps exercises</td>
<td>Press to the bottom in the block machine. Press to the bottom in the block trainer develops the lateral (lateral), as well as the long head of the triceps, forming an exercise, highlighting the lateral part of the triceps. Attach the rope handle to the cable passing through the upper block. Step back a little from the machine and grab the handle with a neutral grip (palms facing each other). Place your feet parallel or apart, taking a small step backward with one leg. Slightly (10-15°) tilt your torso toward the machine and extend your elbows slightly forward. In the initial position, the cable is taut, and the hands are located approximately at shoulder level. Keeping your elbows as close to your sides as possible, take a deep breath and, holding your breath, straighten your arms down. Do not move your elbows, bend forward, or squat throughout the exercise. The upper arms, torso and legs remain stationary for the rest of the set. Extending your arms down, pay attention: as soon as the little fingers are below the elbows, begin to smoothly unfold the hands and spread the handles to the sides so that when you fully straighten your arms, your palms are directed towards your hips. Fully straightening your arms (the top point of the exercise), exhale and fix this position for a couple of moments. Smoothly bending your arms, let the handle rise up to a position where the hands are just above the elbows (the lowest point of the exercise), and proceed to the next repetition.</td>
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<td>Wide-grip vertical row</td>
<td>The wide-grip vertical row works on the top of the latissimus dorsi, traps, and rhomboids to form the exercise, width and mass of the upper back. Adjust the height of the horizontal row block machine leg bolsters to keep your thighs firmly in place and keep them from coming off the bench during the exercise. The pelvis should be positioned on the seat so that the top block and bar are in front of the chest (not directly overhead). Lift up slightly, grab the ends of the long bar with an overhand grip, pull the bar down, sit on the machine seat, and place your hips under the rollers. Starting position: The torso and arms are fully extended and the shoulders are raised. The position of the torso resembles the letter &quot;U&quot;. The hips are firmly fixed between the seat and the bolsters, the feet rest on the floor. Tighten the lumbar muscles and do not relax them until the end of the set - it is they who ensure the retention of the trunk in a straightened position. Take a deep breath and hold your breath. Tighten your lats and, bringing your shoulder blades together, pull the bar straight down. The elbows move strictly parallel along the sides and are directed back and to the sides. When the bar is at shoulder level, pause and tighten your lats even more. Gently return the bar to its original position. Pause again at the top to help stretch your latissimus dorsi better. Proceed to the next repetition.</td>
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<td>Deltoid Exercises</td>
<td>Standing dumbbell breeding works on the middle deltas, supraspinatus muscle and trapezius, shaping exercise, shape, relief and shoulder width. Stand with your feet shoulder-width apart or slightly wider, take dumbbells and stand straight. The arms are straight and slightly relaxed, the dumbbells &quot;hang&quot; on the sides of the hips, slightly turned inward, the gaze is directed forward. This is the starting position. Take a deep breath and, holding your breath, tighten the middle deltas, raise your arms across the sides in a strictly vertical plane passing over the shoulders. Beginning to lift the dumbbells, bend your arms slightly and keep them fixed at the elbows until the end of the set. It is unacceptable to bend and unbend the arms during the exercise. Having reached the top point (dumbbells at shoulder level or slightly higher), exhale, gently lower the dumbbells to the hips and immediately, without any stop, start the next repetition. Exercise at an emphatically moderate pace.</td>
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<td>Leg press</td>
<td>In the initial position, the feet are shoulder-width apart in the middle of the platform, the toes are slightly turned outward. This is the most advantageous position for the exercise. Sit comfortably on the seat, rest your back against the backrest, squeeze the platform up and lower the levers that fix it. Hold tightly to the handles on the sides of the seat, give the torso stable position. Slowly lower the platform with the weight down, bending your legs. In the final position, the angle at the knees should be about 90 degrees (knees almost rested against the chest). Make sure that the lower back or, moreover, the buttocks do not lose contact with the seat. This puts stress on the back. Lowering the weight to the end, squeeze it back up, until the legs are almost fully extended. Almost, because, firstly, this forces the knees to bend in the opposite direction, and, second, relaxes the quadriceps at the end point, which reduces intramuscular stimulation. In the top position, a short pause, and repeat.</td>
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The main condition for working in the gym is the safety of life and activities of students. Therefore, at the first stage of work, we gave instructions on the safety and security of training in the gym, students take a safety test individually.

In addition, under the guidance of a teacher, students get acquainted with the methods of performing exercises on simulators, individually receive advice from a teacher and keep a training diary.

The training exercise diary includes information about the number of exercises performed in the classroom per week, the number of sessions per week, information about the state of health.

**Table 2. Sample Student Training Diary**

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<th>№</th>
<th>Exercise type</th>
<th>Date / number of exercises</th>
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The use of such a methodology for conducting classes allows you to improve the effectiveness of various sports movements, improve the results in the physical health of young people, in our case, improve the posture of students. In cases where a competitive exercise requires overcoming maximum or near maximum external resistance (barbell, wrestling), then the training uses, for example, the weight of weights, which is 80-100% of the maximum strength, as well as such muscle work modes that, in addition to training neuromuscular factors in the manifestation of strength contribute to an increase in the mass of certain muscle groups.

If the resistances are small, then exercises are used in which the muscles work in the maximum "explosive" mode, develop the maximum speed of shortening, or experience extreme loads "to break" in the amortization phases of movements.

Conclusions

Within the framework of this study, the goal of developing a methodology for performing a preventive complex of athletic gymnastics exercises, strengthening back muscles in conditions of physical culture and sports classes at the TIU branch in Surgut were achieved. Students note an improvement in posture, abdominal muscles, and back, note the disappearance of back pain, increased interest and motivation for sports.

At the beginning of the experiment, most of the students noted deviations in posture, pain during flexion, extension in the frontal plane, and when turning in each direction. At the end of the experiment, these indicators had improved.

In the prospect of the study, we note the need on the part of our university to create conditions for the rehabilitation of students with the help of physical education, suffering from flat feet, low vision and other diseases.

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