DEVELOPMENT OF PHYSICAL QUALITIES AMONG 20-22 YEARS OLD GOALBALL PLAYERS

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Annotation. The results of the study of the methodology aimed at the development of the physical qualities of goalball players, which consisted in the use of exercises in facilitated and complicated conditions, are presented. The study involved 24 athletes, aged 20-22 years. The results of the study showed a statistically significant improvement in all indicators in athletes of the experimental group, which allows us to state the positive and effective application of the experimental methodology for developing physical qualities.

Introduction. Currently, all over the world, goalball is gaining a universal popularity among people with disabilities. Goalball is a sports game developed for people with visual impairment. Rules of this game imply getting the ball to the opponent’s gates, which have a built-in bell, with a team of three people.

As a new type of Paralympic sports, goalball is the most available type. In order to perform technical moves within the process of the in-game activity, a certain level of physical fitness of goalball players is required. To throw a ball, strength of arm muscles is developed, to perform in-game technical and tactical actions it is necessary to develop motor and coordination abilities. Insufficiently developed flexibility can complicate an action of throwing a ball while moving the hand up then back and back, a higher movement amplitude of the joint and ligamentous apparatus of the shoulder is necessary, in order to move fast across the goalball ground speed-related abilities are important and the cardiovascular system is needed to be trained as well [3, 5].

The analysis of scientific and methodological literature allowed structuring fragmented material on the development of physical qualities of a goalball player [6]. Information about usage of a percentage ratio of exercises aimed at the development of physical qualities of a goalball player were summarized in order to
identify the state of the examined issue and its significance in the process of a goalball player’s training [7].

Insufficient development of theory and methodology of basics in the goalball training and absence of specific literature on goalball players’ training determines the relevance of our research.

The purpose of this study is to develop and justify methodology of the development of physical qualities for 20-22 years old goalball players.

**Methods and organization.** Features of in-game activity have special requirements to the physical fitness of a beginner athlete.

Physical fitness of an athlete in goalball is fulfilled through the aspect of showing speed- and power-related qualities (explosive strength) during performance of technical moves. When throwing the ball, speed and power-related abilities of an athlete are manifested to a greater extent during the throwing phase and giving the right direction of a ball’s trajectory. Speed- and power-related qualities are also needed to perform series of throws in the state of exhaustion, which is a high-intensity motor activity. The speed of the ball's flight and its distance to the side of the opponent's playing court are considered as an indicator of the effectiveness of a series of throws. Both of these parameters require presenting a high level of speed- and power-related fitness of an athlete [1, 4].

The most important factor of the effectiveness of in-game actions in goalball is the ability of an athlete to perform complicated coordination movements and show their agility. Ball reception, which is a standard action in its structure, requires presenting one of the most important aspects of agility – space-related precision of movements. Moreover, the ball reception in whole is composed of the space-related precision of performance of various phases.

Modern technique of throwing a ball, regardless of the chosen method, requires a sufficient level of flexibility development, especially in the aspect of shoulder flexibility. The last aspect allows a player to take a needed position, which contributes to the precise throw of a ball to an indicated landmark.

Physical exercises appear to be the most effective in the process of training activity of a goalball player. At the same time, it is advisable to note the fact that the most effective method is the one, which is based on motor activity with numerous repeat of learned movements. The purpose of this method is to improve certain abilities in goalball players with visual impairment.

Method of voice control is used during the training activity of goalball players. The coach is located at a certain distance and gives following commands: “number one, move to the right”, “number two, move to the left”, “number three, move forward, back” etc.
To a goalball player with visual impairment, the use of audio information and signals is an integral part of their training. In most special exercises with a ball, a sound appears when a ball interacts with a surface, which allows to get an idea about movements of an object. Sounds are used as conditional signals, which replace visual imagery.

Twenty-four goalball players and seven coaches participated in our study. During the pedagogical experiment, an effectiveness of the methodology of the development of physical qualities in 20-22 years old goalball players was experimentally tested and justified. Participants were divided into two groups: experimental and control group, 12 goalball players each. Intensity of training session in the groups was three times a week.

Control measurements of the level of physical fitness, flexibility of the nervous system and flexibility of articular joints were carried out both at the beginning and at the end of the experiment.

In order to solve the set tasks, we used following methods: analysis of literature sources, pedagogical experiment, monitoring tests, methods of mathematical statistics.

The purpose of a questionnaire was to identify opinion of specialists in goalball about using the percentage ratio of exercises aimed at the development of physical qualities of a goalball player in sports activity, which, in their opinion, should be included in the structure of physical training. Seven coaches of the 1st and 2nd qualification with a working experience of not less than 5 years answered to the suggested questions. Results of the questionnaire allowed determining the most significant physical qualities.

Thus, endurance took the first place according to coaches’ opinion – 39,2%, 66,6% of them consider coordination endurance as the most significant quality, 33,4% of them consider general endurance. The second place was taken by coordination abilities according to the opinion of 21,5% of coaches, 62,5% of them assume that it is important to develop the sense of time and space, as well as the muscular sense, 37,5% of them stated the need to develop an ability to hold a steady position of your body (balance). 19,4% of interviewed coaches considered power-related abilities as the third quality in its significance, 47,1% of them laid emphasis on power-related abilities, 29,4% of them pointed out speed- and power-related abilities, 23,5% of them – power endurance. The fourth place was taken by flexibility (12,4% of coaches), the fifth place – by quickness (7,5%). While choosing the most effective measures in the development of physical qualities, opinions were separated: 49,3% of coaches think that exercises, which develop motor coordination, would be the most effective, 38,7% of them think that exercises
requiring comprehensive presentation of physical qualities would do a better job in the development of physical qualities.

When answering to the question on how much time in the training process is needed for exercises aimed at the development of physical qualities in 20-22 years old goalball players, following opinions were registered: 40.3% of time should be dedicated to endurance, 26.6% of time – to coordination abilities.

The conducted questionnaire on the issue of the physical qualities development for goalball players allowed to reveal that the most important physical quality for development is general and special endurance. The next significant quality are coordination abilities, which is followed by power-related abilities, flexibility and speed-related abilities.

To increase the physical fitness of athletes we developed the methodology of the physical qualities development, which is implemented during training sessions. Volume of week loads was 6 hours. Training sessions were held 3 times a week.

Exercises suggested below were performed at the first, second and the third day of the week micro cycle during the preparatory period. Every day of training has its own direction, which develops motor qualities with inclusion of exercises in relaxed and complicated conditions:

- First day – exercises aimed at the development of speed-related and coordination abilities, as well as exercises for acoustic analyzer training;
- Second day – exercises aimed at the development of power-related abilities and flexibility;
- Third day – exercises aimed at the development of endurance.

40% of time are dedicated to the first and second training. 70% of time are dedicated to the third training.

Content of the first day included sets of physical exercises aimed at the development of speed-related abilities.

Subjects were suggested a set of physical exercises aimed at the development of speed-related qualities. At the same time, this set implies alteration of speed-related exercises in relaxed, average and complicated conditions. Period of time, dedicated to the performance of exercises, should not be longer than 20-22 seconds. It is necessary to take into account the contingent of test subjects, rest intervals should also adjusted appropriately. While goalball players were crossing the distance of 30 and 100 meters, we identified an appropriate interval, which is a period of time needed until full recovery. At the same time, it should be mentioned that rest within intervals should be active, implying all possible physical exercises, which do not require much energy.
Repeating method was chosen as the main method in the development of speed-related abilities. Exercises developing speed-related abilities were performed with a dosage of 3-4 times.

In order to develop coordination abilities, following exercises were applied: throwing (ballistic) exercises with a ball, exercises aimed at the development of space orientation. Exercises on the development of coordination abilities were performed with a dosage of 3-4 times.

Contents of the second day included sets of physical exercises aimed at the development of power and flexibility.

Exercises with a 1 kg stuffed ball with visual monitoring, exercises with dumbbells developing strength of muscles of the pectoral girdle were suggested to develop power. Exercises developing power-related abilities were performed with a dosage of 8-12 times in two sets.

In order to develop flexibility, we enhanced the set of physical exercises developing the pectoral girdle according to revealed studies.

The set of physical exercises, aimed at the development of special flexibility, was structured the following way:
- the first part of physical exercises is performed near the support with a rubber tourniquet;
- the second part of the set includes physical exercises while sitting and lying on the floor with a partner. Exercises were performed with a dosage of 16-18 times.

Contents of the third day included sets of physical exercises aimed at the development of general endurance with the use of external weights (weighted belt and wristbands) and special endurance with the use of an instable surface and acrobatic exercises.

According to data from the questionnaire, we dedicated 50% of the time to coordination endurance within the main part of the training. Physical exercises aimed at the development of general endurance were dedicated 20% of the time within the preparatory stage of the training.

In order for goalball players to develop general endurance, running on average tempo 5-8 to 25-30 minutes long was suggested. Heart rate was maintained within the limits of 120-140 beats per minute. Moreover, goalball players were suggested to use weights in the form of 0,5 kg weighted belts and 0,2 kg wristbands. Later general endurance was increased through steady and alternating running.

Following exercises were used in order to develop coordination endurance: exercises on an instable surface and acrobatic exercises. Every exercise was performed with a dosage of 8-12 times.

Learning and performance of physical exercises was carried out according to a degree of their difficulty based on the “easy-to-hard” principle.
Results and discussion. During the pedagogical experiment, indicators of examined physical qualities of goalball players of the experimental and control groups were increased in all examined indicators at $p \leq 0.05$ (Table 1).

Table 1

<table>
<thead>
<tr>
<th>№</th>
<th>Tests</th>
<th>Groups</th>
<th>t</th>
<th>P</th>
<th>Growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standing long jump (cm)</td>
<td>control $M \pm m$</td>
<td></td>
<td></td>
<td>4,91</td>
</tr>
<tr>
<td></td>
<td></td>
<td>experimental $M \pm m$</td>
<td>5,96</td>
<td>$\leq 0.05$</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>From the supine position, arms on the nape, feet fixed, transition to the sitting position (number of repetitions)</td>
<td>control $M \pm m$</td>
<td></td>
<td></td>
<td>10,64</td>
</tr>
<tr>
<td></td>
<td></td>
<td>experimental $M \pm m$</td>
<td>5,10</td>
<td>$\leq 0.05$</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2000 m running (s)</td>
<td>control $M \pm m$</td>
<td></td>
<td></td>
<td>7,75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>experimental $M \pm m$</td>
<td>5,4</td>
<td>$\leq 0.01$</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Arm-pumping exercises in the prone position on the gymnastic bench (number of repetitions)</td>
<td>control $M \pm m$</td>
<td></td>
<td></td>
<td>13,43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>experimental $M \pm m$</td>
<td>2,66</td>
<td>$\leq 0.05$</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>10X10 shuttle run (s)</td>
<td>control $M \pm m$</td>
<td></td>
<td></td>
<td>10,71</td>
</tr>
<tr>
<td></td>
<td></td>
<td>experimental $M \pm m$</td>
<td>2,21</td>
<td>$\leq 0.05$</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Flexibility in shoulder joint during extension of muscles</td>
<td>control $M \pm m$</td>
<td></td>
<td></td>
<td>26,37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>experimental $M \pm m$</td>
<td>4,33</td>
<td>$\leq 0.05$</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Flexibility in shoulder joint in the squat position, arms on the nape</td>
<td>control $M \pm m$</td>
<td></td>
<td></td>
<td>3,58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>experimental $M \pm m$</td>
<td>5,98</td>
<td>$\leq 0.05$</td>
<td></td>
</tr>
</tbody>
</table>

Thus, during the experiment, the effectiveness of the developed methodology of the development of physical qualities in 20-22 years old goalball players was justified and proved. As a result of the conducted experiment, a sustainable improvement of indicators ($p \leq 0.05$) was registered in the following muscle endurance exercises:

- standing long jump;
- transition to the sitting position from the supine position, arms on the nape, feet fixed;
- 2000 m running;
- arm-pumping exercises in the prone position on the gymnastic bench;
- 10X10 shuttle run;
- flexibility in shoulder joint during extension of muscles
- flexibility in shoulder joint in the squat position, arms on the nape.

Conclusion. Performed muscle endurance exercises at the end of the study showed a positive tendency of the transition of goalball players of the experimental group from one level of physical fitness into another, which allows to state the
positive and effective use of the experimental methodology, which develops physical qualities using exercises performed in relaxed and complicated conditions.

References


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