Study of the effectiveness of using classes with Aqua Jogging in the training process of gymnasts 15-17 years

Yuliia Golenkova1ABCD*, Anna Hontar2ABCD, Anton Holenkov2ABCD, Dmytro Vysotskiy1ABCD

1 Department of Sports and Pedagogical Disciplines and Fitness, H.S. Skovoroda Kharkiv National Pedagogical University, Kharkiv, Ukraine
2 Department of Education and Innovative Pedagogy, H.S. Skovoroda Kharkiv National Pedagogical University, Kharkiv, Ukraine

How to cite

Abstract

Background and purpose
In order to improve the training process of gymnasts 15-17 years and the search for new means of physical training, the use of classes with Aqua Jogging was investigated to identify their effectiveness on the functional state of the occupants. Purpose: to identify the effectiveness of using classes with aqua jogging in the training process of gymnasts 15-17 years old.

Material and methods
The research was conducted on the basis of the “Kharkiv City” sports club from October 2022 to November 2023. We examined 12 female gymnasts aged 15-17 years who were engaged in Aqua Jogging 1 once a week for six months according to an experimental program developed by the researcher.

During the study, the following methods were used: general scientific - analysis of literary and documentary sources; psychological and pedagogical - observations, conversations, interviewing, testing, questioning; physiological - determination of heart rate (HR), Stange and Genchi tests, reactionometry, Romberg test; mathematical and statistical analysis, determination of the Student’s test.

Results
Modern research is constantly searching for new means of physical training in artistic gymnastics and increasing the functional capabilities of female athletes. Taking into account the specifics of the sport, complexes with Aqua Jogging were developed, which used exercises with objects, stretching exercises, running and jumping exercises in water. Conducting training according to the developed Aqua Jogging system contributed to the improvement of the indicators of the functional state of the research gymnasts. In girls, significant improvements in the performance of the Stange test were noted by 12.2 s (p<0.05); samples of Genchi for 5.1 s. (p<0.05). Other indicators tend to change in the direction of improvement: heart rate by 1.5 bpm. (p>0.05); the indicator of the reactometry test by 1.5 cm (p>0.05) and the Romberg test by 12.1 s. (p>0.05), but they turned out to be statistically improbable.

Conclusions
The use of the developed training system with Aqua Jogging in the educational and training process in artistic gymnastics for girls aged 15-17 years contributed to the improvement of the indicators of the functional state of the research gymnasts. In girls, significant improvements in the performance of the Stange test were noted (p<0.05); and samples of Genchi (p<0.05). Other indicators tend to change in the direction of improvement: heart rate (p>0.05); the indicator of the reactometry test (p>0.05) and the Romberg test (p>0.05), but they turned out to be statistically improbable. The obtained data allow trainers to expand the arsenal of means of exercises in water for the development and improvement of the functional capabilities of the athletes’ bodies during the educational and training process.

Keywords: gymnastics, Aqua fitness, functional state
Анотація

ІЮлія Голенкова, Анна Гонтар, Антон Голенков, Дмитро Висотський. Дослідження ефективності використання занять з Aqua Jogging у тренувальному процесі гімнасток 15-17 років

Обґрунтування і мета

З метою удосконалення тренувального процесу гімнасток 15-17 років та пошуку нових засобів фізичної підготовки досліджено використання заняття з Aqua Jogging для виявлення їх ефективності на функціональний стан учнів.

Мета: виявити ефективність використання заняття з aqua jogging у тренувальному процесі гімнасток 15-17 років.

Матеріал і методи

Дослідження проводились на базі спортивного клубу «Kharkiv City» у період з жовтня 2022 року по листопад 2023 року. Обстежено 12 дівчат гімнасток віком 15-17 років, які займались Aqua Jogging 1 раз на тиждень протягом шести місяців за експериментальною програмою, розробленою дослідником.

У процесі проведення дослідження були використані методи: загальнонаукові – аналіз літературних і документальних джерел; психолого-педагогічні – спостереження, бесіди, інтерв’ювання, тестування, анкетування; фізіологічні – визначення частоти серцевих скорочень (ЧСС), проби Штанге і Генчі, реакціометрія, проба Ромберга; математично-статистичний аналіз, визначення критерію Стьюдента.

Результати

В сучасних дослідженнях постійно ведеться пошук нових засобів фізичної підготовки в художній гімнастиці та підвищення функціональних можливостей спортсменок. За рахунок специфіки виду спорту були розроблені комплекси з Aqua Jogging, в яких використовувались вправи з предметами, вправи на розтягування, бігові та стрибкові вправи у воді. Проведення тренування за розробленою системою Aqua Jogging сприяло поліпшенню показників функціонального стану досліджувальних гімнасток. У дівчат відмічаються достовірні покращення показників проби Штанге на 12,2 с (р<0,05); проби Генчі на 5,1 с. (р<0,05). Інші показники мають тенденцію зміни в бік покращення: частота серцевих скорочень на 1,5 уд/хв. (р>0,05); показник тесту на швидкість реакції на 1.5 см. (р>0,05) та проби Ромберга на 12,1 с. (р>0,05), але вони виявилися статистично невірогідними.

Висновки

Застосування в навчально-тренувальному процесі в художній гімнастиці для дівчат віком 15-17 років розробленої системи тренувань з Aqua Jogging сприяло поліпшенню показників функціонального стану гімнасток. У дівчат відмічаються достовірні покращення показників проби Штанге (р<0,05); проби Генчі (р<0,05). Інші показники мають тенденцію зміни в бік покращення: частота серцевих скорочень (р>0,05); показник тесту на швидкість реакції (р<0,05) та проби Ромберга (р<0,05), але вони виявилися статистично невірогідними.

Отримані дані дають змогу тренерам розширити арсенал засобів вправ у воді для розвитку і вдосконалення функціональних можливостей організму спортсменів під час навчально-тренувального процесу.

Ключові слова: гімнастика художня, аква-фітнес, функціональний стан
Introductions

In the conditions of constant development of sports science and practice, scientists have devoted their attention to the search and implementation of new techniques and tools in the training process of rhythmic gymnastics. Aimed at improving technology and the physical and psychological training of athletes, these studies have become an advanced step in the use of new training tools [1-6].

To date, the problems of injury, stress, insufficient rest, and shortcomings in the training process affect the development of physical abilities and functional capabilities of gymnasts. These problems require a systematic approach to solve them, including new approaches to organizing the training process to help gymnasts reach their full potential. Swimming is one of the popular mass sports where all muscle groups of the body work. It has a positive effect on the development of coordination, and endurance, strengthens the body, and increases its motor and functional capabilities [7,8].

Modern achievements of specialists studying the problem of rhythmic gymnastics development, and improvement of the training process are aimed at updating the methods of development of flexibility, coordination abilities, endurance, and functional capabilities of the organism [9].

As we know, running is a great exercise for the cardiovascular system. But it has a huge drawback - it is also harmful to your body. Surveys show that most gymnasts choose running to maintain fitness and develop endurance, but proper running needs to be learned, systematically and regularly run. Cardio loads are extremely useful for athletes and positively affect the cardiovascular and respiratory system, physical condition, and well-being [9,10].

Aquafitness is a leisure activity for the population of different ages and levels of fitness, which involves solving health, developmental and educational tasks. A variety of traditional and non-traditional swimming equipment, equipment, games and fun are used in the water. The phenomenon is that swimming is generally considered one of the healthiest sports and an excellent form of physical recreation and recovery [12-15].

The possibilities of using exercises in water, including Agua Jogging, in physical education are reflected in the authors' research [15,16]. The proven importance of water types of physical culture and sports and the development of aqua aerobics as one of the forms of recreation and health technologies and its impact on the female body.

This is a unique combination of running and swimming, which affects the improvement of the work of the cardiovascular system, endurance, and the development of the body's functional capabilities. Activities in the water simultaneously reduce the load on the musculoskeletal system compared to running on the road [17,18].

The purpose of the research is to experimentally substantiate the effectiveness of using aqua jogging classes in the training process of 15-17-year-old gymnasts.

Material and methods

Participants

The research was conducted on the basis of the Kharkiv City sports club from October 2022 to November 2023. We examined 12 female gymnasts aged 15-17 years who were engaged in Aqua Jogging once a week for six months according to an experimental program developed by the researcher.

Procedure

The study involved 12 girls aged 15-17 years, engaged in rhythmic gymnastics. The subjects were treated with Aqua Jogging once a week for six months according to an experimental program developed by the researcher. The management of the sports club "Kharkiv City," the participants of the experiment, and their parents were informed and agreed to participate in this experiment.

The study was conducted in several stages. The first stage consisted of studying, analyzing, and summarizing literary sources and regulatory documents on the current state of the training process in rhythmic gymnastics and the use of training in water, including Aqua Jogging, in working with gymnasts aged 15-17 years (theoretical section of the work).

The second stage was devoted to studying the process of changing the functional state of athletes during classes using training with Aqua Jogging. We implemented a training program with Aqua Jogging. At the beginning and at the end of the classes, functional samples were taken from the subjects, in particular heart rate, Stange, Genchi, reactionometry, and Romberg's test. The classes were conducted by the researcher according to the schedule of training sessions.

The third stage involved statistical processing
of the results of the experiment, analysis of the results of the study, and formulation of conclusions.

**The methods for determining the effectiveness of Aqua Jogging in the training process in rhythmic gymnastics**

For Aqua Jogging classes with gymnasts, complexes were developed. The structure of the Aqua Jogging class consisted of the following parts:

1. Warm-up. The initial stage of the lesson, during which a general warm-up was carried out, prepares the body for physical activity.

2. The main part (exercises in the pool). At this stage, specific Aqua Jogging exercises in water are carried out. The main idea of Aqua Jogging is to simulate running in place in water, where water creates additional resistance to muscles. Exercises may include running in place with knees raised, running with legs raised high, steps to the side, hand and foot movements to increase resistance and other exercises. The pace and intensity of the lesson were consistent with the level of physical fitness of the study participants. Classes were aimed at the development of aerobic endurance, strength, and flexibility.

During Aqua Jogging, special swimming belts were used to help maintain buoyancy and stability during exercise. This allowed participants to focus on the correct technical execution of movements and get more benefit from the Aqua Jogging lesson.

An important aspect of Aqua Jogging is breathing control. Participants should ensure uniform and deep breathing, corresponding to the rhythm of movements in the water. This helped to maintain an effective oxygen exchange and improve energy processes in the body.

3. The final part. After completing the main part of Aqua Jogging, final relaxation and recovery exercises (smooth movements in the water, light stretching and breathing exercises aimed at calming the body and returning to a calm state) were carried out.

The following methods were used during the study:
- general scientific - analysis of literary and documentary sources;
- psychological and pedagogical - observations, conversations, interviewing, testing, questioning;
- physiological - determination of heart rate (HR), Stange and Genchi tests, reactionometry, Romberg test;
- mathematical and statistical analysis, determination of the Student's t-test.

Heart rate (heart rate) most fully reflects the functional state of the cardiovascular system. During exercise with high training, the heart rate reaches 180-200 bpm. In a state of acute fatigue in comparison with calm, it increases 1.5-2 times.

Stange's test is a delay in breathing in. The subject in the standing position takes a breath, then a deep exhale inhales again (80-90% of the maximum), and closes his mouth. The time of breath delay is noted. With fatigue, the delay time is sharply reduced. In healthy, but untrained persons, the hour of breath holding varies in men within 40-60 seconds. and in women 30-40 sec. In athletes, the indicator increases to 60-120 seconds. in men and up to 40-95 sec. in women.

The Genchi test is a delay in breathing out. With fatigue, the breath delay time decreases sharply. Algorithm of respiratory tests:
- before measurement, it is recommended to perform three complete inhalation-exhalation cycles at approximately 3/4 of the depth of total inhalation;
- if a barbell test is performed, hold a breath. Genchi test is carried out at full exhalation;

using a stopwatch, the breath-holding time is measured;
- the level of oxygen supply of the body is estimated by the following indicators: breath holding on inhalation (barbell test) for 50 seconds and above - "excellent," 40-50 seconds - "good".

**Statistical analysis**

The obtained test results during the study were analyzed using standard methods of mathematical statistics. For each indicator, the mean (X), standard deviation (S), and coefficient of variation (V) were calculated and the probability of differences between the initial and final estates was estimated using Student's t-test with the corresponding probability level (p). To process the received data, the Microsoft Excel programs "Data Analysis" and SPSS were used. Differences were considered significant at a significance level of p< 0.05.

**Results**

When introducing Aqua Jogging classes into the training process, positive dynamics of changes in the functional state of gymnasts were noted. Below are diagrams for visual comparison
of test results at the beginning and at the end of the experiment (Figure 1,2).

The use of classes with Aqua Jogging contributed to a likely improvement in indicators such as the Stange test by 12.2 s (p < 0.05); Genchi test by 5.1 s (p < 0.05). Heart rate values of 1.5 bpm were also positive (p > 0.05); the reactionometry parameters at 1.5cm (p > 0.05) and the Romberg test at 12.1s (p > 0.05), but they were not statistically probable (Table 1).

Positive changes in the testing rates of gymnasts occurred due to physical activity in the aquatic environment and specially selected exercises used in training with Aqua Jogging.

It should be noted that all measured indicators of functional state correspond to the age norms of the study participants. However, the likely increase in these indicators may be due to the use of special exercises during training in water.

![Fig. 1. Dynamics of changes in the functional state of the subjects at the beginning and at the end of the experiment with Aqua Jogging (n = 12) | Table 1](image)

Functional status indicators studied girls engaged in rhythmic gymnastics at the beginning and end of the Aqua Jogging experiment (n = 12)

<table>
<thead>
<tr>
<th>Test name</th>
<th>Before the experiment</th>
<th>After the experiment</th>
<th>t</th>
<th>p (&gt;,&lt;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart rate, bpm</td>
<td>79,0 ± 3,47</td>
<td>77,5 ± 3,28</td>
<td>0,3</td>
<td>&gt;0,05</td>
</tr>
<tr>
<td>Stange test, s</td>
<td>33,6 ± 3,00</td>
<td>45,8 ± 2,75</td>
<td>3,0</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Genchi test, s</td>
<td>18,7 ± 1,36</td>
<td>23,8 ± 1,16</td>
<td>2,9</td>
<td>&lt;0,05</td>
</tr>
<tr>
<td>Reactionometry, cm</td>
<td>11,4 ± 1,38</td>
<td>9,9 ± 1,16</td>
<td>0,8</td>
<td>&gt;0,05</td>
</tr>
<tr>
<td>Romberg test, s</td>
<td>68,9 ± 12,92</td>
<td>81,0 ± 10,46</td>
<td>0,7</td>
<td>&gt;0,05</td>
</tr>
</tbody>
</table>
**Discussion**

The obtained results indicate the positive impact of the developed training technique with Aqua Jogging on the functional capabilities of gymnasts aged 15-17 years, which makes it possible to apply it in the training process.

Trotsenko, et.al [12] was engaged in the prospects for the development of aquafitness in physical education. They note that exercises in water were initially used only to train athletes in almost all sports, and then were widely used as rehabilitation means.

In general, Aqua Jogging is an interesting and effective form of training that can be beneficial for improving fitness, relieving stress, improving endurance, and maintaining overall health. It may also be an option for injury recovery or rehabilitation [10,13,14].

Age 15-17 years is puberty and it has its own characteristics. At this age, it is very important to properly distribute physical activity, so as not to harm the growing organism. [11,12].

We will focus our attention on it, because running in water is an effective means of increasing the functional, aerobic capacity of the body of athletes, developing strength and endurance, and improving the cardiovascular system. That is why we chose Aqua Jogging as a means of training and improving the functionality of gymnasts [17–21].

It should be noted that this work for the first time justifies the effectiveness of using aqua jogging training in the training process of girls 15-17 years old in rhythmic gymnastics. From this point of view, the results obtained have prospects for practical and theoretical implementation in sports science.

The data confirm the research of scientists on the use of various means, forms and methods of training athletes in water, which have a positive effect on the body of athletes, improve the training process, reduce injuries, and also improve sports results [1-6].

Most authors claim and prove the effectiveness of using training in water. Positive influence on the physical, mental, and emotional state of those who are involved [16].

Scientific novelty is presented in the identification and scientific justification of the significance and effectiveness of using Aqua Jogging training, based on a combination of running and cardio to improve the functional condition of gymnasts aged 15-17 years.

**Conclusions**

The use of the developed training system with Aqua Jogging in the educational and training process in artistic gymnastics for girls aged 15-17
years contributed to the improvement of the indicators of the functional state of the research gymnasts. In girls, significant improvements in the performance of the Stange test were noted (p<0.05); and samples of Genchi (p<0.05). Other indicators tend to change in the direction of improvement: heart rate (p>0.05); the indicator of the reactometry test (p>0.05) and the Romberg test (p>0.05), but they turned out to be statistically improbable.

The obtained data allow trainers to expand the arsenal of means of exercises in water for the development and improvement of the functional capabilities of the athletes' body during the educational and training process.

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Conflict of interest

The authors declare that there is no conflict of interest.

References


Ilnitskaya AS, Kozina ZhL, Barybina LN, Kolomiez NA, Cieślicka M, Stankiewicz B, Pilewska W. Author's internet blog as information and communication technologies in the educational space within the physical education students. Physical education of students. 2014;18(1):22-26

Yuliia Golenkova
golenkovaulia@gmail.com
https://orcid.org/0000-0003-1553-8893
Department of Sports and Pedagogical Disciplines and Fitness;
H.S. Skovoroda Kharkiv National Pedagogical University,
Alchevskykh St, 29, Kharkiv, 61002, Ukraine

Anna Hontar
gontarik94@gmail.com
https://orcid.org/0000-0003-2608-1008
Department of Education and Innovative Pedagogy;
H.S. Skovoroda Kharkiv National Pedagogical University,
Alchevskykh St, 29, Kharkiv, 61002, Ukraine

Anton Holenkov
golenkovanton7@gmail.com
https://orcid.org/0000-0002-7854-4492
Department of Education and Innovative Pedagogy;
H.S. Skovoroda Kharkiv National Pedagogical University,
Alchevskykh St, 29, Kharkiv, 61002, Ukraine

Dmytro Vysotskiy
dmitriy.visotskiy.qa@gmail.com
https://orcid.org/0009-0007-2800-8994
Department of Sports and Pedagogical Disciplines and Fitness;
H.S. Skovoroda Kharkiv National Pedagogical University,
Alchevskykh St, 29, Kharkiv, 61002, Ukraine

Інформація про авторів

Юлія Голенкова
golenkovaulia@gmail.com
https://orcid.org/0000-0003-1553-8893
кафедра спортивно-педагогічних дисциплін і фітнесу,
Харківський національний педагогічний університет імені Г.С. Сковороди
вул. Алчевських, 29, Харків, 61002, Україна
Анна Гонтар

gontarik94@gmail.com
https://orcid.org/0000-0003-2608-1008

кафедра освітології та інноваційної педагогіки,
Харківський національний педагогічний університет імені Г.С. Сковороди
вул. Алчевських, 29, Харків, 61002, Україна

Антон Голенков

golenkovanton7@gmail.com
https://orcid.org/0000-0002-7854-4492

кафедра освітології та інноваційної педагогіки,
Харківський національний педагогічний університет імені Г.С. Сковороди
вул. Алчевських, 29, Харків, 61002, Україна

Дмитро Висотський

dmitriy.visotskiy.qa@gmail.com
https://orcid.org/0009-0007-2800-8994

кафедра спортивно-педагогічних дисциплін і фітнесу,
Харківський національний педагогічний університет імені Г.С. Сковороди
вул. Алчевських, 29, Харків, 61002, Україна

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