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Selected Specific Physical Training Program to Improve Jump Ability for Aerobic Gymnastic

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Abstract

Background and Aim: For aerobic gymnasts, a customized physical training regimen is essential because it increases muscle strength, improves performance quality, and lowers the risk of injury. It also cultivates priceless life lessons like self-control and tenacity, which are essential for athletes' overall growth. In the end, these kinds of programs are essential for optimizing physical ability, guaranteeing competitiveness, and developing well-rounded people in the demanding world of aerobic gymnastics. This research objective was to select specific physical training programs on Jumping ability and to compare the effect of selected specific physical training programs within the experimental group on jumping ability between pretest, after week 4, and posttest.

Materials and Methods: The research was a quasi-experimental design, The Population was the 23 aerobic gymnastic players of Qingyuan City No. 3 Middle School in Guangdong Province, in 2023, aged 16-17 years. The sample was 23 aerobic gymnastic players, a purposive sampling method. They examined jump ability in the Straddle jump test, 360-degree-jump test, Split leap test, and power strength such as the Vertical jump test, Standing long jump test, and Wall squat test with pretest, after week 4 and posttest. The selected specific physical training programs were conducted for an eight-week duration of training, three days each week (Monday Wednesday Friday) and 1.30 hours per time. Data were collected and analyzed for mean and standard deviation. Differences were compared using one-way analysis of variance (ANOVA) with repeated measures. Bonferroni performed a post hoc pairwise comparison. The significance level is set to .05.

Result: (1) The mean and standard deviation of jump ability and, strength and power which divide into the pretest, after week 4 and the posttest were followed by the Straddle jump was 4.61 ± 1.31, 6.13 ± 1.22 and 8.00 ± 0.74 score, 360-degree-jump was 5.57 ± 0.79, 6.96 ± 0.64 and 8.39 ± 0.58 score, Split leap test was 5.30 ± 0.76, 6.65 ± 0.71 and 8.26 ± 0.62 score, Vertical jump was 256.91 ± 23.50, 262.91 ± 24.55 and 269.09 ± 25.53 cm., Standing long jump was 204.83 ± 31.02, 209.43 ± 31.81 and 214.43 ± 31.82 cm. and Wall squat was 54.04 ± 10.44, 59.61 ± 11.02 and 66.04 ± 11.37 sec respectively. (2) The mean comparison of aerobic gymnastic jump ability and strength and power with the pre-test after week 4 and post-test found that all pairwise post hoc, pretest-after week 4, pretest-posttest, and after week 4- post-test were significant differences (*p<.05).

Conclusion: The special physical training program can improve the jumping ability of aerobic gymnastic players. This study concludes the most effective methods to improve the jumping ability of aerobics athletes, discusses and corrects the deficiencies in the training process, bids farewell to the boring traditional exercises, and expands the application of the training contents, it provides a basis for teachers to formulate training programs.

Keywords: Special Physical Training Program; Jumping Ability; Aerobic Gymnastic Players.

Introduction

Because aerobic gymnastics places a strong emphasis on explosive movements and has high physical demands, athletes must improve their jump ability. Muscle strength, power, and coordination are improved by a well-planned physical training program; these abilities are necessary for high jumps and dynamic routines. A study by Bosco et al. (1982) found that by boosting the neuromuscular system's efficiency, plyometric training considerably enhances jump performance. This kind of training improves the muscle's capacity to exert maximum force in the shortest amount of time, which is essential for accomplishing higher and more controlled jumps in aerobic gymnastics. Exercises like bounding and jump squats fall under this category. Programs for physical training designed to increase jump ability also help prevent injuries. Repetitive high-impact movements used in aerobic gymnastics put a lot of strain on the musculoskeletal system. Athletes can lessen their chance of sprains and strains by combining strength and conditioning exercises to strengthen their muscles, tendons, and ligaments. According to research by Hewett et al. (1996), athletes' careers can be prolonged and their performance longevity increased by implementing training regimens that emphasize lower body strength and stability. Lastly, for aerobic gymnasts to succeed in their sport, a thorough physical training program

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promotes overall athletic development. Additional advantages include improved cardiovascular fitness, flexibility, and balance, all of which help the athlete execute intricate routines with grace and accuracy. To enhance overall performance and artistic execution in gymnastics, Myers et al. (2004) stress the significance of a comprehensive approach to training that incorporates aerobic conditioning, flexibility exercises, and balance training. Aerobic gymnasts can reach optimal physical condition and compete at their best by incorporating these components into their training regimen. \

Aerobics is growing in popularity in our nation at a rapid rate, and students can use it to further their academic careers in addition to strengthening their bodies. The majority of the coaches' attention was centered on the arrangement in the past, and the quality of aerobics instruction varied. There are exercises for jumping ability in daily life as well, but these are ineffective training methods; the majority of training methods involve the basic jump exercise. As a result, it's important to learn jump training since only those who can jump well and high enough can stretch farther and learn challenging maneuvers faster.

A skilled dancer must possess extraordinary jumping ability to have enough air time to execute intricate dance moves. Training in strength, coordination, and flexibility is an essential part of a dancer's work and is a crucial component of their performance. The competitive mechanism used in dance and aerobics differs somewhat from one another. Both are intuitive visual experiences. Chinese dance students between the ages of 13 and 15 can benefit from both in-situ continuous straight jump training and deep jump training, respectively. Regarding students' jumping ability, body jumping exercises at varying heights can help them improve their jumping ability. Students' ability to jump with just one leg can be greatly enhanced by practicing the single-leg vertical deep jump. Additionally, the training approach is superior to traditional Chinese dance. It is simpler to increase students' enthusiasm for learning and to pique their interest in training with this method. It is advised to use endurance training in conjunction with deep-jump training methods, taking into account various technical skills that are tailored to the deep-jump exercise.

The capacity to jump is a type of all-encompassing trait. The effect is greater when multiple comprehensive training methods are used than when just one method is used. The ideal mix of training techniques should include deep jump and special jump exercises; the latter can also be used to replace intermittent static strength training methods with visible short-term training results. Research quality and the creation of reliable experiments that support the experimental topics are key components of well-designed training programs that help educators, aerobics instructors, and students preparing for specialized exams raise their game and meet their training objectives more rapidly.

Research Questions

1. How to improve aerobic gymnastics jumping ability?
2. How to develop a specific physical training program to improve aerobics jumping ability?

Research objectives

1. To study the results that will occur with research in this matter.
2. To compare whether there have been changes before and after the experiment.
3. To develop tools for this research.

Literature Review

Aerobic Gymnastics Jumping Ability

In aerobic gymnastics, the ability to jump is a crucial factor that greatly affects an athlete's performance and ability to succeed in competition. This skill includes not only the height and length of the jumps but also the control and accuracy with which technical elements are executed. Cappa and Mazzà (2010) state that the high-intensity jumps needed for aerobic gymnastics routines require the development of explosive leg power. These jumps emphasize the need for specific training plans that concentrate on improving these physical qualities because they require quick force production and ideal neuromuscular coordination. Better jumpers can perform more intricate and dynamic movements, which often translate into higher competition scores.

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Furthermore, a mix of strength, plyometric, and technical drills aimed at enhancing the biomechanical efficiency of the jumps constitutes effective jump training in aerobic gymnastics. It has been demonstrated that incorporating plyometric exercises, like box jumps and jump squats, improves the muscles' stretch-shortening cycle, which raises jump height and power (Markovic, 2007). To maximize jump performance and reduce injury risk, technical drills emphasizing proper body alignment, take-off, and landing mechanics are essential. According to Santos and Janeira (2008), using these diverse training methods enhances athletes' ability to jump higher while also improving their overall athletic performance and allowing them to perform routines with more fluidity and artistic expression.

Physical training program to improve aerobics jumping ability

Strength, plyometric, and technical exercises that are specifically crafted to increase explosive power and neuromuscular efficiency should all be incorporated into a comprehensive physical training program aimed at improving jumping ability in aerobic gymnastics. Stronglifting, especially with an emphasis on the lower body, develops the base muscle mass needed for explosive leaps. Exercises that target the quadriceps, hamstrings, and glutes, among other important muscle groups, increase force production. Examples of these exercises include squats, lunges, and leg presses. Plyometric training improves the muscle's stretch-shortening cycle, which is essential for reaching higher jumps. It entails high-intensity, explosive exercises like bounding, depth jumping, and box jumps. Strength and plyometric training together dramatically increase muscle power and coordination, which in turn improves vertical jump performance (Markovic and Mikulic, 2010).

Apart from strength and plyometric exercises, the training regimen ought to incorporate targeted technical drills designed to enhance jumping mechanics. To maximize jump height and guarantee safe execution, proper technique during the takeoff, flight, and landing phases is crucial. Exercises that concentrate on timing, body alignment, and landing mechanics assist athletes in staying in control and lowering their risk of injury. According to a study by Bobbert et al. (1996), technical training is crucial for enhancing jump performance because it teaches athletes how to move efficiently, which improves performance. Aerobic gymnasts can improve their jumping ability by adding these components into a structured training program, which will help them perform in competitions with greater energy and higher scores.

Conceptual Framework

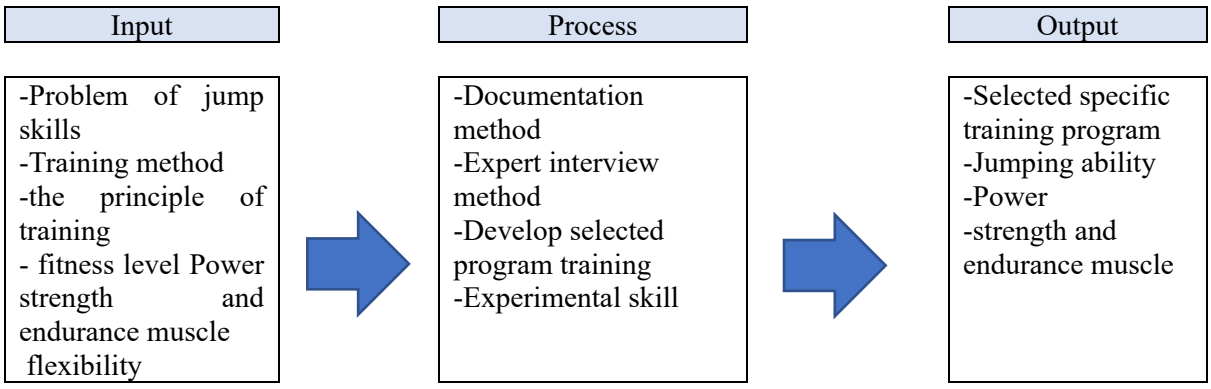

Figure 1 Conceptual Framework

Research Hypothesis

Jumping ability of selected specific physical training programs, post training had better than pretraining.

Methodology

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Content: Based on the theory of youth jumping ability training, develop specific physical training programs and study the most effective training methods to improve the jumping ability of aerobics athletes.

Time: The training program lasts for 8 weeks, 3 sessions a week (Monday, Wednesday Friday), and 1.30 hours a session. The data collection time is from October 2023 to December 2023

Population and Sample: The population was the 23 aerobic gymnastic players of Qingyuan City No. 3 Middle School in Guangdong Province, in 2023, aged 16-17 years.

The sample was 23 aerobic gymnastic players, the purposive sampling method

Research tools: The specific physical training program: that was constructed by the researcher was an 8-week duration of training, 3 days per week and 45 minutes per session, which included elements of exercise about strength, power, jump technique, and flexibility.

The content validity was conducted with the Index of Item-Objective Congruence (IOC) by 3 experts (physical education teacher, aerobic gymnastic coach) The IOC was 0.88, after that, a tryout with 5 subjects found that exercise, intensity, training volume, and recovery time were appropriate.

Vertical jump test (Kamutsri, 2017)

Standing long jump test (Kamutsri, 2017)

Wall squat test (Kurniawan, et al, 2023)

Straddle jump test (validity= 1.00, reliability= .81)

360-degree-jump test (validity=1.00, reliability=.66)

Split leap test (validity=0.90, reliability=.73)

Data collection

1. Using measurement methods, researchers measure the basic conditions of the experimental subjects (age, height, weight)

2. Using experimental methods, researchers apply specific training programs designed for experimental subjects and obtain relevant data content through testing.

3. The researcher conducted an 8-week specific training in the dance classroom of No. 3 Middle School in Qingyuan City. Before the start of the experiment, a pre-test of data collection was conducted. The second test of data collection was conducted in the 4th week. A post-test for data collection was conducted in week 8.

4. The researchers collected data and validated the results of the jumping ability test and the specific test for further data analysis.

Data Analysis: Analyze the general data of the sample, and find the mean and standard deviation. One-way ANOVA repeated measurement and Bonferroni pairwise post hoc.

Results

Table 1 The characteristics of the subject (N=23)

Variable	Mean±S.D.
Age (y)	16.52 ± 0.51
Height (cm)	169.26 ± 4.49
Weight (kg)	59.86 ± 10.42
Muscle mass (kg)	42.28 ± 12.50
Bone mass (kg)	12.10 ± 2.12
%Fat	18.42 ± 0.03

Table 3 shows that a total of 23 subjects participated in the experiment. Their age had a mean and standard deviation of 16.52± 0.51, their height had a mean and standard deviation of 169.26± 4.49, their weight had a mean and standard deviation of 29.86± 10.42, and their muscle mass had a mean and standard deviation of 42.28± 12.50, the mean and standard deviation of bone mass was 12.10± 2.12, and the mean and standard deviation of fat percentage was 18.42± 0.03.

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Table 2 Mean and standard deviation jump ability test, strength, and power Classified at pretest, after week 4 and post-test

Variables	Pretest	After week 4	posttest
	Mean+ S.D.	Mean+ S.D.	Mean+ S.D.
Straddle jump test (score)	4.61 ± 1.31	6.13 ± 1.22	8.00 ± 0.74
360-degree-jump test (score)	5.57 ± 0.79	6.96 ± 0.64	8.39 ± 0.58
Split leap test (score)	5.30 ± 0.76	6.65 ± 0.71	8.26 ± 0.62
Vertical jump (cm)	256.91 ± 23.50	262.91 ± 24.55	269.09 ± 25.53
Standing long jump (cm)	204.83 ± 31.02	209.43 ± 31.81	214.43 ± 31.82
Wall squat (sec)	54.04 ± 10.44	59.61 ± 11.02	66.04 ± 11.37

Table 4 shows that the mean and standard of jump skill and, strength and power which were divided into the pretest, after week 4 and the posttest were followed by the Straddle jump was 4.61 ± 1.31, 6.13 ± 1.22 and 8.00 ± 0.74 scores, 360-degree-jump was 5.57 ± 0.79, 6.96 ± 0.64 and 8.39 ± 0.58 score, Split leap test was 5.30 ± 0.76, 6.65 ± 0.71 and 8.26 ± 0.62 score.

Vertical jump was 256.91 ± 23.50, 262.91 ± 24.55, and 269.09 ± 25.53 cm., Standing long jump was 204.83 ± 31.02, 209.43 ± 31.81, and 214.43 ± 31.82 cm. and Wall squat was 54.04 ± 10.44, 59.61 ± 11.02 and 66.04 ± 11.37 sec respectively.

Table 3 Compare Mean comparison of aerobic gymnastic jump ability and strength and power with pre-test after week 4 and post-test by way of ANOVA repeated measurement.

Variables	Source of variance	Type III sum of Squares	df	MS	F	p
Straddle jump test	Week	132.73	2	66.36	244.51	.01*
	Error	11.94	44	0.27		
	Total	144.67	46	66.63		
360-degree-jump test	Week	91.86	2	45.93	296.67	.01*
	Error	6.81	44	0.16		
	Total	98.67	46	46.09		
Split leap test	Week	100.78	2	50.39	376.82	.01*
	Error	5.88	44	0.13		
	Total	106.66	46	50.52		
Vertical jump	Week	1704.46	2	852.23	561.12	.01*
	Error	67.54	44	1.54		
	Total	1772	46	853.77		
Standing long jump	Week	1062.35	2	531.17	561.12	.01*
	Error	41.65	44	0.95		
	Total	1104	46	532.12		
Wall squat test	week	1658.90	2	829.45	1493.60	.01*
	Error	24.44	44	0.56		
	Total	1683.34	46	830.01		

*P< 0.05

Table 5 shows that all variables were the straddle jump test, 360-degree jump test, split leap test, vertical jump, standing long jump, and wall squat test. There were at least one pair significantly different at .05

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Table 4 Compare with the matching pair of straddles jump test, 360-degree-jump test, split leap test, vertical jump, standing long jump, and wall squat test by Bonferroni.

Variables	Test	Pretest	After week 4	Posttest
Straddle jump test	Pretest	xxx	-1.52*	-3.39*
	After week 4	1.52*	xxx	-1.87*
	Posttest			xxx
360-degree-jump test	Pretest	xxx	-1.39*	-2.83*
	After week 4		xxx	-1.44*
	Posttest			xxx
Split leap test,	Pretest	xxx	-1.35*	-2.96*
	After week 4	1.35*	xxx	-1.61*
	Posttest			xxx
Vertical jump	Pretest	xxx	-6.00*	-12.17*
	After week 4		xxx	-6.17*
	Posttest			xxx
Standing long jump	Pretest	xxx	-4.61*	-9.61*
	After week 4		xxx	-5.00*
	Posttest			xxx
Wall squat	Pretest	xxx	-5.57*	-12.00*
	After week 4		xxx	-6.44*
	Posttest			xxx

*P< .05

Table 6 showed that all pairwise post hoc, pretest-after week 4, pretest-posttest, and after week 4- posttest were significant differences (*p<.05)

The focus of this study was the jumping ability of selected specific physical training programs, post-training was better than pre-training.

Discussion

Through research and experiments on special physical training programs to improve aerobics jumping ability, it was found that the formulated special physical training programs can effectively improve the jumping ability of aerobics athletes, thereby improving their special level. According to the data results, pretest, after the week 4 test, and post-test, the jumping strength of aerobics athletes increased (*P<0.05) because it followed the sports training theory (Tian et al., 2000) creating reasonable specialized training content. Whether it is the test of vertical jump, standing long jump, static squat, or the test of special movements, due to the improvement of physical fitness and the intervention of the 8-week special training program, the special level of aerobics athletes has been improved. Therefore, after 8 weeks of training, the strength, flexibility, and jumping skills were also improved. The improvement of strength quality affects the completion quality of jumping technical movements, Consistent with Zhao's research (2021).

Jumping was the key to aerobics. This study raises the issues that arise during adolescent training and formulates a specific program to study effective training methods for adolescent aerobics athletes to improve their jumping ability. The explosive strength level of the lower limbs directly affects the athlete's jumping ability. Training results created based on specific training programs further improve the performance of an athlete's jumping ability. Training load needs to be designed according to the characteristics of different events and the personal circumstances of athletes to achieve the best training effect. When formulating a training program, we should start with the students themselves and gradually promote the development of students' jumping abilities. Training intensity and difficulty should be reduced if necessary. Pay attention to the quality of your training movements. When cultivating students' jumping ability, it is recommended to combine strength, endurance, and flexibility training so that students can improve their specific abilities faster. Functional physical training programs

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should focus on full-body training, including strength, endurance, and agility, to help improve body functions and increase body adaptability. For the special group of art exam students, how to improve the training effect in the short term is the key to winning the exam. Improve physical fitness during special movement exercises, and the improvement of physical fitness will promote the completion of special movements, is indeed the best way (Li & Guo, 2022).

Both deep jumping exercises and in-situ continuous straight-body jumping training can effectively develop the jumping ability of students aged 13-15. Deep jumping exercises at different heights can develop the body's jumping ability (Liu, 2019). Experiments show that selection and bodybuilding The jumping method and the difficult movement method are similar or the same muscle method, which can more effectively develop the special jumping ability of aerobics athletes. Experiments show that under the intervention of specific training content, the test scores of special movements in the 8th-week test have been significantly improved. During training, we must always observe the status of athletes, find out the weak links in the muscle kinetic chain, and improve jumping techniques, which can effectively promote the development of comprehensive qualities in all aspects, Consistent with Chen's (2021) research results. Design a suitable jumping training program based on the force generation, jumping, and technical characteristics of aerobics events. The special physical fitness of aerobics athletes is mainly based on the characteristics of the special aerobics event, combined with competition tasks and specific training needs, to carry out specialized and targeted physical fitness training activities. Aerobics physical training needs to be combined with athletes' specific technical requirements to achieve technical and physical improvements. According to the content of the new aerobics cycle rules, there are higher requirements for the cardiopulmonary function and special physical fitness of aerobics athletes. Therefore, when designing special physical training, try adding as much multi-element and multi-dimensional training content as possible. Elements such as jumping and ground movements can be added to endurance training to exercise athletes' muscle strength and agility; Integrating special movement techniques into special physical training will provide targeted strength training for difficult movements with high technical requirements, thereby improving the completion rate of movements.

Recommendation

1. The results of this research can be applied to physical training in other sports, providing teachers and coaches with theoretical support for targeted physical training programs for jumping ability, and providing a reference for subsequent research.
2. The research results are targeted and can be applied to the development and use of other student groups.
3. Further research on factors such as cultivating students' training interests and psychological quality.
4. Research results can promote the development of aerobics and contribute to further increasing the popularity and influence of aerobics.
5. The indicators and testing methods used to evaluate jumping ability in this study are relatively simple and common. It is recommended that more advanced measurement tools be used in future research to conduct more complete and comprehensive data analysis.
6. Insufficient training time, extend the training cycle, learn the characteristics of long-term training programs, and develop a fun and effective training program.

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