IMPACTS OF ELASTIC BAND TRAINING ON LOWER LIMB STRENGTH IN AEROBIC GYMNASTICS ATHLETES

IMPACTOS DO TREINAMENTO COM BANDA ELÁSTICA NA FORÇA DOS MEMBROS INFERIORES EM ATLETAS DE GINÁSTICA AERÓBICA

IMPACTOS DEL ENTRENAMIENTO CON BANDAS ELÁSTICAS EN LA FUERZA DE LOS MIEMBROS INFERIORES EN ATLETAS DE GIMNASIA AERÓBICA

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ABSTRACT

Introduction: For over 100 years, elastic band training has been used in fitness training, including mainly male physical strength training, female body sculpting training, and stimulation of stages in child development. Objective: Verify the impacts of elastic band training on lower limb strength in aerobic gymnastics athletes. Methods: The method of literary data, expert interview, and logical analysis were adopted. Mainly through the logical analysis method, 20 aerobics athletes in a rhythmic gymnastics club were selected as volunteers for the experiment. They were randomly divided into the experimental and control groups and then performed a jump test for 14 weeks, involving three steps. Results: It was found that before the experiment, the athletes in the experimental group performed slightly better in the three-step approach and level 1 straight step jump than the control group. Elastic band training significantly improved trunk strength and lower limb strength. Conclusions: Factors affecting the selection of lower body strength training content for aerobic gymnastics athletes are: physical factors, training cycle factors, multi-age factors, and coaches' factors. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Endurance Training; Exercise; Lower Extremity; Athletes.

RESUMO

Introdução: Há mais de 100 anos, o treinamento de banda elástica tem sido utilizado no treino de aptidão física, incluído principalmente no treinamento de força física masculina, treinamento de escultura corporal feminina e estimulação de estágios no desenvolvimento infantil. Objetivo: Verificar os impactos do treinamento com banda elástica na força dos membros inferiores em atletas de ginástica aeróbica. Métodos: Adotou-se o método de dados literários, entrevista especializada e análise lógica. Principalmente através do método de análise lógica, 20 atletas de ginástica aeróbica em um clube de ginástica rítmica foram selecionados como voluntários para o experimento. Eles foram divididos aleatoriamente no grupo experimental e no grupo de controle, e então realizaram um teste de salto por 14 semanas, envolvendo três etapas. Resultados: Verificou-se que antes do experimento, os atletas do grupo experimental tiveram um desempenho ligeiramente maior na abordagem de três etapas e salto de passo direito nível 1 do que o grupo de controle. O treinamento de banda elástica melhorou significativamente a força do tronco e a força dos membros inferiores. Conclusões: Os fatores que afetam a seleção de conteúdos de treinamento de menor força corporal para atletas de ginástica aeróbica são: fatores físicos, fatores de ciclo de treinamento, fatores de várias idades e fatores próprios dos treinadores. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Treino de Resistência; Exercício Físico; Membros Inferiores; Atletas.*

RESUMEN

Introducción: Desde hace más de 100 años, el entrenamiento con bandas elásticas se utiliza en el entrenamiento de la condición física, incluyendo principalmente el entrenamiento de la fuerza física masculina, el entrenamiento de la escultura corporal femenina y la estimulación de las etapas del desarrollo infantil. Objetivo: Verificar los impactos del entrenamiento con bandas elásticas en la fuerza de los miembros inferiores en atletas de gimnasia aeróbica. Métodos: Se adoptó el método de los datos literarios, la entrevista especializada y el análisis lógico. Principalmente mediante el método de análisis lógico, se seleccionaron 20 atletas de aeróbic de un club de gimnasia rítmica como voluntarios para el experimento. Se dividieron aleatoriamente en el grupo experimental y en el grupo de control, y luego realizaron una prueba de salto durante 14 semanas, con tres etapas. Resultados: Se comprobó que, antes del experimento, los atletas del grupo experimental rendían ligeramente mejor en la aproximación de tres pasos y en el salto de paso recto de nivel 1 que el grupo de control. El entrenamiento con bandas elásticas mejoró significativamente la fuerza del tronco y de las extremidades inferiores. Conclusiones: Los factores que afectan a la selección del contenido del entrenamiento de la fuerza de la parte inferior del cuerpo para los atletas de gimnasia aeróbica son: factores físicos, factores del ciclo de entrenamiento, factores de la edad múltiple y factores propios de los entrenadores. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Entrenamiento de Resistencia; Ejercicio Físico; Extremidad Inferior; Atletas.*

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INTRODUCTION

More than 100 years ago, elastic band training has been used in fitness training, mainly including male fitness strength training, female body sculpting training and training in children's developmental stages.[1] In the 1960s and 1970s, elasticity training tools were gradually applied by therapists to sports rehabilitation training. By the end of the 1970s, through the improvement of elastic band materials by physical therapists, the more professional and formal elastic band training system was gradually applied to various sports training and rehabilitation, and has been used until now.[2] Conventional elastic bands are divided into three types, namely tubular, ribbon and rod. Elastic band training is a type of strength training, the resistance generated by the stretching of the elastic band, the trainer needs to complete the action to overcome the resistance through muscle contraction. With the increase of the traction resistance of the elastic band, the trainer needs to increase the number of motor units, which accelerates the metabolism of muscle protein and increases the cross-sectional area of the muscle to meet the training needs. The elastic band can be combined with a number of special sports, without a fixed trajectory, so that the training effect can be transferred, and it is conducive to the improvement of the sports level.[3]

Aerobics is a high-level sport with the direct purpose of competition and winning, and it is mainly based on anaerobic metabolic exercise; The characteristics of the project are high exercise intensity, short time, fast speed, difficult movement, various changes, and complex technology, especially in the aerobics competition rules, the completion of several types of difficult movements stipulated, all need to have strong strength as a guarantee. People usually call the speed, strength, endurance, agility and flexibility of the human body in muscle activity as physical fitness. Strength is the human body's ability to resist resistance and is the basis for physical ability elements such as speed, endurance, agility, and flexibility. The strength quality of aerobics mainly includes four categories: Upper body strength, lower body strength, trunk strength, and wrist joint strength. Strength quality is the core of completing a set of competitive aerobics, and it is the guarantee to reduce sports injuries of athletes. Therefore, in the teaching and training should pay attention to the improvement of strength quality.[4] With the continuous updating of the rules and the introduction of more and more new movements, aerobics has become more standardized. At the same time, the physical quality of Chinese athletes is also gradually improving, which makes the training in aerobics to upgrade.[5] Therefore, by carrying out special strength training for athletes specializing in aerobics, according to the comparative analysis of various data, a complete set of strength training system is sorted out, so that after special strength training for aerobics candidates, it can scientifically improve the physical fitness of candidates. Partial strength quality.[6]

METHOD

Documentation method

In order to further study the effect of elastic band training on the strength quality of aerobics girls in physical education majors in colleges and universities, mainly use the words "elastic band training", "physical education", "aerobics", "girls", "strength quality" and other words to conduct a large number of related materials in the library of Guangzhou Institute of Physical Education, CNKI, Wanfang and other databases, the author also consulted relevant books such as "National Physical Fitness Monitoring Indicators", "2000 Student Physical Fitness Survey Indicator System", "Human Sports Ability Testing and Evaluation", etc, it laid a theoretical foundation for the selection of the author's indicators; And also consulted books related to sports anatomy, exercise physiology, elastic band training, etc., which laid a theoretical foundation for this article.[7]

Expert interview method

According to the author's research direction and research content, interviews with relevant professional experts, it includes aerobics international athletes, national athletes, etc., to understand and discuss issues related to the selection of measurement indicators, the formulation of training programs, and the design of movements in this study, carefully listen to and adopt opinions to provide protection for the author's research. The results are shown in Table1.

Teaching experiment method

Twenty aerobics athletes from gymnastics clubs were selected as experimental subjects, and they were randomly divided into experimental group and control group, and then conducted a 14-week three-step approach-up first-level right-span jump test teaching experiment, and they had not received three-step approach-level first-level right span. Step-jump experiment.[8] Before the teaching experiment, two groups of gymnasts were tested for 50-meter running, 1-minute rope skipping, sitting forward bend, 1-minute sit-up and standing long jump. The independent samples t-test statistics before the experiment showed that, in the physical fitness test of the experimental group and the control group, the physical fitness test results of 50-meter running, 1-minute rope skipping, sitting forward bending, 1-minute sit-ups and standing long jumps were all greater than 0.05, which were not significant. sexual differences. This shows that the physical fitness level of the experimental group and the control group before the experiment is the same, and the initial level is the same.

RESULTS

Before the experimental intervention, the experimental group and the control group were tested with a three-step approach and a right-step jump test, before the experiment, the average score of the three-step approach and first-level right step jump in the experimental group was 170.23cm, after 14 weeks of training, in the experimental group, the average performance of the three-step approach and the first-level right step jump increased to 174.78cm.[9] The average score of the control group increased from 169.82cm before the experiment to 172.52cm. Before and after the experiment, the paired sample t-test was performed within the group, after the elastic band training, the average performance of the three-step approach and the first-level right step jump in the experimental group increased by 4.55cm, and the overall improvement rate was 2.67%. The results show: The t value was -2.96, and the P value was 0.034 ($P<0.05$), indicating that the difference before and after the experiment was statistically significant.[10] After routine training, the average performance of the three-step approach and the first-level right step jump in the control group increased by 2.7cm, and the overall improvement rate was 1.59%. The results showed: The t value was -1.95, and the P value was 0.251 ($P>0.05$), indicating that there was no significant difference before and after the experiment. The results are shown in Figure 1.

Table 1. Statistics of professional titles of experts.

content	job title			level			Education		
	professor	Associate Professor	lecturer	international	national level	Level 1	PhD	master	Undergraduate
number of people	3	14	7	5	8	11	2	14	8
percentage	12.5	58.3	29.2	20.8	33.4	45.8	8.3	58.3	33.4

After 14 weeks of intervention with different training methods in the experimental group and the control group, the experimental group and the control group achieved three-step approach-run level one right-step jumping performance, there are different degrees of improvement, and the experimental group has a greater increase, which is 2.26cm higher than the control group. After independent samples t test between groups, the results show that: The t value was 2.17, the P value was 0.186 (P>0.05), and there was no significant difference.[11] It can be seen from this that, compared with the conventional training method, the elastic band training method is more effective in promoting the level of the gymnast's three-step approach to the first-level right step jump, the results are shown in Figure 2.

From Figure 3, it can be seen that before the experiment, the athletes in the experimental group had a slightly higher performance in the three-step approach and level 1 right step jump than the control group.

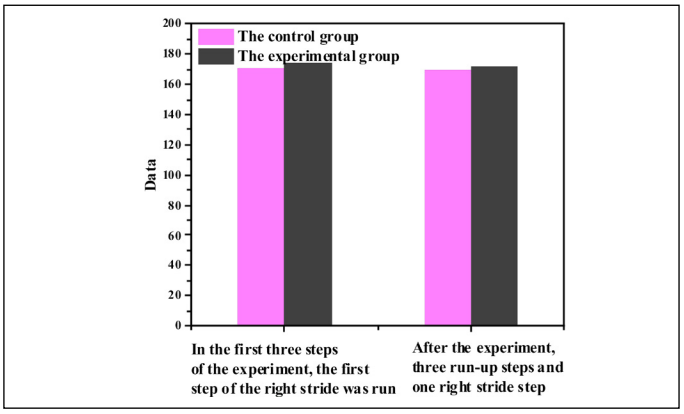

Figure 3. After the experiment, the experimental group and the control group three--step approach-run level one right step jump performance comparison chart.

DISCUSSION

Due to the difficulty of jumping and spinning in the rhythmic gymnastics set, the requirements for the lower body strength of athletes are relatively strict. Therefore, long-term training is likely to cause certain physical damage to athletes, especially the bones in the growing stage with high elasticity and poor compression resistance, which are likely to cause joint damage or deformation, affecting normal development. In order to avoid muscle strain caused by increased training intensity, it will cause injury and pain to the sports joints of athletes. Therefore, when using elastic bands for training, the trainer needs to put safety first, maintain a suitable load and a suitable training interval. Combining the analysis of the data results of the teaching experiment with the training effect felt by the participants in the experimental group, that is, combining objective factors and subjective factors, in order to test whether the elastic band training is really loved by the practitioners, the survey was related to willingness to take the initiative to improve aerobics strength by completing elastic band training.

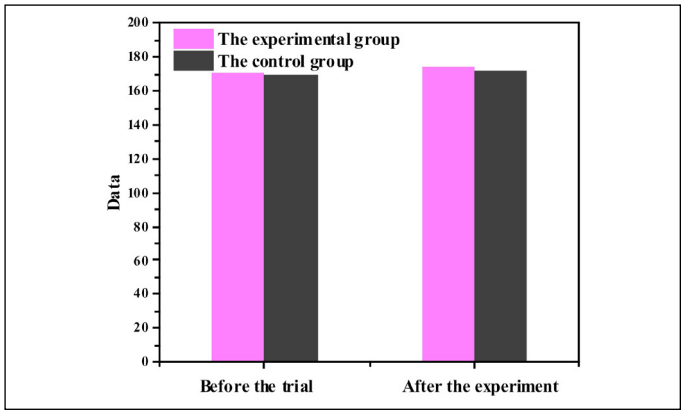

Figure 1. Analysis of the changes in the three-step approach-run, first-class right-step jump performance in the experimental group and the control group before and after the experiment (N=40).

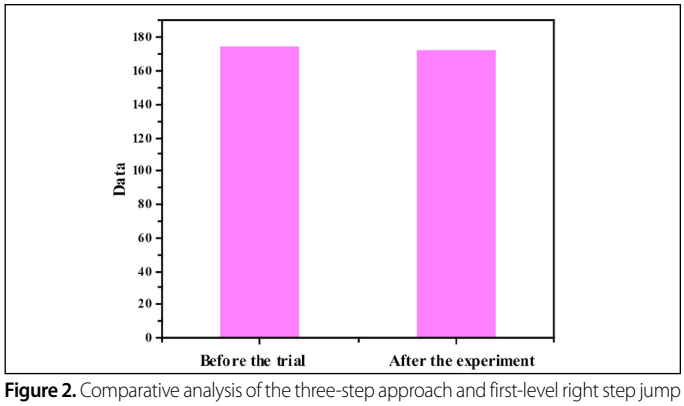

Figure 2. Comparative analysis of the three-step approach and first-level right step jump between the experimental group and the control group after the experiment (N=40).

CONCLUSION

Through the above research, we can find that the use of elastic band is more flexible, elastic band training significantly improved the trunk strength and lower body strength. At present, the overall situation of professional aerobics strength training is generally in general, mainly due to the low emphasis on training, the relatively simple training methods and methods, the lack of auxiliary training equipment, the exclusion of strength training, and the lack of targeted special strength training for the lower limbs, most of the commonly used methods are With years of training experience to formulate and other issues, this leads to the lack of strength training, poor training effect, and insufficient performance of special strength of the lower limbs. Therefore, according to the physical quality of the athlete, combined with the different muscle groups of the body, a set of targeted bouncing force training programs should be designed using elastic bands to enhance the strength of the lower limbs, so as to achieve the purpose of improving the jumping difficulty of the athlete.

The author declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: The author made significant contributions to this manuscript. YD: writing; data analysis; article review and intellectual concept of the article.

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