

CONSEQUENCES OF ELASTIC BAND TRAINING ON MUSCLE STRENGTH IN AEROBIC ATHLETES



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CONSEQUÊNCIAS DO TREINAMENTO COM ELÁSTICO NA FORÇA MUSCULAR DOS ATLETAS DE AERÓBICA

CONSECUENCIAS DEL ENTRENAMIENTO CON BANDAS ELÁSTICAS EN LA FUERZA MUSCULAR DE ATLETAS AERÓBICOS

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ABSTRACT

Introduction: The elastic band training method has been widely used in strength training and collective rehabilitation of international athletes as a new method of strength training. **Objective:** Compare the research on the effect of resistance strength training for aerobics athletes, practicing the latest theories and techniques of this strength training. **Methods:** Evaluation tests, experimental tests, and mathematical statistics were conducted to complete the study and research. **Results:** Elastic band training can potentially improve the blood circulation of specialized aerobic athletes, increasing muscle strength and improving the activities of daily living of its practitioners. **Conclusion:** Elastic band training can improve the strength quality of aerobics athletes, increasing the diversity of training methods in its practitioners. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Endurance Training Athletes; Muscle Strength.

RESUMO

Introdução: O método de treinamento com banda elástica tem sido amplamente utilizado no treinamento de força e na reabilitação coletiva de atletas internacionais como um novo método de treinamento de força. **Objetivo:** Comparar as pesquisas sobre o efeito do treinamento de força resistida para atletas de aeróbica, praticando as mais recentes teorias e técnicas desse treinamento de força. **Métodos:** Foram realizados testes de avaliação, método de teste experimental e método de estatística matemática para concluir o estudo e a pesquisa. **Resultados:** O treinamento com banda elástica tem o potencial de melhorar a circulação sanguínea dos atletas especializados em aeróbica, aumentando a força muscular e melhorando as atividades de vida diária dos seus praticantes. **Conclusão:** O treinamento com elástico pode melhorar a qualidade da força de atletas de aeróbica, aumentando a diversidade dos métodos de treinamento em seus praticantes. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Treino de Resistência; Atletas; Força Muscular.

RESUMEN

Introducción: El método de entrenamiento con bandas elásticas ha sido ampliamente utilizado en el entrenamiento de la fuerza y la rehabilitación colectiva de atletas internacionales como un nuevo método de entrenamiento de fuerza. **Objetivo:** Comparar las investigaciones sobre el efecto del entrenamiento de la fuerza de resistencia para los atletas de aeróbica, practicando las últimas teorías y técnicas de este entrenamiento de la fuerza. **Métodos:** Para completar el estudio y la investigación se realizaron pruebas de evaluación, método de prueba experimental y método de estadística matemática. **Resultados:** El entrenamiento con bandas elásticas tiene el potencial de mejorar la circulación sanguínea de los atletas especialistas en aeróbica, aumentando la fuerza muscular y mejorando las actividades de la vida diaria de sus practicantes. **Conclusión:** El entrenamiento con bandas elásticas puede mejorar la calidad de la fuerza de los atletas de aeróbica, aumentando la diversidad de métodos de entrenamiento en sus practicantes. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descritores: Entrenamiento de Resistencia; Atletas; Fuerza Muscular.



INTRODUCTION

Bodybuilding is a popular sport that has developed rapidly in society, especially competitive aerobics, which puts forward very high requirements on the strength and quality of athletes. The author applies the elastic band training method to aerobics training, taking special athletes in aerobics class as an example, after 8 weeks of training, the changes of various indicators before and after the experiment are measured. The result shows, the elastic band training method can effectively improve the strength and quality of students, and also has a certain effect on the body posture control ability, thereby increasing the diversity of training methods and improving the quality of teaching. The survey results showed that after the elastic band aerobic exercise experiment, the heart rate of the two groups of subjects decreased slightly. The lung capacity of the experimental subjects in the observation group increased, which was significantly different from that before the experiment ($P < 0.05$). At the same time, the upper arm circumference difference of the observation group members increased, and there was a significant difference ($P < 0.05$).

RESEARCH METHODS

Evaluation test method

Before the intervention, 4 weeks and 8 weeks after the intervention, the same community health service physician who did not participate in the intervention evaluated the two groups of athletes: The first 5 sit-stand test (FTSST): Assessment of lower-extremity muscle strength in aerobics-specialized athletes. Aerobics athletes sit on a chair against the wall, with their arms crossed in front of their chest, and their legs naturally separated, when the "start" command is issued, the timer starts, at the same time, special aerobics athletes stand up and sit down again, stop timing after completing 5 times of standing up and sit down, and record the required time (s), the shorter the time, the better the lower limb muscle strength.¹ The Second Health Survey Short Form (SF-36): Assessing the quality of life of aerobics athletes.² The scale includes 36 items and 8 dimensions: Physical function, physical function, physical pain, general health, energy, social function, emotional function, and mental health, each dimension has different conversion scores, the highest being 100 points and the lowest 0 points, higher scores indicate better quality of life.³ As shown in Equation 1:

$$j\theta + k\theta = T(t) \quad (1)$$

Among them, j is the rotational inertia matrix, and is the generalized moment vector.

Experimental test method

In this experiment, the members of the observation group were guided by 3 special aerobics teachers to exercise for 8 weeks with elastic band aerobics special athletes, 3 times a week, each time for more than 30 minutes. The members of the control group performed regular physical exercise.⁴ The female elastic band athlete consists of three parts: The first part is the warm-up preparation part, this is to accelerate blood circulation and improve blood circulation, more oxygen and nutrients are delivered to the muscles to prepare for later exercises. The second part is the basic part, follow the music to stretch the elastic band, and the lower limbs make jumping movements in different directions, which can increase the lung capacity of the members, speed up the breathing and metabolism, and is conducive to body adjustment and exercise.⁵ The third part is the end of the relaxation part, the subjects through the soothing music, the heart rate gradually decreased, and gradually returned to the normal level.⁶ The physical function (including resting heart rate, vital capacity, upper arm circumference difference) and other indicators were tested twice before

and after the experiment. Research shows, after 4 and 8 weeks of intervention, the FTSST time in the intervention group was shorter than that in the control group, and the FTSST time was shortened when the intervention time increased, it is shown that elastic band training can effectively improve the lower limb muscle strength of aerobics special athletes, as shown in Figure 1, the muscle strength curve of bodybuilders, the better the improvement effect is with the prolongation of the intervention time.⁷

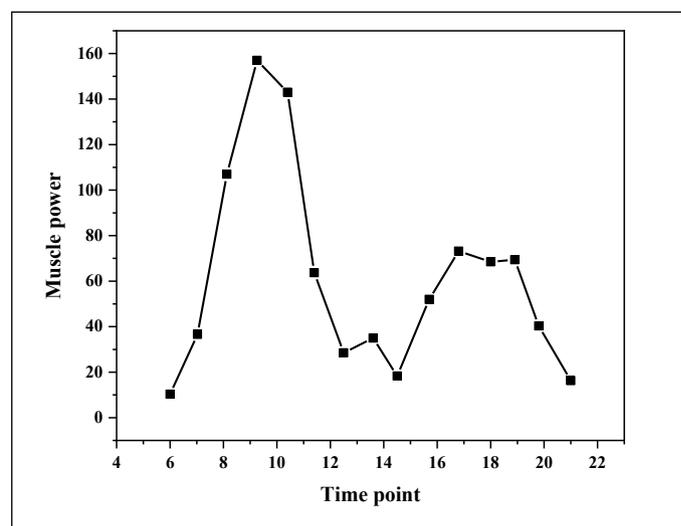


Figure 1. The curve of muscle strength change of bodybuilders.

Mathematical Statistics

In the study, Excel was used to store the original data, SPSS 18.0 was used to analyze and test the data, and the paired sample t test was used before and after the observation, $P < 0.05$ represented a significant difference. In order to provide a research basis for the future search for the exercise mode suitable for aerobics special athletes in the early stage of frailty.⁸ The sample size is small, and the long-term efficacy needs to be further verified, and research with larger sample size and longer intervention time should be carried out in the future, explore the efficacy of elastic band training in pre-frail aerobics athletes.⁹ In order to provide evidence-based medicine for the improvement of lower limb muscle strength and quality of life of aerobics special athletes in the early stage of weakness by elastic band training. In addition to adjusting the strength of elastic band training by its own properties, such as the thickness of the elastic band, the number of uses, and the number of folds, the load can also be determined by the distance between the hands and the degree of stretch when holding the elastic band.¹⁰ The following Figure 2 shows the effect of elastic band on the athlete's intervention.

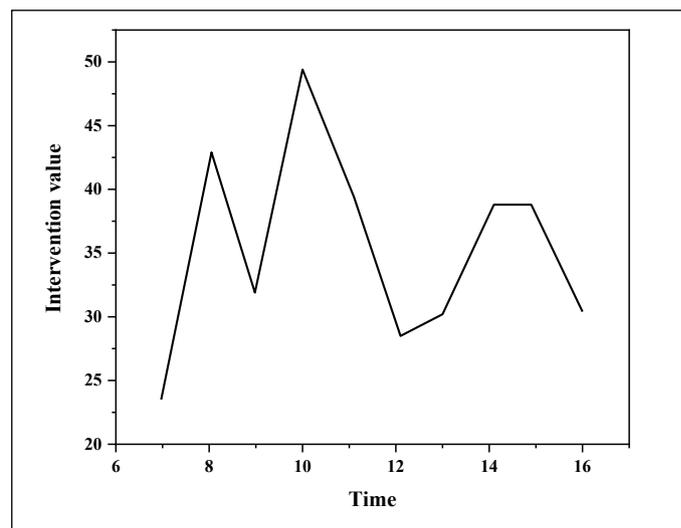


Figure 2. Intervention effect of elastic band on athletes.

ETHICAL COMPLIANCE

Research experiments conducted in this article with animals or humans were approved by the Ethical Committee and responsible authorities of Boda College of Jilin Normal University and The Party School of Li Shu County following all guidelines, regulations, legal, and ethical standards as required for humans or animals.

RESULTS AND ANALYSIS

The improvement of the ability of aerobics athletes from sitting to standing is conducive to the improvement of daily activities and quality of life.¹¹ The results of this study showed that, compared with the control group, after 4 weeks of intervention, the SF-36 in the intervention group only increased the scores of 3 dimensions of physical function, somatic pain and general health, and the scores of all 8 dimensions increased after 8 weeks; Comparing the differences in the scores of each dimension between the three time points, they were all increased after 8 weeks compared with before the intervention, indicating that elastic band training can improve the quality of life of aerobics special athletes in the early stage of frailty, manifested in physiological function, physiological function, body pain, general Health, energy, social function, emotional function, and mental health are eight aspects.¹² The other five aspects are improved slowly. Elastic band resistance training improves the ability of aerobics athletes to move from sitting to standing by enhancing muscle strength, and promotes blood circulation in the body, it can improve the daily activities of special aerobics athletes, relieve physical pain, and benefit physical health.¹³ Increasing social support and contact with other community aerobics athletes, it is helpful for aerobics special athletes to make friends, reduce the phenomenon of depression and taciturn, and is beneficial to mental health.¹⁴ As shown in Figure 3, the physical fitness of bodybuilders changes after elastic band training. It is further divided into two domains: physiology and psychology, of which physiological functions, somatic pain and general health belong to the physiology domain.¹⁵ The first improvement in these three aspects indicates that elastic band training may first improve the physical health of aerobics athletes, and then improve their mental health, and ultimately improve the overall quality of life.¹⁶ Figure 4 shows the change curve of the growth rate of hip, knee, and ankle extensor and flexor muscles.

DISCUSSION

The extensor muscles of the knee and hip joints of the lower limbs play a major role. Research on elastic band training includes resistance training of knee extension and hip extension, when stretching elastic band, muscle contraction increases muscle fiber thickness and muscle cross-sectional area, which can effectively improve the muscle strength of lower limb knee and hip extensor groups, making aerobics special, athletes are more likely to complete the movement from sitting to standing. The single and old training concept has been changed, which can not only improve the strength and quality of athletes, but also mobilize the enthusiasm of practitioners. With the continuous enhancement of people's health awareness, the awareness of different bodybuilding equipment and bodybuilding methods has gradually increased.

CONCLUSION

The elastic band training method is combined with the aerobics training method to form a new training mode. The single and old training concept has

been changed, which can not only improve the strength and quality of special athletes, but also mobilize the enthusiasm of practitioners, and at the same time, it can also increase the diversity of aerobics training methods. We know that the ratio of muscle to body weight in women is smaller than that in men, the muscle cross-sectional area is smaller, the muscle is soft, the muscle fiber is thinner, the interstitium is more, and the tendon is wide and short; Muscles have more water and relatively less protein, fat and inorganic salts, so the muscle contraction strength is weak, the endurance is poor, and it is easy to produce fatigue, but the recovery speed is faster. For this reason, in the creation of elastic band aerobics, the muscle strength should be developed in a targeted manner according to the development of women's muscles. Secondly, we should grasp the characteristics of women who are psychologically curious about new things, pursue and yearn for beautiful things, pay attention to safety in the choice of movements, and reflect interest in the arrangement, so as to enhance women's interest in participating in exercises.

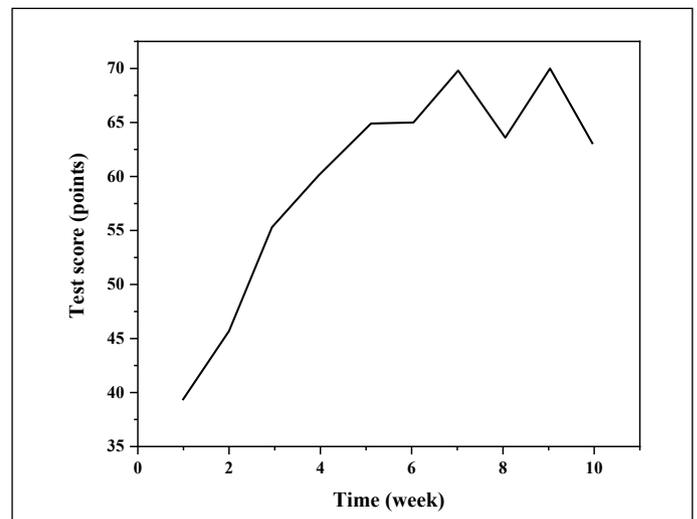


Figure 3. Physical fitness changes of bodybuilders after elastic band training.

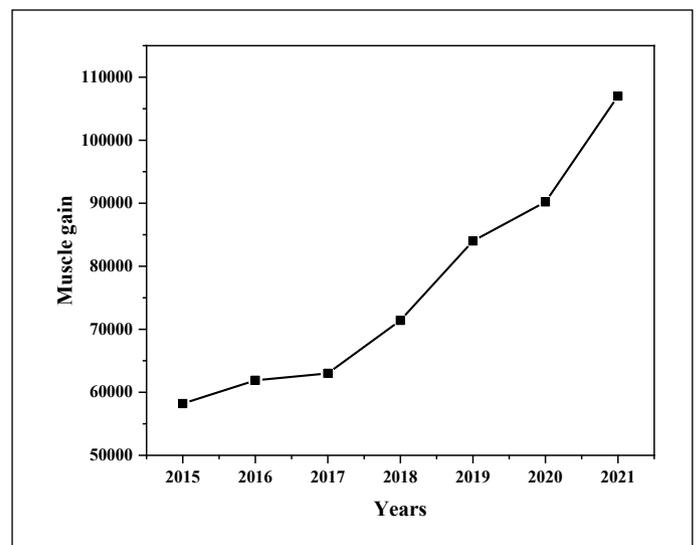


Figure 4. The change curve of the growth rate of hip, knee and ankle extensor and flexor muscles.

The author declares no potential conflict of interest related to this article.

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REFERENCES

1. Kravchuk TM, Golenkova JV, Slastina OO, Komar AV, Sierykh AK. Use of a step-platform in the preparation of female students, going in for sports aerobics, to fulfill elements of static and dynamic strength. *HSR*. 2021;7(1):8-18.
2. Friedlander AL, Genant HK, Sadowsky S, Byl NN, Glüer CC. A two-year program of aerobics and weight training enhances bone mineral density of young women. *J Bone Miner Res*. 2020;10(4):574-85.
3. Eisenmann JC, Welk GJ, Wickel EE, Blair SN. Stability of variables associated with the metabolic syndrome from adolescence to adulthood: the Aerobics Center Longitudinal Study. *Am J Hum Biol*. 2020;16(6):690-6.
4. Singh V, Yaduvanshi P, Singh K. A Study of Factors Affecting the Level of Happiness Amongst Practitioners of Yoga, Aerobics and Walking During Corona Lockdown. *Int J Res Granthaalayah*. 2021;9(3):338-46.
5. Sims AD. Deep Breaths and High Impact Aerobics: Reflecting on Teaching Writing in the Key of Katie Geneva Cannon. *The Wabash Center Journal on Teaching*. 2020;1(1):101-5.
6. Liu Q. Effect of aerobics combined with strength training intervention on invisible obese college students. *Matrix Sci Medica*. 2020;4(2):32-5.
7. Guo H, Liu H, Liu X. Aided Image Acquisition System for Aerobics Training Based on Motion Recognition Technology. *IEEE Access*. 2020;5(1):11-5.
8. Ran W. Exploration on and Thinking about Aesthetic Infiltration in the Aerobics Teaching in Colleges and Universities. *Open Access Libr J*. 2020;07(11):1-6.
9. Ran W. Practical Analysis of the Integration Mode of Teaching and Training of Aerobics in Colleges and Universities. *Open Access Libr J*. 2020;07(10):1-6.
10. Chuprun N, Zakopaylo S, Shulga M, Gordienko A. Optimization of movement activity and the mental state of students by dance aerobics. *EQOL*. 2020;3(1):121-31.
11. Zhang X, Xu Z. Visual Error Correction Method for VR Image of Continuous Aerobics. *IEEE Access*. 2020;20(9):1-7.
12. Shen M, Yin H, Miao Z. Control effect of functional strength training for aerobics sports injury. *J Pak Med Assoc*. 2020;70(9):94-7.
13. Azyyatullova G, Sakharnova T. Analysis and Trends of Development of Sports Aerobics. *Human Sport Med*. 2020;20(2):90-8.
14. Zheng P, Richardson M, Macdonald H, Zhang L. Long-term Participation in Four Different Sports (Aerobics, Tai-chi, Track and Field and Diabolo): A Comparison of Fitness Measures: 2547 Board #8 May 29 9:30 AM - 11:00 AM. *Med Sci Sports Exerc*. 2020;52(7):688.
15. Todorova V, Dolinsky B, Pasichna T. Improving the Content of Choreographic Training in Sports Aerobics at The Stage of Specialized Basic Training. *Sci Educ*. 2020;34(1):60-5.
16. Fan W, Min HJ. Accurate Recognition and Simulation of 3D Visual Image of Aerobics Movement Complexity. 2020;20(1):1-11.