

IMPACTS OF MEDICINE BALL TRAINING ON EXPLOSIVE STRENGTH IN TENNIS PLAYERS' UPPER BODIES



ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

IMPACTOS DO TREINAMENTO POR BOLA MEDICINAL SOBRE A FORÇA EXPLOSIVA EM MEMBROS SUPERIORES DE TENISTAS

IMPACTO DEL ENTRENAMIENTO CON BALÓN MEDICINAL EN LA FUERZA EXPLOSIVA EN MIEMBROS SUPERIORES DE TENISTAS

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ABSTRACT

Introduction: Medicine Ball training has a long history as a training to strengthen the musculature of athletes, and tennis requires high explosive muscle strength in the upper limbs of its athletes. **Objective:** Explore whether medicine ball training can significantly improve explosive forearm strength in tennis players. **Methods:** 100 professional tennis players with a mean age of 21 years were selected and randomly divided between the experimental and control groups. During 12 weeks of conventional tennis training, an extra training protocol, with Medicine Ball, was added to the experimental group. **Results:** After the experiment, the performance of the experimental group showed expressive signs of evolution: the forward throwing distance increased by 13.23%, the backward throwing distance increased by 11.96%, the solid ball throwing distance increased by 18.93%, and the touch distance with vertical jump increased by 1.98%. An increase in the experimental group's overall velocity was also observed, by 18.37%. While the control group did not show expressive changes. **Conclusion:** The explosive strength of the tennis players' upper limbs can be effectively improved through the Medicine Ball training presented. The tennis players' overall speed also benefited, reflecting the improvement of the tennis players' specific performance. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Tennis; Resistance Training; Physical Education and Training.

RESUMO

Introdução: O treinamento da bola medicinal tem uma longa história como treinamento para fortalecer a musculatura dos atletas e o tênis requer uma elevada força explosiva muscular nos membros superiores de seus atletas. **Objetivo:** Explorar se o treinamento com bola medicinal pode melhorar significativamente a força explosiva no antebraço dos tenistas. **Métodos:** Foram selecionados 100 tenistas profissionais com idade média de 21 anos, divididos aleatoriamente entre grupo experimental e controle. Durante 12 semanas de treinamento convencional de tênis, ao grupo experimental adicionou-se um protocolo de treinamento extra, com a bola medicinal. **Resultados:** Após o experimento, o desempenho do grupo experimental demonstrou sinais expressivos de evolução: a distância de arremesso à frente aumentou em 13,23%, a distância de arremesso atrás aumentou em 11,96%, a distância de arremesso de bola sólida aumentou em 18,93%, e a distância de toque com salto vertical aumentou em 1,98%. Observou-se também uma elevação da velocidade geral do grupo experimental, em 18,37%. Enquanto o grupo controle não demonstrou alterações expressivas. **Conclusão:** A força explosiva do membro superior dos tenistas pode ser efetivamente aprimorada através do treinamento de bola medicinal apresentado. A velocidade geral dos tenistas também é beneficiada, refletindo na melhora do desempenho específico dos jogadores de tênis. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Tênis; Treinamento de Força; Educação Física e Treinamento.

RESUMEN

Introducción: El entrenamiento con balón medicinal tiene una larga historia como entrenamiento para fortalecer la musculatura de los deportistas y el tenis requiere una elevada fuerza muscular explosiva en los miembros superiores de sus deportistas. **Objetivo:** Explorar si el entrenamiento con balón medicinal puede mejorar significativamente la fuerza explosiva del antebrazo en jugadores de tenis. **Métodos:** Se seleccionaron 100 tenistas profesionales con una edad media de 21 años, divididos aleatoriamente entre el grupo experimental y el de control. Durante 12 semanas de entrenamiento convencional de tenis, se añadió al grupo experimental un protocolo de entrenamiento extra, con balón medicinal. **Resultados:** Tras el experimento, el rendimiento del grupo experimental mostró signos expresivos de evolución: la distancia de lanzamiento hacia delante aumentó un 13,23%, la distancia de lanzamiento hacia atrás aumentó un 11,96%, la distancia de lanzamiento con balón sólido aumentó un 18,93%, y la distancia de toque con salto vertical aumentó un 1,98%. También se observó un aumento de la velocidad global del grupo experimental, en un 18,37%. Mientras que el grupo de control no mostró cambios expresivos. **Conclusión:** La fuerza explosiva del miembro superior de los tenistas puede mejorarse eficazmente mediante el entrenamiento



Descriptores: *Tenis; Entrenamiento de Fuerza; Educación y Entrenamiento Físico.*

DOI: http://dx.doi.org/10.1590/1517-8692202329012023_0013

Article received on 01/28/2023 accepted on 02/10/2023

INTRODUCTION

In the development of Chinese tennis, although Chinese tennis has made brilliant achievements in some world competitions. However, this does not mean that China's tennis level has been in line with the world-class tennis level, and there is still a big gap.¹ Tennis mainly uses the upper limbs to hit tennis, so the requirements for the upper limbs of tennis players are relatively high. If you want to improve the professional quality of tennis players, you can improve the upper arm muscle strength of tennis players, constantly improve the upper arm explosive force of tennis players, and then improve the service speed of tennis players, which can significantly improve the professional level of tennis players.² The explosive force of the upper arm is a very important factor in the professional quality of tennis players. The explosive force of the upper arm of tennis players can be enhanced through systematic strength training. In addition to the traditional dumbbell training to enhance the explosive strength of the upper arm, the medicine ball training is also a very effective way.³ It can significantly improve the explosive force of the upper arm. At the same time, compared with the traditional strength training, the medicine ball training is more flexible. At the same time, the medicine ball training is also more targeted, which can carry out both systemic training and special training. Moreover, when designing the action of medicine ball training, we can not only carry out single-line medicine ball training, but also carry out multi-dimensional medicine ball training.⁴ Since medicine ball is spherical and tennis ball is spherical, tennis players will be more familiar with it, which is conducive to enhancing the core stability of tennis players. In medicine ball training, tennis players need to coordinate their whole body and keep their body stable all the time.⁵ By practicing throwing medicine ball, receiving medicine ball and other actions, tennis players can effectively enhance the upper arm explosive force. In addition, with the increasing intensity of medicine ball training, the weight of medicine ball is also increasing, which can effectively improve the upper arm muscle strength of tennis players with different physical qualities.⁶ In addition, the gradual medicine ball training can make tennis players have a good transition, prevent the injury caused by sports, and also make a certain buffer and transition for muscles. In the process of medicine ball training, professional guidance is required. In the basic stage of medicine ball training, we need to lay a solid foundation, which is conducive to the follow-up medicine ball training.⁷ This paper explores the influence of medicine ball training on tennis players' upper arm explosive strength. It provides an effective way to enhance the explosive strength of tennis players' upper arm. Medicine ball training can effectively improve the service speed of tennis players, and then improve the professional level of tennis players.⁸

METHOD

Research object

In this paper, 100 professional male tennis players were selected as experimental subjects, and 100 tennis players were randomly divided into experimental group and control group, with 50 tennis players in each group, for 12 weeks of training. The study and all the participants were reviewed and approved by Ethics Committee of Shanghai Vocational College of agriculture and forestry(NO.SHVCAF-20FD05). The average

age of tennis players is 21 years old, the average height is 177cm, and the average weight is 78kg. The basic situation of tennis players in the experimental group and the control group is shown in Table 1. There is no significant difference between the basic situation of tennis players in the experimental group and the control group.

Research methods

First of all, before and after the experiment, the basic information of tennis players in the experimental group and the control group was recorded for subsequent comparative analysis. Secondly, the experimental group was given a 12-week medicine ball training. In the first four weeks of training, the primary medicine ball training was carried out, in the middle four weeks of training, the intermediate intensity medicine ball training was carried out, and in the last four weeks of training, the advanced intensity medicine ball training was carried out. This progressive way of training tennis players can effectively prevent sports injuries caused by excessive training. At the same time, during the whole process of training, professional coaches will guide to prevent physical injury caused by improper training. The 50 tennis players in the control group only received normal tennis training without any other intervention training during the training process. During the whole process of training, tennis players in the experimental group and the control group need to wear professional electronic instruments and equipment to record body information. At the same time, during the training period, professional nutrition consultants should match the diet to prevent muscle loss. Finally, during the 12-week training, the tennis players in the experimental group and the control group were equipped with professional doctors and sports coaches to ensure the accuracy of the experiment. By comparing the training data of medicine ball training with that of ordinary training, and making statistical analysis of the data before and after the experiment, this paper explores the impact of medicine ball training on the explosive force of tennis players' upper arm.

RESULTS

Effect of medicine ball training on tennis players' upper arm explosive force

Table 2 shows the indexes of upper limb explosive force of tennis players in the experimental group and the control group before the experiment.

Since the physical fitness level of 100 tennis players selected in this paper is basically the same, there is no significant difference between the indexes of upper limb explosive force of tennis players in the experimental group and the control group before the experiment, and the data of each index are relatively close.

Table 1. Basic information of tennis players in the experimental group and the control group.

Index	Experience group	Control group	P value
Age (years)	21.55 ±1.9560	21.29 ±1.1076	0.2480
Height (cm)	177.19 ±2.0316	176.68 ±2.0515	0.8552
Body weight (kg)	78.14 ±2.8040	77.64 ±3.1118	0.5100

Table 3 shows the indexes of upper limb explosive force of tennis players in the experimental group and the control group after the experiment. Since the experimental group has been trained with medicine ball for 12 weeks, while the control group has only been trained with normal tennis sports, there are differences in the indexes of upper limb explosive force of tennis players in the experimental group and the control group after the experiment. The level of the indexes in the experimental group is significantly higher than that in the control group.

Table 4 shows the change rate of various indicators of tennis players in the experimental group and the control group before and after the experiment. By comparing the changes of various indicators of tennis players in the experimental group and the control group before and after the experiment, we can find that the change rate of various indicators in the experimental group is significantly higher than that in the control group. The change of various indicators in the experimental group is relatively obvious. The most obvious change is the distance of kneeling and throwing the solid ball, with the change rate close to 20%. This shows that the medicine ball training can significantly enhance the distance of kneeling and throwing the solid ball of tennis players, while the change of various indicators in the control group is not significant, with the change rate less than 2% as a whole, of which the change of backhand throwing is the smallest.

Effect of medicine ball training on tennis players' service speed

Table 5 shows the change of service speed of tennis players in the experimental group and the control group. Before the experiment, the service speed of the experimental group was 112.79 ± 14.1016 , and the service speed of the control group was 114.08 ± 13.3647 . After the

Table 2. Data arrangement of upper limb explosive force index of two groups of tennis players before the experiment.

Option	Experience group	Control group	P
Standing long jump (cm)	268.26 \pm 7.6371	258.76 \pm 6.3915	0.6722
1 minute sit-ups (times)	59.57 \pm 4.1012	59.86 \pm 3.7477	0.7323
Forehand throw (m)	11.52 \pm 1.1175	11.65 \pm 1.1276	0.7303
Backhand Throw (m)	11.26 \pm 0.9879	11.51 \pm 1.0577	0.6725
Kneel throwing solid ball (m)	8.82 \pm 1.0755	8.52 \pm 0.7668	0.5037
Vertical jump touch height (cm)	299.64 \pm 6.2566	295.29 \pm 5.0283	0.6965

Table 3. Data collation of upper limb explosive force index of two groups of tennis players after the experiment.

Option	Experience group	Control group	P
Standing long jump (cm)	278.73 \pm 6.0773	260.58 \pm 6.9151	0.0164
1 minute sit-ups (times)	67.87 \pm 3.8817	60.67 \pm 4.0110	0.0237
Forehand throw (m)	13.28 \pm 0.9143	11.69 \pm 1.1175	0.0341
Backhand Throw (m)	12.79 \pm 0.8891	11.53 \pm 1.0677	0.0342
Kneel throwing solid ball (m)	10.88 \pm 1.0258	8.69 \pm 0.8166	0.0149
Vertical jump touch height (cm)	305.72 \pm 5.7876	296.46 \pm 5.5321	0.0266

Table 4. Comparison of the change rate before and after the experiment between the experimental group and the control group.

Option	Change rate of experimental group	Change rate of control group	P
Standing long jump (cm)	3.7590%	0.6994%	0.0630
1 minute sit-ups (times)	12.2271%	1.3356%	0.3719
Forehand throw (m)	13.2364%	0.3416%	0.0602
Backhand Throw (m)	11.9691%	0.1727%	0.3196
Kneel throwing solid ball (m)	18.9387%	1.9518%	0.0355
Vertical jump touch height (cm)	1.9879%	0.3975%	0.0350

Table 5. Effect of Medicine Ball Training on Tennis Players' Service Speed.

Option	Experience group	Control group	P
Before experiment	112.79 \pm 14.1016	114.08 \pm 13.3647	0.5618
After experiment	138.19 \pm 16.2852	120.11 \pm 13.2868	0.4348
Rate of change	18.3764%	5.0213%	0.3509

experiment, the service speed of the experimental group was 138.19 ± 16.2852 , and the service speed of the control group was 120.11 ± 13.2868 . The change rate of service speed of the experimental group before and after the experiment was 18.3764%, and that of the control group before and after the experiment was 5.0213%.

Comparing the data of the experimental group and the control group, it can be found that the change rate of the service speed of the tennis players in the experimental group with the addition of medicine ball training is significantly stronger than that of the tennis players in the control group with only normal training. Therefore, medicine ball training can be added to daily training to improve the service speed of tennis players. By improving the explosive force of the upper arm of tennis players, the tennis technical level of tennis players can be improved.

DISCUSSION

With the continuous development of tennis, China's tennis has gradually made some remarkable achievements in the world's tennis competitions, which has gradually attracted the public's attention. However, as far as China is concerned, there is still a big gap between the training methods and the skill level of tennis and the advanced tennis players in the world. If we want to narrow the gap between China's tennis and the world's tennis, we must constantly cultivate excellent Chinese tennis players. The development of tennis is also the same as other undertakings. It is necessary to do a good job in the reserve of talents. Only by doing a good job in the training of excellent tennis talents can we provide a continuous stream of talents for tennis, promote the further development of China's tennis, and make China's tennis movement impact the world-class level. Only in this way can China's tennis reach the world's top level as well as China's table tennis, and let China's tennis win glory for the country. In order to continuously improve the skill level of Chinese tennis players, the first step is to improve the explosive force of tennis players' upper limbs. Due to the high requirements of tennis on the upper limbs, the explosive strength of the upper limbs directly affects the service speed of tennis players. After observing a large number of excellent foreign tennis matches, this paper finds that tennis players with strong upper limb strength have obvious advantages in serving speed. So. To improve the professional level of tennis players, we can improve the explosive force of tennis players' upper limbs, and then improve the service speed of tennis players, and promote the competitive level of Chinese tennis players to a new level.

Tennis requires high speed and strength. It is an explosive sport of strength. At the same time, upper limb explosive force is also the foundation of tennis players' professional quality. If there is no good upper limb explosive force, it will restrict the improvement of tennis players' skill level. Although in daily tennis training, the explosive force of tennis players' upper limbs can be improved through daily tennis training. However, the effect is not obvious. Through this study, it can also be found that during the normal tennis training of 50 tennis players in the control group for 12 weeks, the explosive strength of the upper limbs of tennis players before and after the experiment did not improve significantly. Although the service speed has been improved, the improvement is very small. This paper finds that medicine ball training can significantly improve the explosive force of tennis players' upper limbs by consulting different documents.

CONCLUSION

When tennis players are trained with medicine ball, different medicine ball training methods can be used to train tennis players' upper arm explosive force. However, during the medicine ball training, we should pay attention to the gradual way. First, we should carry out the medicine ball training with primary difficulty, and then gradually transition to the medicine ball training with intermediate and advanced difficulty. At the same time, attention must be paid to the safety of athletes in the dangerous practice of throwing medicine balls. The medicine ball training should be conducted under the guidance of professional coaches throughout the training. Although the main purpose of medicine ball training is to increase the explosive force of tennis players' upper arm, the whole body medicine ball training should be carried out during the training process, especially the coordination training of upper limbs and lower limbs,

which can effectively improve the coordination of the whole body. At the same time, due to the high requirements of tennis on the upper arm, the special medicine ball training of the upper arm can be added on the basis of the whole body training. This can effectively improve the upper limb muscle strength of tennis players, improve the upper arm explosive force of tennis players, and then improve the service speed of tennis players, so that tennis players can achieve better results in the game.

ACKNOWLEDGEMENT

This paper was supported by Research on the teaching practice of "wucaolong" sports elective course in Songjiang based on inheriting national intangible cultural heritage(No.: C2-2020052)

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: The author has completed the writing of the article or the critical review of its knowledge content. This paper can be used as the final draft of the manuscript. Every author has made an important contribution to this manuscript. Kong Huangsheng and Xu Zhongming: writing and execution.

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