IMPACTS OF LOWER LIMB TRAINING IN BADMINTON

IMPACTOS DO TREINAMENTO DE MEMBROS INFERIORES NO BADMINTON

IMPACTOS DEL ENTRENAMIENTO DE MIEMBROS INFERIORES EN EL BÁDMINTON

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ABSTRACT

Introduction: Badminton is extremely popular among Chinese people, and the development of its training methods is constant. The study of improvement in the training of the lower limbs is the main focus to increase the physical fitness of its practitioners. Objective: Study the effects of a specific lower-limb training protocol on the physical fitness of badminton players. Methods: Twenty-four volunteers were selected from freshmen and sophomore badminton majors in a physical education college. The sample was randomly divided into control and experimental groups with no statistical differences. The control group continued to use the traditional fitness training method, while the experimental group reinforced their training with a lower limb strength protocol. The experiment lasted 6 weeks, consisting of one hour of training thrice a week. Indicators were collected before and after the experiment for statistical analysis. Results: The Illinois sensitivity index was optimized from 17.049 ± 0.9618 to 15.287 ± 0.8146 in the experimental group, with optimization of the blind step index from 4.607 ± 1.2072 to 10.631 ± 5. 3292.4. The 10m return index was optimized from 10.582 ± 0.6085 to 9.853 ± 0.4809, and the reaction action test index was optimized from 1.965 ± 0.1378 to 1.756 ± 0.1378 after the experiment. Conclusion: Increasing the proportion of lower limb training to traditional fitness training can improve athletes' fitness level and competitive level. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Physical Education and Training; Physical Fitness; Lower Extremity; Racquet Sports.

RESUMO

Introdução: O badminton é bastante popular entre os chineses, e o desenvolvimento dos seus métodos de treinamento é constante. O estudo de aprimoramento no treinamento dos membros inferiores é o principal foco para incrementar a aptidão física de seus praticantes. Objetivo: Estudar os efeitos de um protocolo de treinamento específico dos membros inferiores sobre a aptidão física em jogadores de badminton. Métodos: Foram selecionados 24 voluntários entre calouros e alunos do segundo ano de especialidade de badminton numa faculdade de educação física. A amostra foi aleatoriamente dividida em grupos controle e experimental, sem diferenças estatísticas entre os grupos. O grupo de controle continuou a utilizar o método tradicional de treinamento de aptidão física, enquanto o grupo experimental reforçou o treinamento com um protocolo de força para os membros inferiores. O experimento durou 6 semanas, consistindo em uma hora de treinamento, três vezes na semana. Os indicadores foram coletados antes e depois do experimento para análise estatística. Resultados: O índice de sensibilidade de Illinois foi otimizado de 17,049 ± 0,9618 para 15,287 ± 0,8146 no grupo experimental, com otimização do índice de passo cego de 4,607 ± 1,2072 para 10,631 ± 5. 3292,4. O índice de retorno de 10m foi otimizado de 10,582 ± 0,6085 para 9,853 ± 0,4809, o índice do teste de ação de reação foi otimizado de 1,965 ± 0,1378 para 1,756 ± 0,1378 após o experimento. Conclusão: Incrementar a proporção de treinamento dos membros inferiores ao treinamento de aptidão física tradicional pode melhorar o nível de aptidão física e o nível competitivo dos atletas. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Educação Física e Treinamento; Aptidão Física; Extremidade Inferior; Esportes com Raquete.*

RESUMEN

Introducción: El bádminton es muy popular entre los chinos, y el desarrollo de sus métodos de entrenamiento es constante. El estudio de la mejora en el entrenamiento de los miembros inferiores es el principal objetivo para aumentar la forma física de sus practicantes. Objetivo: Estudiar los efectos de un protocolo de entrenamiento específico de los miembros inferiores sobre la forma física en jugadores de bádminton. Métodos: Se seleccionaron 24 voluntarios entre estudiantes de primer y segundo año de la especialidad de bádminton de una facultad de educación física. La muestra se dividió aleatoriamente en grupos de control y experimental, sin diferencias estadísticas entre los grupos. El grupo de control siguió utilizando el método tradicional de entrenamiento físico, mientras que el grupo experimental reforzó el entrenamiento con un protocolo de fuerza de las extremidades inferiores. El experimento duró 6 semanas y consistió en una hora de entrenamiento, tres veces por semana. Se recogieron indicadores antes y después del experimento para su análisis estadístico. Resultados: El índice de sensibilidad de Illinois se optimizó de 17,049 ± 0,9618 a 15,287 ± 0,8146 en el grupo experimental, con una optimización del índice de paso ciego de 4,607 ± 1,2072 a 10,631 ± 5. 3292,4. El índice de retorno de 10 m se optimizó de 10,582 ± 0,6085 a 9,853 ± 0,4809, el índice de prueba de acción de

reacción se optimizó de 1,965 ± 0,1378 a 1,756 ± 0,1378 tras el experimento. Conclusión: Aumentar la proporción de entrenamiento de las extremidades inferiores con respecto al entrenamiento físico tradicional puede mejorar la forma física y el nivel competitivo de los deportistas. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

***Descriptores*:** *Educación y Entrenamiento Físico; Aptitud Física; Extremidad Inferior; Deportes de Raqueta.*

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INTRODUCTION

With the development of modern sports, "faster and stronger" has become the main development direction of sports.[1] Badminton is very popular in China, and the participation of the masses is also very high. In addition, China has achieved excellent results in all kinds of competitions in the world. The development and training system of badminton is also more advanced than that of other countries.[2] In view of the improvement of badminton, the sensitivity sports attribute has a strong influence factor.[3] Lower limb training is the main method to improve the sports agility of badminton. Participants can improve their agility through strength training and mobile training.[4] It can directly improve the technical level of its own project. Therefore, the study of more efficient lower limb training methods is the key to improve the performance of badminton.[5] Aiming at this demand, combined with the common problems in the badminton teaching process, this paper takes the first year and second year badminton students of a university as the research object, and designs a related controlled experiment to explore the role of lower limb training in the improvement of badminton players' sensitivity.[6] It hopes that this experiment can solve the bottleneck period in the athletes' training and promote the improvement of college badminton players' competitive level.

METHOD

First of all, the article consulted a large number of materials and documents, studied the sensitivity of badminton in this study, grasped the current research status, and fully learned some relatively new training methods. The study and all the participants were reviewed and approved by Ethics Committee of Suzhou Institute Of Technology (NO.19SIT079-PE). Subsequently, in the form of volunteer recruitment, 24 volunteers were selected from the freshmen and sophomores of badminton specialty in a college of physical education. After 24 volunteers were determined, they were randomly sampled and divided into experimental group and control group. The basic information of the athletes in the two groups is shown in Table 1.

The experiment used the control variable method, in which the control group continued to use the traditional sensitive quality training method without change; The experimental group strengthened the training of lower limb strength in the sensitivity training methods, including the use of auxiliary equipment for squatting exercises to train thigh and hip muscles, and the use of tiptoe to train calf muscles. As well as the use of fast stepping to promote the lower limb endurance (see the following discussion for specific methods). The whole experiment lasted for 6 weeks. One hour of relevant training was carried out on Monday, Wednesday and Friday, including 15 minutes of warm-up exercise, 30 minutes of training time and 15 minutes of stretching and relaxation, to prevent sports injuries during the exercise.

In terms of the selection of test indicators, the indicators such as Illinois sensitivity test, hexagon, cross quadrant jump, 20s repeated cross jump, and blind step in situ are selected as the reference objects of sensitivity test. Through these indicators, the reaction speed and transformation of athletes in the badminton court can be judged. Select 4 × The indicators such as 10m turn back run, meter dash, T-shaped run, 30m speed run, 10 second high leg lift in situ, and selection reaction action test are used as the judgment criteria for speed sensitivity detection, which can judge the time for athletes to quickly reach the relevant position or complete the relevant action after they reflect. The relevant indexes were measured before and after the experiment, and the data were statistically analyzed using Excel software and spss software.

Table 1. Analysis of the basic situation of the two groups of athletes.

Project	Experimental group (n=12)	Control group (n=12)	F	P
Age (age)	19.743±1.2003	20.487±1.4578	0.52495	0.60538
Height (cm)	158.660±6.3887	163.711±4.7344	0.54139	0.57683
Weight (kg)	52.826±3.7435	55.028±5.5503	0.71168	0.50411
Years of exercise (years)	6.597±0.8696	6.691±1.9212	0.27056	0.75472

RESULTS

Sensitivity test of badminton players

The agility of badminton players mainly shows that they can react quickly according to the changes of the ball on the court, so as to cope calmly on the unpredictable court. Get more points.

Table 2 shows the sensitivity test of the two groups of athletes before the experiment. From the data, there is little difference between the indicators of the two groups of athletes before the experiment, which shows that the selected personnel are random, and the basic conditions of sensitivity indicators will not bring artificial interference to the experimental results.

As shown in Table 3, the indexes of sensitivity of the two groups of athletes after the experiment are tested. It can be seen from Table 3 that the index of Illinois sensitivity test in the experimental group is optimized from 17.049 ± 0.9618 to 15.287 ± 0.8146 after the experiment, and the index of hexagon is optimized from 2.581 ± 1.1412 to 3.796 ± 0.8435 after the experiment, The cross quadrant jump index was optimized from 23.064 ± 2.5101 to 28.854 ± 3.4747 after the experiment, the repeated

Table 2. Sensitivity detection of athletes in the two groups before the experiment.

Test items	Experience group	Control group	T	P
Illinois sensitivity test	17.049±0.9618	17.557±0.8761	8.61453	0.00000
Hexagonal ball	2.581±1.1412	2.658±1.1090	-3.99644	0.00098
Cross quadrant jump	23.064±2.5101	25.232±2.6295	-1.23000	0.23816
Repeated cross jump in 20s	37.622±2.5207	36.813±1.9946	0.80155	0.43085
Step in situ with eyes closed	4.607±1.2072	4.095±1.4864	-4.93232	0.00000

Table 3. Sensitivity detection of athletes in the two groups after the experiment.

Test items	Experience group	Control group	T	P
Illinois sensitivity test	15.287±0.8146	17.132±0.8269	2.49574	0.02126
Hexagonal ball	3.796±0.8435	2.756±0.8146	-0.30416	0.74909
Cross quadrant jump	28.854±3.4747	26.347±3.6004	2.17046	0.04565
Repeated cross jump in 20s	43.184±3.9076	38.836±3.6320	2.59112	0.01963
Step in situ with eyes closed	10.631±5.3292	5.256±2.1065	-2.33519	0.03150

cross jump index was optimized from 37.622 ± 2.5207 to 3.184 ± 3.9076 after the experiment, and the blind step index was optimized from 4.607 ± 1.2072 to 10.631 ± 5.3292 after the experiment. In the control group, the Illinois sensitivity test index was optimized from 17.557 ± 0.8761 to 17.132 ± 0.8269 after the experiment, the hexagon index was optimized from 2.658 ± 1.1090 to 2.756 ± 0.8146 after the experiment, the cross quadrant jump index was optimized from 25.232 ± 2.6295 to 26.347 ± 3.6004 after the experiment, the cross jump index was optimized from 36.813 ± 1.9946 to 38.836 ± 3.6320 after the experiment, and the blind step index was optimized from 4.095 ± 1.4864 to 5.256 ± 2.1065 after the experiment.

Speed sensitivity test of badminton players

In addition to reaction sensitivity and body sensitivity, speed sensitivity also plays a decisive role on the badminton court. Players need quick reaction after complete relevant actions or reaches the specified location, to better complete volleys and serve action, therefore, this paper chose 4 x 10 m reverse layup, rice word run, T run speed, 30 meters, 10 seconds in situ high leg lifts, select - reaction - action test indicators, such as the velocity sensitivity of detection.

Table 4 shows the speed sensitivity detection of the two groups of athletes before the experiment. It can be seen from the data that there is little difference between the two groups of data, thus eliminating the interference caused by the different foundation before the experiment.

Table 5 shows the speed sensitivity test of the two groups of athletes after the experiment. It can be seen from the table that the test group 4 × The index of 10 m turn back run was optimized from 10.582 ± 0.6085 to 9.853 ± 0.4809 after the experiment, the index of meter running was optimized from 18.890 ± 0.8534 to 17.959 ± 0.9725 after the experiment, the index of T running was optimized from 9.167 ± 0.6595 to 8.529 ± 0.6989 after the experiment, the index of 30 m speed running was optimized from 5.117 ± 0.5062 to 4.804 ± 0.2835 after the experiment, and the index of high leg raising in situ in 10 seconds was optimized from 46.018 ± 3.0817 to 48.479 ± 3.4252 after the experiment, The selection reaction action test index was optimized from 1.965 ± 0.1378 to 1.756 ± 0.1378 after the experiment. Control group 4 × The index of 10m turn back run was optimized from 10.953 ± 0.7875 to 10.690 ± 54.1390 after the experiment, the index of meter running was optimized from 17.797 ± 1.2759 to 17.630 ± 139.3637 after the experiment, the index of T-running was optimized from 9.698 ± 0.6978 to 9.525 ± 0.7787 after the experiment, the index of 30m speed running was optimized from 5.299 ± 0.4962 to 4.804 ± 0.2977 after the experiment, and the index of 10 second high leg raising was optimized from 45.329 ± 4.4099 to 47.888 ± 3.6421 after the experiment, The selection reaction action test index was optimized from 1.914 ± 0.1519 to 1.865 ± 0.1721 after the experiment.

This shows that the optimization effect of the traditional badminton sensitivity teaching method on the athletes is not high, and some options have even declined. It shows that the traditional training can not keep up with the athletes' training state at this time, and it must be optimized, otherwise it will lead to a bottleneck period or even a decline in sports level. And the lower limb training centered sensitivity training method proposed in this paper can better combine with the actual needs of badminton, improve its speed sensitivity indicators in all aspects, so that it can get more initiative in the badminton arena.

DISCUSSION

In the process of badminton sports, explosive jumping movements and short distance sprints are more common in the fashion process. Therefore, participating in the badminton project puts forward higher requirements for the lower limb strength of the participants. Especially in the attack link when jumping and hitting, the lower limbs need to give the body enough strength to complete a series of technical actions in the air. Therefore, we should pay enough attention to the lower limb training in the sequence link. For lower limb training, it can be subdivided into several links. First of all, we need adequate warm-up before training. The warm-up process can be completed with the help of sports equipment or through simple warm-up actions. The warm-up process can make the body reach the best exercise state. It can effectively avoid the risk of sports injury caused by warm-up. At the end of the warm-up activity, the limbs should be stretched in time. The easily strained tissues such as joints and ligaments of the whole body have sufficient flexibility and flexibility. Next is strength training for thigh muscles and hip muscles. In the process of training thigh muscles and hip muscles, you can use auxiliary equipment to carry out weight bearing squatting exercises. It is a common training method to change the training intensity by changing the weight of barbell. In the training process, it is suitable to use the method of increasing weight for training, which is helpful to improve your ability. You can also use the Smith machine to do squatting exercises. With the help of instruments, training can be guaranteed in a safer environment. For the training of lower limb bone biceps, it can be improved by pulling straight leg hard. The training intensity can also be changed by increasing the load. For the exercise of calf muscles, you can do it on tiptoe. When training, you should keep your legs upright and lean forward to achieve the best training effect. The process of lifting and lowering feet shall be carried out slowly and evenly. The calf muscles can be fully trained. It can also ensure the safety of training and avoid the injury of Achilles tendon caused by sudden excessive exertion. This kind of training needs to be carried out in groups, 20 times in each group, during daily training. The daily training amount of 4-5 groups is enough. When you reach a certain ability, you can carry out this kind of training under the state of weight bearing. The training of lower limb endurance can be carried out by stepping quickly. Fix the number of steps of the target, and quickly climb through the front foot. The core training content of this method is to have enough rhythm. With the improvement of self capacity, the number of target steps can be increased. Improving the strength and endurance of calf muscles can obviously help the jumping ability. In the process of training, you can use some training contents focusing on running and jumping, such as long-distance running, sprint, turn back running, etc. These auxiliary exercises have improved the strength of lower limbs to varying degrees.

Table 4. Speed sensitivity detection of the two groups of athletes before the experiment.

Test items	Experience group	Control group	T	P
4 x 10 m reverse layup	10.582±0.6085	10.953±0.7875	-0.24412	0.81899
Meter dash	18.890±0.8534	17.797±1.2759	-1.14873	0.25495
T-running	9.167±0.6595	9.698±0.6978	-0.76027	0.45846
30 meter speed run	5.117±0.5062	5.299±0.4962	4.16484	0.00098
Raise your legs in place for 10 seconds	46.018±3.0817	45.329±4.4099	-2.84997	0.01083
Select-reaction-action test	1.965±0.1378	1.914±0.1519	9.22529	0.00000

Table 5. After the experiment, the speed sensitivity of the two groups of athletes was detected.

Test items	Experience group	Control group	T	P
4 x 10 m reverse layup	9.853±0.4809	10.690±54.1390	-2.43720	0.02430
Meter dash	17.959±0.9725	17.630±139.3637	-0.31401	0.74220
T-running	8.529±0.6989	9.525±0.7787	-2.17654	0.04466
30 meter speed run	4.804±0.2835	4.804±0.2977	3.55886	0.00196
Raise your legs in place for 10 seconds	48.479±3.4252	47.888±3.6421	-2.94604	0.00886
Select-reaction-action test	1.756±0.1378	1.865±0.1721	0.97450	0.32878

CONCLUSION

Based on the traditional sensitivity training of badminton, this paper adds more lower limb training modules, which are combined with the actual needs of the players in the badminton arena, and carries out experimental research on this. The results show that increasing the proportion of lower limb training in the traditional sensitivity training mode can better improve the athletes' sensitivity level, enable them to complete the actions they want to complete faster and more quickly in the sports field, so as to gain more initiative, improve their competition results and competitive level.

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