ABDOMINAL CORE MUSCLE STRENGTH TRAINING IN BADMINTON PLAYERS

TREINAMENTO DE FORÇA MUSCULAR DO CENTRO ABDOMINAL NOS JOGADORES DE BADMINTON

ENTRENAMIENTO DE LA FUERZA MUSCULAR DEL NÚCLEO ABDOMINAL EN JUGADORES DE BÁDMINTON

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Hui Sun[1,2]
(Physical Education Professional)
Zhe Shao[3]
(Physical Education Professional)

1. Capital University of Physical Education and Sports, Beijing, China.
2. Department of Development, Beijing Open University, Beijing, China.
3. Jiangxi University of Chinese Medicine, Nanchang, Jiangxi, China.

Correspondence:
Hui Sun
Beijing, China. 100091.
13146640074@163.com

ABSTRACT

Introduction: Badminton is a sport of intense confrontation and variable transitions between attack and defense, where the athlete maintains an extreme body dynamic. Objective: Study the effects of abdominal core muscle strength training on badminton players. Methods: A screening method was used by randomly selecting 20 male badminton players. The effects of abdominal core muscle strength training and the athletes' specific skills were evaluated by a protocol after 10 weeks of strength training. Results: The results of the two groups were significantly different by t-test, $p<0.05$. Both improved in all indicators. The experimental group showed higher scores in 6 indicators than the control group, with $p<0.01$ having a highly significant difference. Conclusion: Abdominal core muscle strength training can effectively improve body stability, optimize the technical movements of badminton players, and play a positive role in body stability. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Badminton; Athletes; Abdominal Core; Resistance Training.

RESUMO

Introdução: O badminton é um esporte de intenso confronto e transições entre ataque e defesa variáveis, onde o atleta mantém uma extrema dinâmica corporal. Objetivo: Estudar os efeitos do treinamento de força muscular do centro abdominal nos jogadores de badminton. Métodos: Foi utilizado um método de triagem selecionando aleatoriamente 20 jogadores masculinos de badminton. Os efeitos do treinamento de força muscular do centro abdominal e as habilidades específicas dos atletas foram avaliados por um protocolo após 10 semanas de treinamento de força. Resultados: Os resultados dos dois grupos foram significativamente diferentes pelo teste t, $p<0,05$. Ambos melhoraram em todos os indicadores, o grupo experimental apresentou pontuações mais altas em 6 indicadores do que o grupo controle, com $p<0,01$ tendo uma diferença altamente significativa. Conclusão: O treinamento de força muscular do centro abdominal na área central pode melhorar efetivamente a estabilidade corporal e otimizar os movimentos técnicos dos jogadores de badminton, além de desempenhar um papel positivo na estabilidade corporal. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Badminton; Atletas; Centro Abdominal; Treinamento de Força.*

RESUMEN

Introducción: El bádminton es un deporte de intensa confrontación y transiciones variables entre el ataque y la defensa, donde el deportista mantiene una dinámica corporal extrema. Objetivo: Estudiar los efectos del entrenamiento de la fuerza muscular del núcleo abdominal en jugadores de bádminton. Métodos: Se utilizó un método de cribado seleccionando aleatoriamente a 20 jugadores de bádminton de sexo masculino. Los efectos del entrenamiento de la fuerza del núcleo abdominal y las habilidades específicas de los atletas se evaluaron mediante un protocolo después de 10 semanas de entrenamiento de la fuerza. Resultados: Los resultados de los dos grupos fueron significativamente diferentes mediante la prueba t, $p<0,05$. Ambos mejoraron en todos los indicadores, el grupo experimental mostró puntuaciones más altas en 6 indicadores que el grupo de control, con $p<0,01$ teniendo una diferencia altamente significativa. Conclusión: El entrenamiento de la fuerza muscular del núcleo abdominal puede mejorar eficazmente la estabilidad corporal y optimizar los movimientos técnicos de los jugadores de bádminton, y desempeñar un papel positivo en la estabilidad corporal. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Badminton; Atletas; Núcleo Abdominal; Entrenamiento de Fuerza.*

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INTRODUCTION

Badminton is a sport with intense confrontation and changeable offense and defense transitions, and the athlete's body will be in a state of real-time changes. Badminton players need to change their movements in real time according to the actual situation on the field, maintain precise control of your body to perform at your best competitive level.[1] In the training process of badminton players, core strength training can well improve the balance ability of athletes and improve their competitive level. However, there are many mistakes in the core strength training of badminton players, cause badminton players to cause damage to different parts in the training process, affecting their own ability to play, the application of core strength in different sports events is particularly important.[2] The core area is like a hinge or bridge for the upper and lower limbs to be dredged, the stability of this link not only affects whether the fulcrum of the limbs is firm, but also affects the correctness of the movement skills of the whole body and the quality of the movement.[3,4] The author takes the athletes of the badminton class majoring in sports training in Normal University as the experimental research objects, and takes the core area strength training theory as the support, through experimental training and result analysis, the influence of core area strength training on various strength indicators of college badminton players is explored, and the support and reference for college badminton players to improve their competitive ability are provided.[5]

METHOD

Research objects

Twenty male badminton players were randomly selected from the School of Physical Education of Normal University as the research objects, and the results were sorted out according to various test indicators and basic information data, they were divided into control group and experimental group, 10 people in each group. Before the experiment, the basic conditions of the two groups of players were counted, and it was verified that the difference between each index group was greater than 0.05, and the experiment could be carried out. (Table 1)

Experimental plan

The experimental period of the experimental group (core area strength training group) was 10 weeks, and the whole training process was divided into 4 stages, which increased by one stage with the increase of training difficulty. Train 3 times a week, 25 minutes each time. The training plan is as follows: Stage 1 is mainly about overall strength training to overcome self-resistance, including straight back bridge, lateral elbow support and overhead hip. The second stage is the use of equipment core area stability training, including Swiss Ball Kneeling, Swiss Ball Elbow Support, Supine Ball Hip Raise, Front Push and Pull Ball, Supine Double Leg Pull Ball, and Back Leg Raised Split Squat on Ball . The first and second stages of action practice time are 30sx3 for each action in turn. The third stage is combined with special training, this stage increases the difficulty, in the training, the Swiss ball is combined with special movements to do various movements such as pulling, pushing, lifting, and torso twisting on the Swiss ball, this includes pulling the rubber band on the prone ball, throwing the ball on the sit--up ball, and flat pulling the rubber band on the kneeling ball. The fourth stage of weight-bearing resistance training, proprioception and coordination training, this stage is improved, including the balance plate turning and touching the ball, the balance plate flat pulling the rubber belt and the balance plate pulling the rubber belt back and forth.[6,7]

Experimental condition control

During the experiment, the athletes in the experimental group and the control group were in the same training group, the training is guided by the same teacher, except for strength training, the professional technical training content, training intensity, training time and training methods are all consistent. In addition, the two groups of student team members all study in the same grade in the physical education college of a normal university, and their work and rest time, diet rules, etc. are basically the same.

Ethical Compliance

Research experiments conducted in this article with animals or humans were approved by the Ethical Committee and responsible authorities of Capital University of Physical Education and Sports and Beijing Open University following all guidelines, regulations, legal, and ethical standards as required for humans or animals.

RESULTS

In the core strength training of badminton players, the athletes have different degrees of injury due to training errors. In order to avoid this situation, the possible errors in the core strength training of badminton players are analyzed.[8] After investigation and statistics, the common mistakes in core strength training of badminton players are shown in Figure 1. It can be seen from Figure 1 that technical movement errors, poor special quality, incomplete or insufficient preparation activities, poor training equipment and equipment, and excessive training load are common mistakes in the core training process of badminton players, it is very easy to cause physical injury to athletes, which in turn affects the performance of athletes' abilities and ultimately affects their performance.

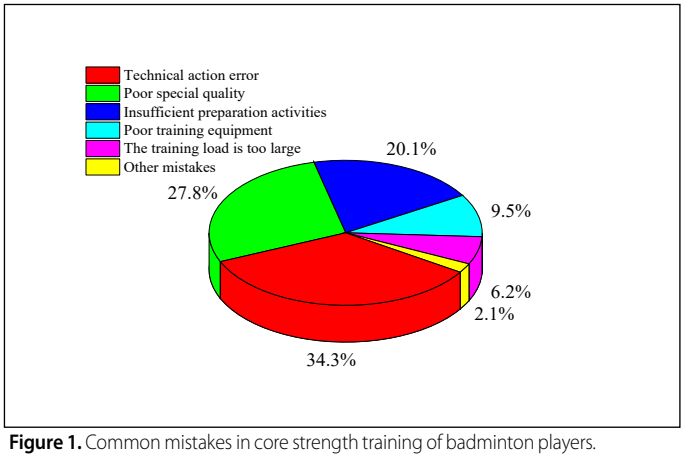

Figure 1. Common mistakes in core strength training of badminton players.

Table 1. Basic information of experimental group and control group.

index	test group	control group	t	p
age(y)	18.2±0.7	17.8±1.3	0.3	>0.05
Height (cm)	175.2±2.4	174.7±1.5	0.5	>0.05
Weight (kg)	66.1±3.2	67.0±3.4	-0.6	>0.05

Comparative analysis of changes in FMS scores between the experimental group and the control group after the experiment

It can be seen from Table 2 that after 10 weeks of training, the scores of 6 indicators in the experimental group were higher than those in the control group, among which the average score of the straight lunge and squatting experimental group was 1.50 points and the control group was 0.88 points, the average score of the experimental group was 2.00 and the control group was 1.50, the scores of the two groups were significantly different by t test, $p<0.05$. Although the performance of squat, hurdle frame, shoulder joint mobility and body control push-up were improved, there was no significant difference ($p>0.05$). The straight leg active lift control group was slightly higher than the experimental group, but $p>0.05$, so there was no significant difference.

Comparative analysis of the changes in the performance of the special technical quality indicators between the experimental group and the control group after the experiment

After 10 weeks of strength training, the two groups have improved in various indicators, as can be seen in Table 3, the experimental group participating in strength training in the core area had higher scores in 6 indicators than the control group, the average score of the badminton throwing experimental group was 8.40, which was higher than that of the control group, which was 7.88, there was a highly significant difference with $p<0.01$. The technical scores of backhand, forehand and backhand are higher in the experimental group than in the control group, the scores of the two groups are significantly different by t test, $p<0.05$. Although the score of forehand draw improved, but there was no significant difference ($p>0.05$).

DISCUSSION

Badminton is a fierce competition against the net, it requires full-court running, the coordination of the muscles of the whole body, not only the simple upper and lower body movements, but the more important link is the development of core strength, only by developing and improving core strength can we improve badminton skills, including rubbing the ball in the front court, releasing the ball, and throwing the ball; The midfield catches and kills the ball; The backcourt heavy kills, splits and other techniques, through the improvement of the core strength of the stability of these techniques, the offensive will be improved.[9] In the process of badminton, when the limbs need to exert force, the force needs to be transmitted by the core muscle group, when the ability of the core muscle group to accumulate strength is improved, the working efficiency of the limb muscles can be improved. For example, the jump-kill action in badminton uses the core muscles of the lower limbs to push the ground as a force transmission link, and transmits the force to the upper limbs.[10] Athletes with good core strength have a fast transmission speed, the quality of smashing the ball will be improved, and the exercise efficiency will naturally improve.

Table 2. Comparison of changes in FMS scores between the experimental group and the control group after the experiment.

Test indicators	group	average	standard deviation	t	p
Squat	test group	1.6	0.5	0.3	>0..05
	control group	1.5	0.5		
hurdles	test group	1.4	0.5	0.7	>0..05
	control group	1.3	0.4		
straight squat	test group	1.5	0.5	3.4	<0.05
	control group	0.9	0.4		
shoulder flexibility	test group	2.9	0.4	2.2	>0..05
	control group	2.0	1.1		
Lower waist flexibility	test group	1.5	0.5	-1.4	>0..05
	control group	1.9	0.4		
body control push up	test group	1.9	0.6	-0.6	>0..05
	control group	1.8	0.5		
swivel stability	test group	2.0	0.0	-2.7	<0.05
	control group	1.5	0.5		

Remarks: FMS: Motor Function Test to test for asymmetry and limitations of the human body

Table 3. Comparison of the results of the special technical quality test between the experimental group and the control group after the experiment.

Test indicators	group	average	standard deviation	t	p
back toss medicine ball	test group	13.1	2.3	-1.8	>0..05
	control group	12.3	2.4		
badminton throw	test group	8.4	0.4	-4.1	<0.01
	control group	7.9	0.5		
Forehand kick (up to standard)	test group	7.3	3.7	-1.8	>0..05
	control group	5.0	2.1		
Backhand draw (standard)	test group	8.4	1.4	-4.8	<0.05
	control group	4.3	1.4		
Forehand kick (technical review)	test group	5.9	1.0	-2.8	<0.05
	control group	5.0	1.1		
backhand kick	test group	5.6	0.7	-2.7	<0.05
	control group	4.6	0.7		

Remarks: Special movement test can test the stability and improvement of technical movement

CONCLUSION

Reasonable design of core area strength training can play a role in correcting movement patterns, through functional exercise tests, it is found that core area strength training can better improve the joint stability of the human body, and play a role in the technical stability of badminton players. positive effects. Core strength training has a better effect on technique than traditional strength training. Especially to improve the technical movements of badminton players' muscle contraction force and rotation force, it has obvious effects on the effectiveness and stability of the technology. According to the test results, the advantages of strength training in the core area can be found, which has positive significance for improving the level of technical and tactical skills, it is recommended that in future sports training, practice closer to specific movements.

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

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