INFLUENCE OF CORE STRENGTH TRAINING ON PELVIC GIRDLE STRENGTH IN TABLE TENNIS PLAYERS

INFLUÊNCIA DO TREINAMENTO DE FORÇA DO CORE SOBRE A FORÇA DA CINTURA PÉLVICA NOS JOGADORES DE TÊNIS DE MESA

INFLUENCIA DEL ENTRENAMIENTO DE LA FUERZA DEL CORE EN LA FUERZA DE LA CINTURA PÉLVICA EN JUGADORES DE TENIS DE MESA

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Lei Dai[1]
(Physical Education Professional)

1. China University of Mining and Technology, School of Sports, Xuzhou, Jiangsu, China.

Correspondence:
Lei Dai
Xuzhou, Jiangsu, China. 221116
4094@cumt.edu.cn

ABSTRACT

Introduction: Core strength training has attracted much attention in modern competitive sports. Objective: Study the effect of core strength training on pelvic girdle strength in table tennis players. Methods: 50 students aged 12-14 from the table tennis club of an elementary school affiliated with a normal university were divided into a control group and an experimental group. They performed a one-week training of core strength exercises. Through a series of technical index tests, the data before and after using these strength training methods were obtained for comparative analysis. Results: After the core strength training, there was no significant difference between the other four indices in the experimental group and the control group, except for the fact that there was a significant difference in the performance of running around the platform ($P < 0.05$). Conclusion: After the experiment, the four indexes reflecting the strength of the core muscle group in the experimental group were significantly optimized, while the four indexes in the control group were not significant, showing that core strength training has a more significant effect on improving the strength of the core muscle group. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Resistance Training; Waist Circumference; Racquet Sports.

RESUMO

Introdução: O treinamento de força do core atraiu muita atenção no campo dos esportes competitivos modernos. Objetivo: Estudar o efeito do treinamento da força do core sobre a força da cintura pélvica dos jogadores de tênis de mesa. Métodos: 50 estudantes de 12-14 anos de idade do clube de tênis de mesa da escola primária afiliada à universidade normal foram divididos em grupo de controle e grupo experimental. Executaram um treinamento de uma semana de exercícios de força do core. Através de uma série de testes de índice técnico, os dados antes e depois do uso desses métodos de treinamento de força foram obtidos para análise comparativa. Resultados: Após o treinamento de força do core, não houve diferença significativa entre os outros quatro índices do grupo experimental e do grupo controle, exceto pelo fato de que há uma diferença significativa no desempenho da corrida ao redor da plataforma ($P < 0,05$). Conclusão: Após o experimento, os quatro índices que refletem a força do grupo muscular do core no grupo experimental foram significativamente otimizados, enquanto que os mesmos índices no grupo controle não foram significativos, evidenciando que o treinamento de força do core tem um efeito significativo no aprimoramento da força sobre o grupo muscular do core. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

***Descritores*:** *Treinamento de Força; Circunferência da Cintura; Esportes com Raquete.*

RESUMEN

Introducción: El entrenamiento de la fuerza del core ha atraído mucha atención en el campo de los deportes de competición modernos. Objetivo: Estudiar el efecto del entrenamiento de la fuerza del core sobre la fuerza de la cintura pélvica en jugadores de tenis de mesa. Métodos: 50 estudiantes de entre 12 y 14 años del club de tenis de mesa de la escuela primaria afiliada a la universidad normal fueron divididos en grupo de control y grupo experimental. Realizaron un entrenamiento de una semana de ejercicios de fuerza del core. Mediante una serie de pruebas de índice técnico, se obtuvieron los datos antes y después del uso de estos métodos de entrenamiento de la fuerza para su análisis comparativo. Resultados: Después del entrenamiento de la fuerza del core, no hubo diferencias significativas entre los otros cuatro índices del grupo experimental y el grupo de control, excepto por el hecho de que hay una diferencia significativa en el rendimiento de correr alrededor de la plataforma ($P < 0,05$). Conclusión: Tras el experimento, los cuatro índices que reflejan la fuerza del grupo de músculos centrales en el grupo experimental se optimizaron significativamente, mientras que los cuatro índices del grupo de control no fueron significativos, lo que demuestra que el entrenamiento de la fuerza central tiene un efecto más significativo en la mejora de la fuerza del grupo de músculos del core. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

***Descriptores*:** *Entrenamiento de Fuerza; Circunferencia de la Cintura; Deportes de Raqueta.*

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INTRODUCTION

Core strength plays an important role in the stability of the center of gravity, the transmission and control of strength and so on. Core strength training is also called functional training or core stability training in Europe and America. This training method can well improve the strength and stability of competitive athletes' core muscles.[1] In recent years, a series of reforms of table tennis, the development trend of table tennis technology and the needs of athletes to enhance their competitive ability and prevent injuries have put forward new requirements for the core strength quality of table tennis athletes. However, in the specific training, many coaches do not have enough in-depth understanding of the core strength training theory of athletes, and the training effect is also lacking, which affects the further improvement of the competitive level of table tennis players.[2]

Core strength training is one of the important contents of modern physical training. Core strength in all sports, all sports take the muscle movement chain as the core. The core strength maintains the body posture, which plays a stable and supporting role for athletes in sports. If athletes complete the technical movements with high core muscle strength level, they will have a better sense of stability and balance and gain better weight in sports competition; Strengthening the core muscle can not only improve the accuracy and the stability of the whole body posture,[3] but also stabilize and strengthen the hip and trunk converted into energy output, which is conducive to improve the speed, integration and overall force transmission, and reduce the occurrence of sports injury.[4]

METHOD

Research object

In this paper, 50 table tennis club students aged 12-14 in the table tennis class of Normal University were divided into experimental group and control group for a period of time. 10 week technical index test (one leg squat, fitness ball push ups, support exercises with both legs on the balance ball, etc.).[5] Analyze and find out the data comparison before and after the use of core strength training methods, as well as the effect of preventing sports injury in the development of teenagers. Through the experimental comparison of core strength training, this paper studies the related problems of table tennis players' core strength training, and explores the impact of core strength training on the development of table tennis players' physical quality, so as to provide reference and suggestions on how to better carry out physical training and improve the effect of physical training.

Experimental method

This study mainly discusses and analyzes the impact of core strength training on the special physical quality of young table tennis players. The physical fitness of 50 table tennis players was tested before the experiment, and they were divided into experimental group and control group according to the test results.[6,7] The control group carried out general physical training according to the teaching plan, and the experimental group carried out core strength training according to the experimental scheme.

The core strength training should be carried out according to the principle of small load and multiple times. The dynamic exercise should be repeated more than 20 times in each group, and the static exercise should be 15-30 times in each group. The difficulty and intensity can be gradually increased or improved with the enhancement of athletes' ability to meet the needs of training, such as the gradual extension of time, the gradual increase of practice times or the gradual increase of load weight, the gradual change of equipment load practice in unarmed practice, the gradual increase of load, and the gradual increase of the complexity of action forms. During the training, we should strictly control the body posture, coordinate the breathing and movement, highlight the participation of the nervous system, and guide the athletes to deeply understand the key points of each movement. The specific methods are as follows:

1. Balance pad training

Stand on a balance pad or cushion with one foot to keep their body stable. Further, they can close their eyes, which will stimulate the proprioceptive nerve more strongly and bring more challenges to the core stability.

2. One leg squat

Stand on one leg, bend the bones and squat down. Their knees should not exceed their toes to ensure that your supporting feet touch the ground with the whole soles of their feet. To increase the difficulty, they can stand on the balance pad or cushion to complete the squat.

3. Fitness ball push ups

Open their hands and put them on the fitness ball with their hands below their shoulders. Beginners can reduce the difficulty by putting their elbows on the ball, or their feet can be wider apart. Don't let their chest touch the ball when you fall to the ground. When they get up, they don't have to straighten their elbow, keep the body in a straight line from head to foot, tighten the abdomen, and don't collapse the waist.[8]

Data processing

SPSS system software is used to analyze and process the test results, so as to provide reference and theoretical basis for this study. The main mathematical analysis methods are independent sample t-test, paired sample t-test and covariance analysis. The relevant index data of physical quality of the two groups of players before and after the experiment are statistically analyzed. Excel 12003 is used for data entry and mathematical statistics, and the data obtained from the test are summarized, statistically analyzed, so as to provide reliable data support for this study.[9]

RESULTS

The comparison of the results of the experimental group and the control group before the experiment is shown in Table 1.

As can be seen from table 1, the results of balance, static solid ball far throw and mobile solid ball far throw in the experimental group are slightly lower than those in the control group. The results of running around the platform and side sliding steps in the experimental group were slightly better than those in the control group. However, there was no significant difference between the two groups.

See Table 2 for the comparison of the results of the experimental group and the control group before and after the experiment.

Table 2 shows that after 10 weeks of teaching training and core strength training, the scores of the two groups have improved. In contrast, the scores of balance, running around the platform, static solid ball throwing and mobile solid ball throwing in the experimental group are higher than those in the control group. The average performance of the

Table 1. Comparison of the results of the experimental group and the control group before the experiment.

Index	Experimental group (n = 25)		Control group (n = 25)		Inter group gap
	X	S	X	S	
Balance (min)	88.50	1.56	87.53	2.40	-0.03.
Run around the platform (seconds)	14.73	0.54	15.87	0.48	-0.11
Static solid ball (m)	11.62	0.83	11.75	0.64	-0.14
Moving solid ball (m)	11.07	0.86	12.18	0.840	-0.10
Side sliding steps	38.10	1.53	35.75	1.98	0.35

experimental group was improved by 0.41 seconds and that of the control group by 0.22 seconds. The improvement range of the experimental group was close to twice that of the control group; The improvement of side slip step performance in the two groups was the same.[10]

The difference between training and competition can also be analyzed from the proportion of training time in different heart rate intervals. Here, the competition week in the third week of the first stage is compared with the training week in the first week of the second stage.

From Table 3, we can clearly see that there is a large gap between the training time of 50% - 60% maximum heart rate and 70% - 80% maximum heart rate between competition week and training Tuesday. This is because the proportion of training time of athletes at 50% - 60% maximum heart rate during competition is reduced compared with training week.

It can be seen from Figure 1 that after 10 weeks of core strength training, the core strength level of athletes has been improved, the stability of core area has been improved, and the control and regulation ability of self balance is better than that before the experiment. The experimental data show that there are significant differences in the physical quality of the experimental group and the control group before and after the experiment, indicating that training has a great impact on the change of physical quality.[11] However, through the analysis of covariance, it is found that the physical quality before the experiment plays a decisive role in the physical quality changes of table tennis players. The training method only has a significant impact on the results of running around the platform, throwing away the static solid ball and moving solid ball. It shows that 10 weeks of training can not have a significant impact on all the physical quality of table tennis players.

Table 2. Comparison of the results of the experimental group and the control group before and after the experiment.

Test index	Balance (min)	Run around the platform (seconds)	Static solid ball (m)	Moving solid ball (m)	Sideslip
Experimental group (n = 10)	2.90	-0.42	0.81	0.73	1.00
Control group (n = 8)	2.50	-0.23	0.91	0.41	1.00

Table 3. Comparative Analysis of heart rate interval proportion time between training week and competition week.

Time	50%-60%	60%-70%	70%-80%
	Maximum heart rate	Maximum heart rate	Maximum heart rate
Competition week	331.86±16. 99	309.01±26.77	274.99±31. 38
proportion	43.83%	41.42%	27.18%
Training week	379.44±25. 76	323.38±23.53	119. 45±16.02
proportion	45.56%	36.67%	15.09%

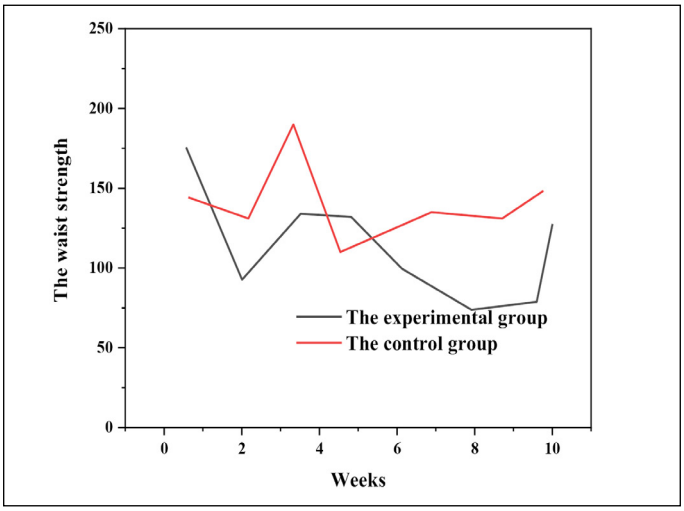

Figure 1. Strength comparison before and after core strength training in 10 weeks.

CONCLUSION

Generally speaking, contemporary table tennis is a competitive sport that integrates technology, tactics, physical fitness, psychology and intelligence. As an important part of the competitive elements of table tennis, athletes first need to have a good core strength to ensure that they have the ability to maintain balance in rapid movement, so as to give full play to their technical and tactical style and level and achieve good competitive results. In the field of table tennis, the training of core strength not only needs scientific guidance, but also needs the long-term exploration and practice of coaches and athletes at all levels. How to take scientific and effective training methods and means to improve the core strength of table tennis players is a new topic worthy of our in-depth exploration and research.

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