IMPACTS OF BALANCE TRAINING ON TENNIS PLAYERS' PERFORMANCE

IMPACTOS DO TREINO DE EQUILÍBRIO SOBRE O DESEMPENHO DOS JOGADORES DE TÊNIS

EFECTOS DEL ENTRENAMIENTO DEL EQUILIBRIO EN EL RENDIMIENTO DE LOS TENISTAS

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ABSTRACT

Introduction: Maintaining body balance is a prerequisite for good tennis practice. Therefore, the demands of technical movements for competitive playability are achieved only after players have improved balance. Objective: Analyze the impacts of balance training on the performance of tennis players. Methods: 24 male tennis college students, 18 to 21 years old, were selected and divided into experimental and control groups. The intervention took place under a specific balance training protocol for eight weeks, and data were collected in the experimental group before and after the intervention. Results: The test time with eyes closed in unipodal support, Romberg test, eyes closed standing, and walking standing in the experimental group was 37.340 ± 14.382s, 67.250 ± 30.275s, 21.070 ± 7.887s and 4.510 ± 0.540s respectively, showing statistical superiority over the control group. Conclusion: After eight weeks of balance training exercise intervention, compared with the subjects without instability training exercise intervention, the subjects' static and dynamic balance ability after eight weeks of training were significantly improved. ***Level of Evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Physical Education and Training; Tennis; Postural Balance.

RESUMO

Introdução: A manutenção do equilíbrio corporal é pré-requisito básico para uma boa prática no tênis. Portanto, as exigências dos movimentos técnicos para jogabilidade competitiva são alcançadas somente depois que os jogadores têm um aprimoramento do equilíbrio. Objetivo: Analisar os impactos do treinamento de equilíbrio sobre o desempenho dos jogadores de tênis. Métodos: 24 estudantes universitários de tênis masculinos de 18 a 21 anos foram selecionados e divididos em grupo experimental e grupo de controle. A intervenção deu-se por protocolo específico de treino de equilíbrio durante oito semanas e os dados foram coletados previamente e posteriormente à intervenção do grupo experimental. Resultados: O tempo de teste com os olhos fechados em apoio unipodal, teste de Romberg, olhos fechados em pé e andar de pé no grupo experimental foi de 37.340 ± 14.382s, 67.250 ± 30.275s, 21.070 ± 7.887s e 4.510 ± 0.540s respectivamente, apresentando superioridade estatística frente ao grupo controle. Conclusão: Após oito semanas de intervenção de exercício de treinamento de equilíbrio, em comparação com os sujeitos sem intervenção de exercício de treinamento instável, a capacidade de equilíbrio estático e a capacidade de equilíbrio dinâmico dos sujeitos após 8 semanas de treinamento foram significativamente aprimoradas. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Educação Física e Treinamento; Tênis; Equilíbrio Postural.*

RESUMEN

Introducción: El mantenimiento del equilibrio corporal es un requisito básico para la buena práctica del tenis. Por lo tanto, las exigencias de los movimientos técnicos para la jugabilidad competitiva se logran sólo después de que los jugadores tengan una mejora del equilibrio. Objetivo: Analizar el impacto del entrenamiento del equilibrio en el rendimiento de los tenistas. Métodos: Se seleccionaron 24 estudiantes universitarios de tenis, de entre 18 y 21 años, y se dividieron en un grupo experimental y un grupo de control. La intervención se llevó a cabo mediante un protocolo específico de entrenamiento del equilibrio durante ocho semanas y se recogieron datos antes y después de la intervención en el grupo experimental. Resultados: El tiempo de prueba con los ojos cerrados en apoyo unipodal, la prueba de Romberg, los ojos cerrados de pie y la marcha de pie en el grupo experimental fue de 37,340 ± 14,382s, 67,250 ± 30,275s, 21,070 ± 7,887s y 4,510 ± 0,540s respectivamente, presentando superioridad estadística sobre el grupo de control. Conclusión: Después de ocho semanas de intervención de ejercicios de entrenamiento de equilibrio, en comparación con los sujetos sin intervención de ejercicios de entrenamiento de inestabilidad, la capacidad de equilibrio estático y la capacidad de equilibrio dinámico de los sujetos después de 8 semanas de entrenamiento mejoraron significativamente. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Educación y Entrenamiento Físico; Tenis; Equilibrio Postural.*

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INTRODUCTION

Instability is defined as "in the unstable state of movement, the muscle group controls the state of pelvis and trunk, and promotes the generation, transmission and control of force to reach the ideal state".[1] In this state, the nerves and receptors of the people participating in the training will give more instructions to the muscles in the core areas of the body such as pelvis and trunk. After one-stage training in an unstable state, it can effectively improve the systemic functional state of bones and muscles in the core areas of the body, which has a significant effect on improving the activity of the muscle system, reducing joint injury and maintaining the health of waist, back, hip and other parts.[2] Unstable training can effectively improve athletes' performance, promote the improvement of athletes' proprioception and physical response ability, reduce the probability of athletes' lower limb injury, and alleviate and prevent athletes' low back pain. Strength training under unstable conditions is the main method of core strength training, which can improve the nerve and muscle control ability of participants, and has an effect on preventing low back injury, especially for small muscle groups. It plays a role in maintaining the body posture and transmitting the strength of upper and lower limbs of participants under unstable conditions, and has a far-reaching impact and positive significance on the prevention of sports injury and the training of physical rehabilitation.[3]

METHOD

Research object

The research object is 24 male tennis special college students aged 18-21 in the Institute of physical education. These players have professional training background and sports level is above level 1. Among them, there were 12 in the experimental group and 12 in the control group, and all subjects had never received relevant balance ability training in their previous exercise training experience, and had never used relevant drugs affecting balance ability in exercise training and life. The subjects had good physical function, normal physical examination, no history of vertigo, no diseases of nervous system, musculoskeletal system, cardiovascular system, eyes and ears; And agreed to participate in this experiment.[4]

Research methods

The experimental group received 30 minutes of unstable hitting training and footwork training three times a week. The training contents were balance board in-situ bow and arrow step knee lifting exercise, balance board chest front pass and catch exercise, balance board V-shaped one hand pass and catch exercise, balance board walking bow and arrow step knee lifting exercise, balance board and sensitive circle combination training; The control group received 30 minutes of passing training and footwork training supported by the horizontal stable surface at the same time.[5] The test standard is the strengthening test time of standing on one foot with eyes closed, Romberg test, standing up and walking with eyes closed.

There is no need for a code of ethics for this type of study.

RESULTS

As can be seen from Figure 1, the time of standing test with eyes closed and one foot before the experiment in the experimental group is 28.400 ± 15.8200 s, and the time of standing test with eyes closed and one foot before the experiment in the control group is 28.790 ± 15.592 s. There was no significant difference in the test time between the experimental group and the control group (P > 0.05); The time of enhanced Romberg test before experiment was 41.710 ± 23.332s in the experimental group and 49.760 ± 22.823s in the control group. There was no significant difference between the time of enhanced Romberg test before experiment in the experimental group and that in the control group (P > 0.05); Before the experiment, the time of eyes closed and in situ test was 16.020 ± 10.447s in the experimental group and 14.130 ± 10.516s in the control group. The time of eyes closed and in situ test in the experimental group was not significantly different from that in the control group (P > 0.05); The test time of standing up and walking before the experiment was 5.490 ± 0.466s in the experimental group and 5.300 ± 0.771s in the control group. There was no significant difference between the test time of standing up and walking before the experiment in the experimental group and that in the control group (P > 0.05).[6]

As can be seen from Figure 2, the test time of standing with eyes closed and one foot before the experiment in the experimental group was 28.400 ± 15.820s, and the test time of standing with eyes closed and one foot after the experiment in the experimental group was 37.340 ± 14.382. There was a very significant difference between the test results of standing with eyes closed and one foot before and after the experiment in the experimental group (P < 0.01); The enhanced Romberg test before the experiment in the experimental group was 41.710 ± 23.332s, and the enhanced Romberg test time after the experiment in the experimental group was 67.250 ± 30.275s. There was a very significant difference between the enhanced Romberg test before and after the experiment in the experimental group (P < 0.01); The test time of the experimental group was 16.020 ± 10.447s before the experiment, and the test time of the experimental group was 21.070 ± 7.887s after the experiment. There was a very significant difference between the test results of the

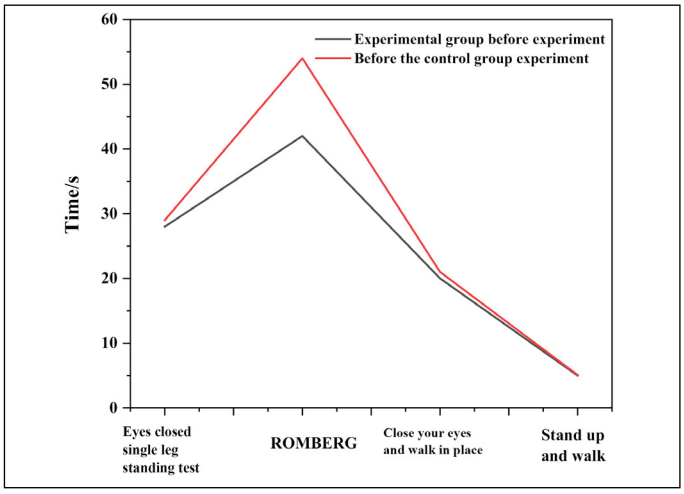

Figure 1. Comparison of balance ability indexes between the experimental group and the control group before the experiment.

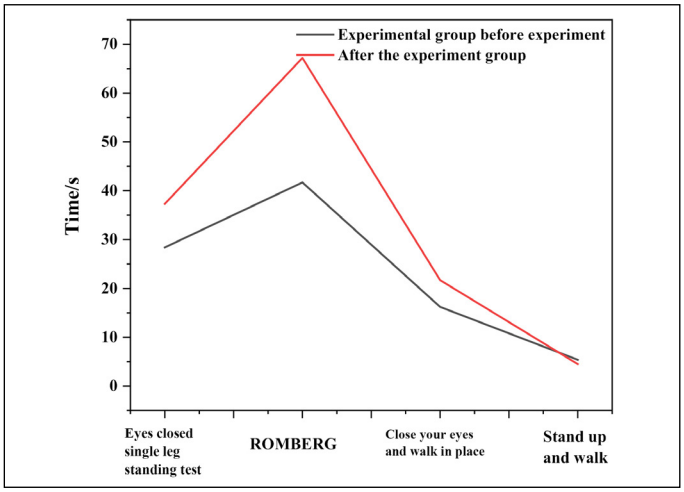

Figure 2. Comparison of balance ability indexes between the experimental group before and after the experiment.

experimental group before and after the experiment (P < 0.01); The test time of standing up and walking before the experiment in the experimental group was 5.490 ± 0.466s, and the test time of standing up and walking after the experiment in the experimental group was 4.510 ± 0.540s. There was a very significant difference between the test results before and after the experiment in the experimental group (P < 0.01).[7]

It can be seen from Figure 3 that the test time of the control group before the experiment with eyes closed and one foot standing was 28.790 ± 15.592s, and the test time of the control group after the experiment with eyes closed and one foot standing was 28.050 ± 15.428. There was no significant difference between the test results before and after the experiment (P > 0.05); The time of enhanced Romberg test in the control group before the experiment was 49.760 ± 22.823s, and the time of enhanced Romberg test in the control group after the experiment was 41.120 ± 20.709s. There was no significant difference between the results of enhanced Romberg test before and after the experiment in the control group (P > 0.05); The test time of the control group before the experiment was 14.130 ± 10.516s, and the test time of the control group after the experiment was 16.340 ± 10.624s. There was no significant difference between the test results of the control group before and after the experiment (P > 0.05); The test time of standing up and walking before the experiment in the control group was 5.300 ± 0.771s, and the test time of standing up and walking after the experiment in the control group was 5.510 ± 0.479s. There was no significant difference between the test results before and after the experiment in the control group (P > 0.05).[8]

As can be seen from Figure 4, the time of standing test with eyes closed and one foot after the experiment in the experimental group was 37.340 ± 14.382s, and the time of standing test with eyes closed and one foot after the experiment in the control group was 28.050 ± 15.428s. There was a very significant difference between the time of standing test with eyes closed and one foot after the experiment in the experimental group and the time of standing test with eyes closed and one foot after the experiment in the control group (P < 0.01); The time of enhanced Romberg test in the experimental group was 67.250 ± 30.275s, and that in the control group was 41.120 ± 20.709s. There was a very significant difference between the time of enhanced Romberg test in the experimental group and that in the control group (P < 0.01); After the experiment, the time of eyes closed and in situ test in the experimental group was 21.070 ± 7.887s, and that in the control group was 16.340 ± 10.620s. There was a very significant difference between the eyes closed and in situ test in the experimental group and the control group (P < 0.01); The test time of standing up and walking after the experiment in the experimental group was 4.510 ± 0.540s, and that in the control group was 5.510 ± 0.479s. There was a very significant difference between the test time of standing up and walking after the experiment in the experimental group and that in the control group (P < 0.01).[9]

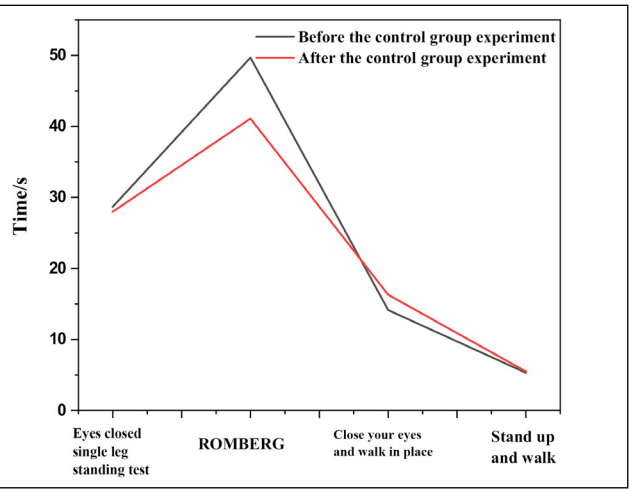

Figure 3. Comparison of balance ability indexes between the control group before and after the experiment.

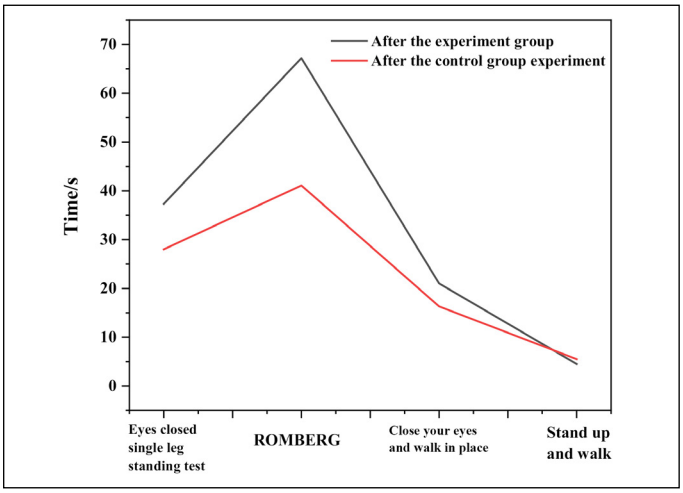

Figure 4. Comparison of balance ability indexes between the experimental group and the control group after the experiment.

DISCUSSION

In tennis, the enhancement of athletes' physical fitness, speed and technology, the innovation of sports equipment and equipment and athletes' psychological factors have higher and higher requirements for the strength of tennis. There are more and more strength players. Tennis players must have strong physical muscle strength and muscle endurance to withstand and resist strong incoming balls, and players themselves must have certain explosive power and speed to effectively fight back.[10] Strong muscle strength and muscle endurance are the necessary physical conditions for modern tennis players. In this trend, in addition to the requirements for the overall physical fitness, the requirements for the stability and coordination of the lower limbs are also more important, because the stability and coordination of the lower limbs are very key factors in the skills of drawing, volleying in front of the net and serving. Hitting stability is the key to winning the tennis match. Improving hitting stability is the training content that coaches should often carry out in training. From maintaining the balance of the preparation posture to rapidly moving the step to the hitting position, the tennis hitting action requires the balance and coordination ability of the body to complete a smooth hitting action. Therefore, the research on the hitting balance of tennis is very important.

CONCLUSION

Through the core stability training in the unstable support training environment created by the balance board, the deep muscles in the core area of the subject can be effectively mobilized to participate in various movements of the subject when the subject carries out relevant training and completes relevant special technical movements. In the unstable support environment, in the process of completing the action, the subjects always control the body to maintain the correct posture, and the difficulty and exercise load of completing the action are enhanced. Under this condition, the subjects' control of the action and overall force under dynamic conditions can be effectively improved. Therefore, the core stability training under unstable support can enable the subjects to make active posture adjustment in the process of completing the action in the environment of unstable support, improve the recruitment ability of deep muscles around the spine in the core area, and improve the core stability of the body in an unbalanced and unstable state.

The author declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: The author made significant contributions to this manuscript. JC: writing, data analysis, article review and intellectual concept of the article.

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