

EFFECT OF FUNCTIONAL TRAINING ON HITTING QUALITY IN BADMINTON PLAYERS

EFEITO DO TREINAMENTO FUNCIONAL SOBRE A QUALIDADE DE ACERTO DOS JOGADORES DE BADMINTON

EFFECTO DEL ENTRENAMIENTO FUNCIONAL EN LA CALIDAD DEL GOLPEO DE LOS JUGADORES DE BÁDMINTON



ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

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ABSTRACT

Introduction: The importance of physical training in badminton is reflected in the quality of technical and tactical movements in the field, improving the athlete the physical strength enough as support and the level of physical fitness necessary for their sports performance, reducing sports injuries and, mainly, increasing their hitting rates. **Objective:** Study the effect of functional training on the hit rate in badminton players. **Methods:** Bibliographic and experimental research methods were used through the ITN badminton technical level test and the functional movement screening system (FMS). The effect of functional training was compared and analyzed considering baseline return quality and functional movement quality of 12 young badminton players. **Results:** Compared to the pre-test, the mean baseline reaching depth and accuracy statistical score increased significantly after the 8 weeks of functional training ($P < 0.05$); the control group baseline depth and accuracy test score improved slightly but not significantly ($P > 0.05$). **Conclusion:** Young badminton players who add functional training to physical training demonstrate more relevant impacts on their hitting rates. These exercises have also demonstrated that they can strengthen muscles and increase shoulder, hip, and knee flexibility. **Level of evidence II; Therapeutic studies - investigating treatment outcomes.**

Keywords: Physical Education and Training; Sports; Physical Functional Performance.

RESUMO

Introdução: A importância do treinamento físico no badminton é refletida na qualidade dos movimentos técnicos e táticas em campo, aprimorando no atleta a força física suficiente como suporte e o nível de aptidão física necessário ao seu desempenho esportivo, diminuindo as lesões esportivas e, principalmente, aumentando as suas taxas de acertos. **Objetivo:** Estudar o efeito do treinamento funcional sobre a taxa de acertos nos jogadores de badminton. **Métodos:** Os métodos de pesquisa bibliográfica e experimentais foram utilizados, através do teste de nível técnico do ITN badminton e do sistema de triagem sobre o movimento funcional (FMS). O efeito do treinamento funcional foi comparado e analisado considerando a qualidade do retorno de linha de base e a qualidade do movimento funcional de 12 jogadores jovens de badminton. **Resultados:** Em comparação com o pré-teste, a pontuação média da linha de base que atingiu profundidade e precisão estatística aumentou significativamente após as 8 semanas de treinamento funcional ($P < 0,05$); a pontuação do grupo controle no teste de profundidade e precisão da linha de base melhorou ligeiramente, mas não significativamente ($P > 0,05$). **Conclusão:** Jovens jogadores de badminton que adicionam o treinamento funcional ao treinamento físico demonstram impactos mais relevantes em suas taxas de acerto. Esses exercícios demonstraram também que podem fortalecer a musculatura e a aumentar a flexibilidade nas articulações do ombro, quadril e joelho. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Educação Física e Treinamento; Esportes; Desempenho Físico Funcional.

RESUMEN

Introducción: La importancia del entrenamiento físico en el bádminton se refleja en la calidad de los movimientos técnicos y tácticos en el campo, mejorando en el deportista la fuerza física suficiente como soporte y el nivel de aptitud física necesario para su rendimiento deportivo, reduciendo las lesiones deportivas y sobre todo aumentando sus índices de aciertos. **Objetivo:** Estudiar el efecto del entrenamiento funcional sobre la tasa de golpeo en jugadores de bádminton. **Métodos:** Se utilizaron métodos de investigación bibliográfica y experimental, a través de la prueba de nivel técnico de bádminton ITN y el sistema de cribado sobre el movimiento funcional (FMS). Se comparó y analizó el efecto del entrenamiento funcional teniendo en cuenta la calidad del retorno de la línea de base y la calidad del movimiento funcional de 12 jóvenes jugadores de bádminton. **Resultados:** En comparación con la prueba previa, la puntuación estadística media de profundidad y precisión de alcance de la línea de base aumentó significativamente después de las 8 semanas de entrenamiento funcional ($P < 0,05$); la puntuación de la prueba de profundidad y precisión de la línea de base del grupo de control mejoró ligeramente pero no significativamente ($P > 0,05$). **Conclusión:** Los jóvenes jugadores de bádminton que añaden el entrenamiento funcional al entrenamiento físico demuestran impactos más relevantes en sus índices de golpeo. Estos ejercicios también demostraron que pueden fortalecer la musculatura y aumentar la flexibilidad de las articulaciones del hombro, la cadera y la rodilla. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptorios: Educación y Entrenamiento Físico; Deportes; Rendimiento Físico Funcional.



INTRODUCTION

For badminton players, physical training is very important, not only need to have good technical movements and tactics, but also need sufficient physical strength as support, the physical fitness level of an athlete also affects the athlete's sports performance, which can prevent sports injuries.¹ Physical training has gradually developed into a part of training badminton players. Liang Z put forward: The specific training methods included in the implementation of functional strength training include: Core strength training, vibration strength and suspension training, proprioceptive training, etc.² Guo S Z proposed: For small ball games against nets, functional strength is very important.³ Schneider C proposed that the research on core strength should mainly focus on physical fitness training in competitive events, when they defined the concept of core strength, they proposed: Taking the core part of the human trunk as the attachment point, including muscles, bones, ligaments, etc., the ability to generate force under the control of nerves.⁴ Xu X Q proposed that training badminton players' physical fitness needs to be emphasized from a young age, and comprehensively implement training for physical fitness to lay a good foundation for physical fitness.⁵ In the process of training young badminton players, it is necessary to take physical training as one of the key training plans, and combine it with the special movement characteristics of badminton, all-round development of the physical fitness of young athletes. Konovalov I proposes: In badminton, with the continuous improvement of performance, it will be affected by various factors, among which physical training and technical tactics are more closely related.⁶

Based on the above analysis, it can be found that, in the study of badminton physical training, it still stops at the level of traditional strength training, although the importance of the specialization of physical training is emphasized, there is no practical implementation analysis of this training, failed to systematically analyze how detailed physical training methods affect the quality or function of badminton players, in this way, the research stops on the surface of physical training, and it fails to better analyze which part of the quality has a higher correlation with the competitive ability of badminton players, and this happens to be the content that coaches and athletes need to pay attention to during training.

METHOD

Research object

The author mainly uses the experimental method, an experimental study on the effects of functional training on the hitting quality and FMS of young badminton players. SPSS23.0 was used for descriptive statistical analysis of the obtained data, and independent samples t test was used to compare and analyze the data between TTG and FTG groups and the data before and after the test.⁷ Statistical significance level was $P < 0.05$, very significant at $P < 0.01$.

Experimental subjects

The author selects 12 male youth badminton players in the badminton club who are national second-level athletes as experimental subjects. The experimental subjects were randomly divided into two groups, the control group (TTG) and the experimental group (FTG), with 6 people in each group, as shown in Figure 1. In addition to technical training according to the normal training plan, TTG performs traditional physical training, and FTG performs functional physical training.⁸ The selected 12 male youth badminton players were all healthy, with no bad habits and no recent sports injuries.

Experimental Design

Before the start of the experiment, subjects were pre-tested for baseline hitting ability and Functional Movement Screening (FMS).

The experiment lasted for 8 weeks, in addition to normal badminton technical training, FTG performed functional physical training 3 times a week, TTG conducted traditional physical training 3 times a week, and after 8 weeks, subjects were post-tested for baseline hitting ability and functional movement screening.

Experimental test

①ITN test. The ITN badminton rating test was launched by the International Badminton Federation in 2003, and a tool for assessing the level of junior badminton players, among them, the depth and accuracy of the baseline shot can comprehensively reflect the strength, stability and accuracy of the badminton player's baseline shot, that is, it can effectively reflect the athlete's baseline shot quality. ②Functional Movement Screening (FMS). The functional movement screening system is a method for quantitative evaluation and prediction of injury risk for human movement patterns, it consists of 7 movements and 3 exclusionary test movements. During the test, the subjects performed each basic action 3 times, and the lowest score was taken. The experimental subjects need to perform bilateral tests, for example, if the test scores on both sides are different, the lowest score will be taken.⁹

Ethical Compliance

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

RESULTS

Analysis of Baseline Hit Test Results

Compared with the pre-test, the average score of FTG's baseline hitting depth and accuracy increased significantly after 8 weeks ($P < 0.05$); The TTG's baseline depth and accuracy test scores improved slightly, but not significantly ($P > 0.05$). (Table 1)

Analysis of FMS test results

In the post-test of TTG, the scores and total scores of each test of FMS were improved less than those of the pre-test, and there was no significant improvement ($P > 0.05$); The average scores of other test

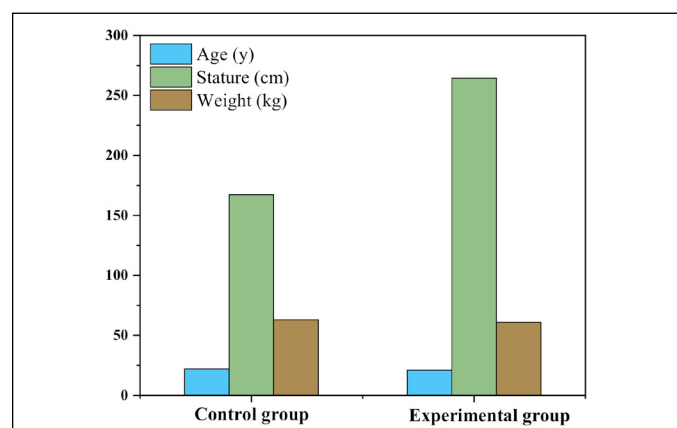


Figure 1. Basic information of the research objects.

Table 1. Comparison of baseline hitting test scores before and after the experiment.

Badminton special ability index	Group	Before experiment	After the experiment
Baseline Depth Test	TTG	41.5±4.1	44.7±4.8
	FTG	41.2±8.2	61.8±6.9**
Baseline Hit Accuracy Test	TTG	35.8±4.3	41.0±4.4
	FTG	36.3±4.0	56.3±4.5**

movements of FTG except the trunk stable push-up were improved, and the difference between the before and after test scores of the straight lunge movement was very significant ($P < 0.01$), the pre- and post-test differences in active straight knee lift, trunk rotational stability and final total score were significant ($P < 0.05$). (Table 2)

Five of the FMS test items involve symmetrical movements on both sides of the body. Before the start of the experiment, the two groups of athletes in these five movements, there are more people with asymmetric scores on the left and right sides of the trunk. Among them, hurdles, straight lunges, and trunk rotational stability had the most asymmetry. After the 8-week experiment, the scores on the left and right sides of the FTG gradually converged, and the number of 5 asymmetric movements decreased from 4, 2, 4, 1, and 4 to 0, 0, 1, 0, and 1; Compared with the pre-test, the asymmetric number of TTG changed less, and only the shoulder joint flexibility decreased by one person. (Table 3)

Influence of functional training on the quality of badminton baseline shots

The scores of the ITN test in the FTG group were significantly improved, indicating that through functional training, the core stability and body balance of the young badminton players have been improved, making the transmission of power in the power chain more coordinated and efficient when hitting the ball, in the process of moving and hitting the ball, the body shape can be better controlled, and the occurrence of inability to exert force due to movement deformation is reduced.

Effect of functional training on FMS score

The author's study found that most of the testers have a greater risk of injury, which reflects the disadvantage of premature specialization of young badminton players; In the FMS test item, a single action score of 0 represents an injury problem, a score of 1 represents a functional disability problem, and a score of 2 represents a compensatory problem. In the post-experiment test, FTG scored higher scores than TTG in the 4 single movements of straight lunge, shoulder flexibility, active straight knee lift and trunk rotational stability, this suggests that functional training is more effective in helping to improve shoulder and hip dysfunction in junior badminton players.¹⁰ At the same time, in the author's study, the total score of FTG and the individual scores of straight lunge, active straight knee raise and trunk rotational stability were significantly improved after 8 weeks ($P < 0.05$), this

shows that functional training is more effective than traditional physical training in improving the quality of movement, improving the flexibility of hip, knee, and ankle joints, and strengthening the flexibility and trunk stability of the gluteal muscles, soleus and other lower limb posterior chain muscles.

DISCUSSION

Functional training helps to improve young badminton players' ability to control body posture and technical movements during movement, improve their power transmission efficiency and strengthen motor nerves' precise control of the racket, it has a positive effect on young badminton players to improve the quality of the bottom line and obtain better special performance. Young badminton players are at greater risk of injury to shoulder joints, knee joints and spine due to their special characteristics, and should pay attention to strength training and relaxation training in related parts.

CONCLUSION

The proprioceptive exercise in functional training, on the one hand, strengthens the precise control of nerves on muscles, promotes the coordination and cooperation between muscle groups, and is beneficial to young badminton players to exert the overall function of muscles. In order to meet the needs of the movement of badminton, the training should focus on improving the flexibility of the ligaments of the lower limbs and the flexibility of the hip joints of young badminton players. Functional training can help improve the movement quality of young badminton players, and has a good effect on improving weak links in sports and reducing the risk of sports injuries.

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

Table 3. Changes in the asymmetric population of FMS before and after the experiment.

Group	Options	Hurdle step/pc	Straight horse lunges/piece	Shoulder joint flexibility	Active straight knee lift	Torso rotational stability/pc
TTG	Front side	4	0	4	2	4
	Rear side	4	1	3	2	4
FTG	Front side	4	2	4	1	4
	Rear side	0	0	1	0	1

Table 2. Comparison of the mean values of the subjects' FMS test scores before and after the test.

Group	Testing time	Squat	Hurdle step	Straight horse lunge	Shoulder flexibility	Active straight knee lift	Torso stabilization push-ups	Torso rotational stability	Total score
TTG	front side	2.5±0.5	2.0±0.6	1.5±0.5	1.2±1.0	1.2±0.4	2.5±0.5	1.7±0.8	12.5±2.4
	rear side	2.7±0.5	2.3±0.5	1.5±0.5	1.5±0.5	1.2±0.4	2.5±0.5	1.5±0.5	13.2±0.6
FTG	front side	2.5±0.5	2.2±0.8	1.2±0.4	1.0±0.9	1.3±0.5	2.5±0.5	1.3±0.5	12.3±2.4
	rear side	2.8±0.4	2.8±0.4	2.2±0.4**	1.7±0.5	2.2±0.4*	2.5±0.5	2.2±0.8*	16.3±2.0*

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

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