EFFECTS OF FUNCTIONAL TRAINING ON THE PERFORMANCE OF SEDENTARY COLLEGE STUDENTS

EFEITOS DO TREINAMENTO FUNCIONAL SOBRE O DESEMPENHO DE UNIVERSITÁRIOS SEDENTÁRIOS

EFECTOS DEL ENTRENAMIENTO FUNCIONAL EN EL RENDIMIENTO DE UNIVERSITARIOS SEDENTARIOS

Original Article
Artigo Original
Artículo Original

Jiajing Li[1,2]
(Physical Education Professional)
Min Liu[2]
(Physical Education Professional)

1. Nanjing Tech University, Physical Culture Institute, Nanjing, Jiangsu, China.
2. Nanjing University of Information Science &Technology, PE Department, Nanjing, Jiangsu, China.

Correspondence:
Jiajing Li
Nanjing, Jiangsu, China. 211800.
ljj5533@sina.com

ABSTRACT

Introduction: One focus of current research by frontline physical education teachers has always been the elective teaching of college students who do not play sports. Lack of training time and poor student training make many professional badminton teaching methods impossible for elective courses. Objective: Study the impact of functional training on the badminton performance of college students. Methods: Forty-four sedentary college students were randomly selected and equally divided into the experimental and control group. The functional training strategy was used in the experimental group, while the control group used the traditional badminton training method. The experimental and control groups were trained twice weekly for 60 minutes and 12 weeks. The data obtained were compared, analyzed, and discussed statistically. Results: In terms of the FMS test, the total score of the experimental group was optimized by 5.61, and the total score of the control group was optimized by 3.20. Regarding badminton performance, the experimental group showed an increase of 23.12 points, while the control group increased 16.75 points (P<0.01), indicating a very significant difference in the results. Conclusion: This work evidenced the importance of promoting functional training, which is superior to the current sports teaching methods. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Physical Education and Training; Physical Fitness; Students; Universities.

RESUMO

Introdução: Um dos focos das pesquisas atuais dos professores de educação física na linha de frente tem sido sempre o ensino eletivo de estudantes universitários que não praticam esportes. A falta de tempo de treinamento e a deficiente formação dos estudantes tornam muitos métodos profissionais de ensino de badminton impossíveis de serem realizados em cursos optativos. Objetivo: Estudar o impacto do treinamento funcional sobre o desempenho de badminton dos estudantes universitários. Métodos: Foram selecionados aleatoriamente 44 universitários sedentários, divididos igualmente em grupo experimental e controle. No grupo experimental foi utilizada a estratégia de treinamento funcional, enquanto o grupo de controle usou o método tradicional de treinamento de badminton. Tanto o grupo experimental quanto o grupo controle treinaram duas vezes por semana, por 60 minutos e durante 12 semanas. Os dados obtidos comparados, analisados e discutidos estatisticamente. Resultados: Em termos de teste FMS, a pontuação total do grupo experimental foi otimizada em 5,61, e a pontuação total do grupo de controle foi otimizada em 3,20. Com relação ao desempenho do badminton, o grupo experimental apresentou um aumento de 23,12 pontos, enquanto que o grupo controle aumentou 16.75 pontos (P<0.01), indicando que houve uma diferença muito significativa dos resultados. Conclusão: Este trabalho evidenciou a importância da promoção do treinamento funcional, comparativamente superior aos métodos de ensino esportivo praticados atualmente. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Educação Física e Treinamento; Aptidão Física; Estudantes; Universidades.*

RESUMEN

Introducción: Uno de los focos de la investigación actual de los profesores de educación física de primera línea ha sido siempre la enseñanza optativa de los estudiantes universitarios que no practican deportes. La falta de tiempo de entrenamiento y la escasa formación de los alumnos hacen que muchos métodos profesionales de enseñanza del bádminton resulten imposibles para los cursos optativos. Objetivo: Estudiar el impacto del entrenamiento funcional en el rendimiento en bádminton de estudiantes universitarios. Métodos: Se seleccionaron aleatoriamente 44 estudiantes universitarios sedentarios y se dividieron equitativamente en grupo experimental y grupo de control. En el grupo experimental se utilizó la estrategia de entrenamiento funcional, mientras que el grupo de control utilizó el método tradicional de entrenamiento de bádminton. Tanto el grupo experimental como el de control entrenaron dos veces por semana, durante 60 minutos y durante 12 semanas. Los datos obtenidos se comparan, analizan y discuten estadísticamente. Resultados: En términos de la prueba FMS, la puntuación total del grupo experimental se optimizó en 5,61, y la puntuación total del grupo de control se optimizó en 3,20. En cuanto al rendimiento en bádminton, el grupo experimental mostró un aumento de 23,12 puntos, mientras que el grupo de control aumentó 16,75 puntos (P<0,01),

lo que indica que hubo una diferencia muy significativa en los resultados. Conclusión: Este trabajo evidenció la importancia de promover el entrenamiento funcional, comparativamente superior a los métodos de enseñanza deportiva practicados actualmente. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

***Descriptores*:** *Educación y Entrenamiento Físico; Aptitud Física; Estudiantes; Universidades.*

DOI: http://dx.doi.org/10.1590/1517-8692202329012022_0751 Article received on 12/01/2022 accepted on 12/14/2022

INTRODUCTION

The training concept of functional training was introduced into China by the General Administration of Sport of the People's Republic of China to improve the physical fitness of athletes.[1] With the continuous popularization of the relevant training knowledge theory, it has directly affected the physical education teaching in colleges and universities. Through long-term experience accumulation, it has a relatively mature sports training system.[2] Badminton is relatively popular in colleges and universities, and students are interested in participating in badminton.[3] With the development of sports science, students have higher requirements for sports experience. The pursuit of high-quality sports has become the main goal of college students to participate in sports.[4] On the basis of strengthening the body, enjoy the fun of sports. Therefore, colleges and universities should make scientific training plans for students to participate in badminton training in combination with functional training to achieve the goal of improving sports performance.[5] The use of functional training methods has a very positive impact on the development of badminton teaching in colleges and universities.[6]

METHOD

Overview of experimental ideas

This paper first used the literature research method to consult a large number of badminton teaching from HowNet, Wanfang and offline information library, especially the relevant contents of badminton elective teaching for non sports majors in ordinary colleges and universities, so as to have more knowledge of the current badminton system teaching for non professional students. Then, by using the interview method, I communicated with some senior college students who had participated in badminton elective courses to understand their needs as beginners with slight experience in badminton elective courses and their evaluation of previous teaching, so as to have more knowledge of badminton teaching. The study and all the participants were reviewed and approved by Ethics Committee of Nanjing Tech University (NO.NJTCU20FF072). On this basis, a controlled experiment was designed to communicate the experimental scheme with front-line physical education teachers and student representatives, absorb their opinions, adjust and rectify, and obtain the final experimental scheme.

Setting of experimental objects

In terms of the selection of research objects, the freshmen and non sports majors of a university are selected as the research objects. They do not know enough about badminton, or they have only a slight foundation, and their preliminary badminton test results are low. These research objects have been fully informed of the needs and precautions of this experiment, and can cooperate with researchers to complete this experiment. The subjects should be healthy, free from diseases or sports injuries that affect the experiment, and no sports injuries occurred during the whole training process. The subjects were divided into experimental group and control group. The experimental group included 12 men and 10 women, and the control group included 11 men and 11 women. The basic characteristics of men and women are shown in Table 1. Their age, height, weight and other factors are not very different and will not interfere with the experimental results.

Experimental methods

In this experiment, the control experiment was selected. The experimental group carried out functional training strategies. According to the students' mastery of the action, the experimental group carried out core strength training and basic badminton action response training respectively. After the basic mastery, multi-directional acceleration training and rapid expansion and contraction training were added. Finally, the sensitivity training of action response was supplemented on the basis of badminton training, So as to gradually purposefully strengthen the teaching of badminton skills and related functional action training. The control group followed the traditional badminton training methods, including basic movement training, arm swing training, frog jumping, turn back running and other movements. The specific movement load will be adjusted according to the students' mastery of the movements. The experimental group and the control group will conduct training twice a week, each time for 60 minutes, lasting for 12 weeks. In addition, the two groups will not carry out additional badminton teaching to ensure the preciseness of the experiment.

Before and after the experiment, indicators such as 30 m running, 60 s supine two head up, V-shaped movement, and 30 s double swing rope jump were selected as the optimization of basic indicators before and after the functional training, from which the influence of functional training on some basic movements could be discussed. Then, indicators such as deep squatting, hurdle crossing, straight lunge squatting, shoulder flexibility, active straight knee lifting, trunk stability, push ups, and rotation stability were selected to form the MS test, This paper discusses the effect of functional training on the mitigation of sports risks in the process of badminton teaching for college students. Finally, it compares the badminton performance of the experimental group and the control group, discusses the effect of functional training on the optimization of badminton performance, collates and analyzes the data obtained, and takes the optimized data for discussion and comparison, which can be more intuitive.

RESULTS

Index optimization before and after functional training

As there is a certain gap between men and women in terms of physical flexibility and explosive sensitivity, when analyzing the optimization

Table 1. Basic characteristics of the two groups of subjects.

Option	Age		Height		Weight	
Group	Control group	Experience group	Control group	Experience group	Control group	Experience group
Male	18.8981±0.5705	18.2860±0.5559	1.7828±0.0496	1.7723±0.0493	66.0222±11.1147	66.4133±11.0493
Female	18.3311±0.5323	18.4691±0.5469	1.6083±0.0306	1.5969±0.0304	52.5173±4.8204	52.1470±4.8546

of indicators, they are divided into male group and female group. The two groups analyze the optimization of the experimental group and the control group respectively.

After 12 weeks of badminton training for boys, the optimization of relevant indicators is shown in Table 2. It can be seen that the 30 m running performance of the experimental group has been shortened by (0.2329 ± 0.0394) s, the number of 60 s supine two head lifts has increased by (3.6236 ± 1.4300), the V-shaped movement has been optimized by (0.7744 ± 0.0713), and the number of 30 s double swing jump rope has increased by (4.4655 ± 1.3926); In the control group, the 30 m running performance was shortened by (0.0099 ± 0.0397) s, the number of supine two head lifts increased by (1.5587 ± 0.7305), the V-shaped movement was optimized by (0.1418 ± 0.0394), and the number of 30 s double swing jump rope increased by (1.5587 ± 0.5113). This shows that both the traditional table tennis teaching and the functional training proposed in this paper can optimize the relevant indicators of boys, and improve their responsiveness, sensitivity and flexibility.

The data results of female students after badminton training are shown in Table 3. It can be seen that the 30 m running performance of the experimental group has been shortened by (0.1418 ± 0.0394) s, the number of lying on both ends in 60 s has been increased by (7.7634 ± 2.2109), the V-shaped movement has been optimized by (0.7545 ± 0.1732), and the number of double swing jump ropes in 30 s has been increased by (5.5597 ± 1.8270); In the control group, the 30 m running performance was shortened by (0.0296 ± 0.0397) s, the number of supine two head lifts was increased by (2.2209 ± 0.7651), the V-shaped movement was optimized by (0.1823 ± 0.0296), and the number of 30 s double swing jump rope was increased by (1.6708 ± 0.8031). The results also show that the two training methods can optimize the relevant indicators of girls.

FMS test optimization before and after functional training

Therefore, in this section, FMS test is selected as the judgment index to study the optimization of functional training on sports injury.

Table 4 shows the optimization of FMS test in the experimental group and the control group before and after 12 weeks of badminton training. The total score of the experimental group was optimized by (5.6150 ± 1.0677) points, and the total score of the control group was optimized by (3.2085 ± 0.6369) points. The research results show that both the traditional badminton teaching training and the functional training proposed in this paper can optimize the students' FMS test results and reduce the risk of injury in the course of sports. And through data comparison, it can be seen that most of the 7 items are functional training with better optimization effect than traditional badminton teaching and functional training, and the total score of FMS test optimization is far greater than the general badminton training of the control group, which shows that the functional training method proposed in this paper is better in reducing the risk of sports injury.

Optimization of badminton performance before and after functional training

As for the research on the effect of badminton teaching, the most intuitive and persuasive judgment indicator is the change of badminton performance. Therefore, before the experiment began and after the 12 week experiment, the two groups of students were tested on their badminton performance.

The specific results of badminton performance test are shown in Table 5. The scores of the experimental group increased by (23.1229 ± 5.6274) points, while those of the control group increased by (16.7527 ± 3.1064) points, p=0.0078, P<0.01, indicating that there was a very significant difference. This shows that the functional training proposed in this paper can improve the badminton performance of college students in the shortest time, enable non sports majors to master a sports skill as soon as possible, and improve their physical fitness and sports ability.

DISCUSSION

Training methods of functional training

The effective functional training plan shall be formulated in combination with the sports mode and competition rules of badminton. It can effectively improve the students' technical movements, improve their physical fitness level, and reduce the body loss during sports. The purpose of functional training is not to improve students' muscle volume and

Table 5. Analysis on the optimization of college students' badminton performance before and after functional training.

Option	Badminton performance	
Group	Control group	Experience group
Result	16.7527±3.1064	23.1229±5.6274
P	0.0078	

Table 2. Analysis of index optimization before and after functional training -- male group.

Option	30m run		60s supine at both ends		V-word movement		30s double rope skipping	
Group	Control group	Experience group	Control group	Experience group	Control group	Experience group	Control group	Experience group
Result	0.0099±0.0397	0.2329±0.0394	1.5587±0.7305	3.6236±1.4300	0.1418±0.0394	0.7744±0.0713	1.5587±0.5113	4.4655±1.3926
P	0.4388		0.0010		0.0438		0.0010	

Table 3. Analysis of index optimization before and after functional training -- female group.

Option	30m run		60s supine at both ends		V-word movement		30s double rope skipping	
Group	Control group	Experience group	Control group	Experience group	Control group	Experience group	Control group	Experience group
Result	0.0296±0.0397	0.1418±0.0394	2.2209±0.7651	7.7634±2.2109	0.1823±0.0296	0.7545±0.1732	1.6708±0.8031	5.5597±1.8270
P	0.8234		0.0377		0.0060		0.0138	

Table 4. Analysis of FMS test optimization before and after functional training.

Option	Squat		Hurdle crossing frame		Straight Lunge Squat		Shoulder flexibility	
Group	Control group	Experience group	Control group	Experience group	Control group	Experience group	Control group	Experience group
Result	0.1126±0.1621	1.3696±0.1872	0.5138±0.0746	1.0933±0.0212	0.6741±0.0953	0.8703±0.0737	0.2283±0.2364	0.4907±0.5561
P	0.0299		0.0069		0.0227		0.0195	
Option	**Active straight knee lifting**		**Torso stability push ups**		**Rotating stability**		**Total score**	
Group	**Control group**	**Experience group**	**Control group**	**Experience group**	**Control group**	**Experience group**	**Control group**	**Experience group**
Result	0.2597±0.1537	0.6414±0.0701	1.2997±0.3301	0.7827±0.2714	0.1204±0.0995	0.3670±0.2624	3.2085±0.6369	5.6150±1.0677
P	0.0286		0.0071		0.0010		0.0253	

muscle volume. The main purpose of functional training is to improve students' ability to control their muscles and coordinate their whole body. The improvement of self strength is mainly through the improvement of core strength. Through the training method of simulated competition, students' sports ability can be improved and their sports performance can be improved. Since modern sports are developing towards a faster sports concept, explosive force plays a crucial role in badminton. In the process of daily training, the abdominal and hip muscles are improved by means of weight bearing squatting, hip bridge, weight bearing end abdomen and other training methods. It can effectively improve the explosive power of hitting during the movement. Under the load state, with the help of the server, jump and hit the ball vigorously. It can effectively simulate different situations in the actual combat link. The reaction ability to students can also be further improved. Secondly, you can use the elastic band to perform the lunge squat exercise. In the process of lunge squatting exercise, attention should be paid to keeping the body upright, the center of gravity stable, and the center of gravity should be kept on the racket holding hand. The training can start from 15 to 20 times per group, and gradually increase the number of times per group with the improvement of ability.

Training function of functional training

Badminton as a technology - led confrontation sports, the process of sports to anaerobic sports as the main mode of exercise. With the improvement of sports science and the improvement of living standards. Make daily training and diet improve the efficiency of their own technology and physical fitness gradually faster. Therefore, participating in badminton sports puts forward higher requirements for students' comprehensive physical quality. In the high-intensity sports environment, excellent physical fitness puts forward higher requirements for daily training. The traditional physical and technical training is still a basic course for students to master. However, under the influence of the concept of faster and stronger development of sports, the method of improving one's own technical ability through functional training has been widely accepted. Functional training makes the training process more efficient and closer to the actual combat situation. Badminton is in the link. Students are required to use the muscle coordination of the whole body to complete high-quality technical movements. Through exquisite technology, you can hit the ball more accurately and move more quickly. These requirements have far exceeded the training objectives of the traditional badminton training mode. Through daily training and actual combat, it is found that in the process of hitting badminton, the body is often in a state of stagnation. In this state, having excellent core strength can ensure the completion of excellent technical actions. Take off, swing and hit are a complete set of offensive technical actions. This set of technical movements is mainly powered by the core force to provide energy support. Functional training can improve the core strength of students.

CONCLUSION

The research results of this paper show that the use of functional training can effectively improve the sports attributes of students and optimize the performance of badminton in combination with the actual situation of students. Compared with the existing badminton teaching methods, the functional training method of this paper is worth promoting.

All authors declare no potential conflict of interest related to this article

AUTHORS' CONTRIBUTIONS: The author has completed the writing of the article or the critical review of its knowledge content. This paper can be used as the final draft of the manuscript. Every author has made an important contribution to this manuscript. Jiajing Li and Min Liu: writing and execution.

REFERENCES

1. Liu C, Shiroy DM, Jones LY, Clark DO. Systematic review of functional training on muscle strength, physical functioning, and activities of daily living in older adults. Eur Rev Aging Phys Act. 2014;11(2):95-106.
2. Hedley M, Mackintosh C, Shuttleworth R, Humphrey D. Wireless tracking system for sports training indoors and outdoors. Procedia Eng. 2010;2(2):2999-3004.
3. Abdullahi Y, Coetzee B. Notational singles match analysis of male badminton players who participated in the African Badminton Championships. Int J Perform Anal Sport. 2017;17(1-2):1-16.
4. Jaksic-Stojanovic A, Jankovic M, Seric N. Montenegro as high-quality sports tourism destination-trends and perspectives. Sport Mont. 2019;17(1):93-5.
5. Lamberth J, Hale B, Knight A, Boyd J, Luczak T. Effectiveness of a six-week strength and functional training program on golf performance. Int J Golf Sci. 2013;2(1):33-42.
6. Liu SZ, Ali AS, Campbell MD, Kilroy K, Shankland EG, Roshanravan B, et al. Building strength, endurance, and mobility using an astaxanthin formulation with functional training in elderly. J Cachexia Sarcopenia Muscle. 2018;9(5):826-33.