BADMINTON INFLUENCES ON THE BODY CONSTITUTION OF COLLEGE STUDENTS

INFLUÊNCIAS DO BADMINTON NA CONSTITUIÇÃO CORPORAL DOS UNIVERSITÁRIOS

INFLUENCIAS DEL BÁDMINTON EN LA CONSTITUCIÓN CORPORAL DE LOS ESTUDIANTES UNIVERSITARIOS

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ABSTRACT

Introduction: The physical condition of college students is worsening annually, and the rate of obesity is a factor in alarming rise, influencing the quality of performance in physical education of badminton practice's effects on college students' body composition of college students. Objective: Study badminton practice's effects on college students' body composition. Methods: During a training period of three months, 60 college volunteers were randomly divided into experimental and control groups to practice exercices twice a week for 1.5 hours. The experimental group practiced badminton, while the control group practiced running. Results: The body fat ratio of the experimental group waist-to-hip increased from 38.98% to 33.21%, the waist to hip ratio decreased from 0.83cm to 0.82cm, the vital capacity increased from 2,817ml to 3,111ml, and the resting heart rate decreased from 78 to 75 times/minute. Conclusion: Optimization of body composition and an improvement in body build were statistically observed when implementing badminton training in college students. The promotion of badminton for college students was shown to be superior than running. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Racquet Sports; Body Constitution; Physical Fitness; Students.

RESUMO

Introdução: A condição física dos estudantes universitários está piorando anualmente, sendo a taxa de obesidade um fator em alarmante ascensão, influenciando a qualidade do desempenho na educação física dos estudantes universitários. Objetivo: Estudar os efeitos da prática do badminton sobre a composição corporal dos estudantes universitários. Métodos: Durante o período de treinamento de três meses, 60 universitários voluntários foram divididos aleatoriamente em grupo experimental e controle para exercícios praticados duas vezes por semana, com duração de 1,5 horas. O grupo experimental praticou badminton, enquanto o grupo de controle praticou corrida. Resultados: A taxa de gordura corporal do grupo experimental diminuiu de 38,98% para 33,21%, a relação da cintura do quadril diminuiu de 0,83cm para 0,82cm, a capacidade vital aumentou de 2.817ml para 3.111ml, e a frequência cardíaca em repouso diminuiu de 78 para 75 vezes/minuto. Conclusão: A otimização da composição corporal e uma melhoria da constituição corporal foram estatisticamente observadas ao implementar o treinamento de badminton nos universitários. A promoção do badminton para estudantes universitários mostrou-se superior que a corrida. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Esportes com Raquete; Constituição Corporal; Aptidão Física; Estudantes.*

RESUMEN

Introducción: La condición física de los estudiantes universitarios empeora anualmente, siendo la tasa de obesidad un factor en alarmante aumento, influyendo en la calidad del rendimiento en educación física de los estudiantes universitarios. Objetivo: Estudiar los efectos de la práctica del bádminton en la composición corporal de estudiantes universitarios. Métodos: Durante un periodo de entrenamiento de tres meses, 60 voluntarios universitarios fueron divididos aleatoriamente en grupo experimental y grupo de control para ejercicios practicados dos veces por semana, con una duración de 1,5 horas. El grupo experimental practicó bádminton, mientras que el grupo de control practicó atletismo. Resultados: La proporción de grasa corporal del grupo experimental disminuyó del 38,98% al 33,21%, la proporción cintura/cadera disminuyó de 0,83cm a 0,82cm, la capacidad vital aumentó de 2.817ml a 3.111ml, y la frecuencia cardiaca en reposo disminuyó de 78 a 75 veces/minuto. Conclusión: Se observó estadísticamente una optimización de la composición corporal y una mejora de la constitución corporal al aplicar el entrenamiento de bádminton en estudiantes universitarios. Se demostró que la promoción del bádminton entre los estudiantes universitarios era superior a la del atletismo. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores*: Deportes de Raqueta; Constitución Corporal; Aptitud Física; Estudiantes.*

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INTRODUCTION

With the rapid development of sports in China, the physical education curriculum in colleges and universities has also undergone a series of reforms, and the physical education curriculum has gradually shown diversity.[1] Various universities have set up badminton related courses. Badminton is very popular in colleges and universities. A large number of students are willing to participate in badminton.[2] It is common for college students to play badminton on the open field after class. The basic movements of badminton are very simple and easy to master.[3] There are no special requirements for the site, just an empty site. And there is no specific requirement for the number of people. Badminton has a unique interest. Among the elective courses in colleges and universities, badminton is also a course with many participants.[4] Regular badminton can not only improve the physical health of college students, but also cultivate their indomitable will. University is an important stage of human growth, which is beneficial to the future development of college students by cultivating complete will quality.[5] And badminton is mainly aerobic sports, supplemented by anaerobic sports. Muscles and tissues all over the body participate in the sports. For students with obesity problems, it can help them improve their weight problems, which is beneficial to the correction of body posture.[6] Colleges and universities to promote badminton, let more students participate in badminton projects, can effectively improve the physical quality of college students.[7] Badminton can also become a lifelong sport.

METHOD

Research object

In view of the current problem of college students' obesity caused by lack of exercise, we recruited volunteers from the junior year of a university to participate in the weight loss training camp. The study and all the participants were reviewed and approved by Ethics Committee of Tangshan polytechnic college(NO.2018TSPC062). The applicants should meet the following requirements: First, college students' BMI index is more than 24kg/m^2, that is, overweight and obesity in the physiological sense, so the effect is more obvious; Secondly, the college students who signed up can maintain the exercise frequency twice a week during the three months of weight loss training. Unless there are irresistible factors, there is no absence; Third, during the experiment, students should follow the arrangement of the staff in grouping and training plans, and have good understanding and obedience; Fourth, college students have no congenital diseases and cardiovascular diseases, and will not have some bad consequences due to exercise, so as to ensure the normal conduct of the experiment. After a lot of recruitment and selection, a total of 60 students were finally selected as research objects, which were divided into running group and badminton group according to the form of random lottery, with 30 people in each group. Their age, height, weight, BMI and other indicators are shown in Table 1.

Research methods

The experiment was conducted in a controlled way. During the three-month training cycle, the experimental group and the control group exercised twice a week for 1.5 hours each time. Among them, the experimental group is the badminton group. After 20 minutes of warm-up preparation in 1.5 hours of sports training, the experimental group will carry out 1 hour of badminton sports and 10 minutes of stretching training after the sports. The control group was the running group, which also had 20 minutes of warm-up, one hour of aerobic running and 10 minutes of stretching training. The daily diet and work and rest of the experimental group and the control group are in the same grade in the same college, so there is no difference, so as to minimize the interference of human factors on the experimental results.

In terms of the sports effect of badminton, the body fat rate, muscle weight, lean weight, fat weight and other indicators were selected to judge their impact on college students' physique; The waist circumference, hip circumference, waist hip ratio and other indicators were selected to judge their impact on college students' physique; The indexes such as systolic blood pressure, diastolic blood pressure, vital capacity and quiet heart rate were selected to judge their impact on the cardiorespiratory situation of college students, so as to explore the impact of exercise training on college students' body shape and health, and analyze which exercise mode is better. Before the start of the experiment and after three weeks of sports training, the above indicators were measured, and the relevant data were collated and analyzed using Excel software and SPSS software.

Table 1. List of basic information of researchers.

Group	Running group (n=30)	Badminton group (n=30)
Age	20.415±1.133	20.500±1.111
Height	162.761±3.501	157.004±3.487
Weight	71.653±8.254	69.947±8.182
BMI	27.412±3.217	27.965±3.346

RESULTS

Effect of badminton on body fat of college students

In this section, the body fat rate, muscle weight, lean weight, fat weight and other indicators are selected as the criteria for judging the body fat rate of college students. After three months of training, the fat content and body fat rate of college students have decreased, and their bodies are developing in a healthy direction. The specific results are shown in Table 2.

It can be seen from Table 2 that after three months of training, the body fat rate of the running group decreased from (40.031 ± 3.719)% to (35.922 ± 3.959)%, the muscle weight decreased from (31.815 ± 2.739) kg to (30.975 ± 2.548) kg, the lean weight decreased from (44.548 ± 2.331) kg to (43.971 ± 1.963) kg, and the fat weight decreased from (30.060 ± 5.180) kg to (25.881 ± 4.877) kg. This shows that long-term exercise can effectively reduce the body fat rate, fat weight and lean weight of obese college students. Although the muscle weight has decreased, the change is relatively small, indicating that running can improve the body composition of obese college students.

After three months of training, the body fat rate of the badminton group decreased from (38.983 ± 3.412)% to (33.216 ± 3.321)%, the muscle weight decreased from (30.735 ± 2.548) kg to (34.513 ± 2.987) kg, the lean weight decreased from (45.952 ± 1.548) kg to (47.543 ± 2.097) kg, and the fat weight decreased from (28.099 ± 3.786) kg to (23.723 ± 3.210) kg. Compared with running, the body fat rate and fat weight of the badminton group decreased more, and the lean weight and muscle weight increased, indicating that the optimization effect of body composition of obese college students in the badminton group was better than that of the running group, and the effect of badminton on reducing fat and increasing muscle was better than that of running.

Table 2. Influence of Badminton on Body Fat of College Students.

Group	Running group		Badminton group	
	Before experiment	After experiment	Before experiment	After experiment
Body fat percentage	40.031±3.719	35.922±3.959	38.983±3.412	33.216±3.321
Muscle weight	31.815±2.739	30.975±2.548	30.735±2.548	34.513±2.987
Lean weight	44.548±2.331	43.971±1.963	45.952±1.548	47.543±2.097
Fat weight	30.060±5.180	25.881±4.877	28.099±3.786	23.723±3.210

The influence of badminton on college students' physique

In Section 3.2 of this paper, three indexes, namely waist circumference, hip circumference and waist hip ratio, are selected as the judgment criteria for college students' physique. The results are shown in Table 3.

It can be seen from Table 3 that after three months of training, the waist circumference of the running group decreased from (82.748 ± 4.889) cm to (78.627 ± 4.969) cm, the hip circumference from (102.550 ± 3.063) cm to (94.790 ± 3.151) cm, and the waist hip ratio from (0.840 ± 0.020) cm to (0.810 ± 0.030) cm. This shows that insisting on running can reduce waist circumference and hip circumference, reduce waist hip ratio, and make the athlete's figure more beautiful.

After three months of training, the waist circumference of the badminton group decreased from (83.643 ± 4.522) cm to (76.091 ± 4.492) cm, the hip circumference from (99.702 ± 3.003) cm to (97.156 ± 2.936) cm, and the waist hip ratio from (0.835 ± 0.030) cm to (0.820 ± 0.041) cm.

The influence of badminton on college students' heart and lungs

In this section, four indexes, namely systolic blood pressure, diastolic blood pressure, vital capacity and quiet heart rate, are selected as the basis for judging the cardiopulmonary status of college students. See Table 4 for details.

Table 4 shows that after three months of training, the systolic blood pressure of the running group decreased from (129.359 ± 4.173) mmHg to (125.945 ± 4.071) mmHg, the diastolic blood pressure decreased from (84.477 ± 3.113) mmHg to (79.522 ± 2.840) mmHg, the vital capacity increased from (2936.104 ± 301.221) ml to (3183.294 ± 292.636) ml, and the quiet heart rate decreased from (79.409 ± 2.586) times/minute to (77.062 ± 2.797) times/minute. The effect of comparison before and after is obvious, which shows that running can effectively reduce college students' blood pressure and make them closer to the normal range for some college students who are obese and overweight; Improve the vital capacity of obese college students, so that college students will not be panting due to some minor exercises in daily life; It can also reduce the quiet heart rate of college students, prevent them from excessive palpitations, and reduce the hidden dangers of cardiovascular diseases.

After three months of training, the systolic blood pressure of the badminton group decreased from (131.598 ± 4.314) mmHg to (124.447 ± 5.1926) mmHg, the diastolic blood pressure decreased from (81.350 ± 2.863) mmHg to (80.403 ± 3.175) mmHg, the vital capacity increased from (2817.115 ± 150.754) ml to (3111.021 ± 200.8056) ml, and the quiet heart rate decreased from (78.224 ± 3.653) times/minute to (75.003 ± 3.215) times/minute. Compared with the running group, the badminton group has a larger optimization range of systolic blood pressure, a smaller optimization range of diastolic blood pressure, a higher optimization range of vital capacity, and a slightly higher decline range of resting heart rate than the running group. From the perspective of the optimization of cardiopulmonary capacity, although three of the four aspects of the badminton group are better than the running group, there is little difference between them.

Table 3. The Influence of Badminton on College Students' Body Shape.

Group	Running group		Badminton group	
	Before experiment	After experiment	Before experiment	After experiment
Waist circumference	82.748±4.889	78.627±4.969	83.643±4.522	76.091±4.492
Hipline	102.550±3.063	94.790±3.151	99.702±3.003	97.156±2.936
Waist hip ratio	0.840±0.020	0.810±0.030	0.835±0.030	0.820±0.041

Table 4. The Influence of Badminton on College Students' Cardiopulmonary Conditions.

Group	Running group		Badminton group	
	Before experiment	After experiment	Before experiment	After experiment
Systolic pressure	129.359±4.173	125.945±4.071	131.598±4.314	124.447±5.1926
Diastolic pressure	84.477±3.113	79.522±2.840	81.350±2.863	80.403±3.175
Vital capacity	2936.104±301.221	3183.294±292.636	2817.115±150.754	3111.021±200.8056
Quiet heart rate	79.409±2.586	77.062±2.797	78.224±3.653	75.003±3.215

DISCUSSION

Badminton is a whole body sport mainly involving aerobic exercise. Whether it is competitive badminton competition or badminton practice, students will be required to constantly move their feet, jump, and hit the ball during the movement. It is well known that aerobic exercise can effectively speed up fat burning. When badminton is in progress, all technical movements need ATP for energy support. Therefore, playing badminton for a long time will obviously improve the weight problem. Fat will keep burning during exercise. After the exercise process, with reasonable diet, you can effectively increase your muscle content. The body fat content showed a decreasing trend, while the muscle content increased, effectively reducing the body fat rate. The daily training of badminton habit can effectively improve the physical condition, and make all parts of the body return to the standard level. The body's fat reserves provide an adequate source of energy for the body. Carbohydrates and proteins are direct energy sources for human body. In daily life, after being used for normal body metabolism, excess sugars and proteins are converted into fat through a series of reactions and stored by the body. In the process of exercise, carbohydrate and protein can not provide enough energy source. Under the action of lipase, fat is decomposed, and the decomposed fat provides sufficient energy for the body through oxidation reaction. The rate of fat consumption is related to the type, intensity and duration of exercise. Because badminton belongs to aerobic sports, the activity of enzymes in the body also increases when there is enough oxygen. At this time, a large amount of fat is consumed. Through a long time of badminton, the consumption of fat is also considerable. When badminton is playing, nerves everywhere in life are in a state of excitement, and sports have a very positive effect on their own nervous system and endocrine system. When the nervous system is excited, it will secrete various hormones. Some hormones will inhibit the secretion of insulin. With the increase of exercise duration, fat energy supply will replace most sugar energy supply. The energy produced by the same unit of fat is far greater than that produced by sugar. This is also the main reason why the body temperature after exercise is much higher than that before exercise. Regular and periodic participation in badminton can effectively solve the problem of obesity. The reduction of fat reserves can effectively prevent various cardiovascular and cerebrovascular diseases. Reduce the physical burden and improve the health level of the body. It can also improve the functional level of the circulatory system and respiratory system. Therefore, college students participating in badminton can not only solve the problem of obesity, but also improve their physical and mental development.

CONCLUSION

At present, due to the influence of the epidemic situation and the lack of self-discipline of many college students in school, the physique of college students has declined year by year, and the obesity rate has increased year by year, which has had a certain impact on the physical education of

college students. Therefore, this paper uses two ways of badminton and running to study the impact of badminton on college students' body fat and body shape, hoping to improve college students' body composition through effective sports training, cultivate correct sports concepts, and reduce the occurrence of excessive dieting and weight loss. The results obtained from the research and analysis show that the optimization effect of body composition and the improvement effect of body shape are better than running by using badminton sports, so badminton sports are worth promoting in college students' class and after-school sports.

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