EFFECTS OF INTERMITTENT SOCCER TRAINING ON PHYSICAL ENDURANCE IN UNIVERSITY STUDENTS

EFEITOS DO TREINAMENTO INTERMITENTE COM FUTEBOL SOBRE A RESISTÊNCIA FÍSICA DE ESTUDANTES UNIVERSITÁRIAS

EFECTOS DEL ENTRENAMIENTO INTERMITENTE DE FÚTBOL EN LA RESISTENCIA FÍSICA DE ESTUDIANTES UNIVERSITARIAS

Original Article
Artigo Original
Artículo Original

Yang Bo[1]
(Physical Education Professional)

1. Xi'an Aeronautical Institute, Xi'an, Shaanxi, China.

Correspondence:
Yang Bo
Xi'an, Shaanxi, China. 710077.
yangbo490261014@163.com

ABSTRACT

Introduction: The development of modern science and technology has led young people to a continuous decline in physical activity, negatively impacting the quality of cardiopulmonary endurance in college students. It is believed that the emerging need to strengthen physical endurance training can be met through sports. Progressive soccer training is a practice of interest due to its recreational and sporting effects. Objective: Study the effect of intermittent soccer training on the physical endurance of female college students. Methods: 12 classes of young women participated in soccer training lasting two hours, twice a week, according to the organization of the optional school soccer course. During the experiment, the intermittent training mode was selected and the combination of soccer walking and running was adopted for impact analysis. Results: The research showed that in the first 6 weeks, the changing trend of cardiopulmonary endurance of female college students was not different from that before the experiment, but there was a slight optimization phenomenon. After the experiment, the cardiopulmonary endurance of female college students was significantly improved. Conclusion: Intermittent soccer training for female college students can significantly improve their cardiorespiratory endurance and enhance their sports performance. It is an important tool for optimizing college students' physical functions and healthy growth. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Soccer; Physical Education and Training; Physical Endurance; Students.

RESUMO

Introdução: O desenvolvimento da ciência e tecnologia modernas tem levado os jovens ao declínio contínuo da atividade física, impactando negativamente sobre a qualidade de resistência cardiopulmonar das estudantes universitárias. Acredita-se que a necessidade emergente de fortalecer o treinamento de resistência física possa ser suprida através do esporte. O treinamento progressivo de futebol é uma prática de interesse devido aos seus efeitos lúdicos e esportivos. Objetivo: Estudar o efeito do treinamento intermitente de futebol sobre a resistência física das estudantes universitárias. Métodos: 12 classes de jovens participaram do treinamento de futebol com duração de duas horas, no período de duas vezes por semana, de acordo com a organização do curso optativo de futebol escolar. Durante o experimento, o modo de treinamento intermitente foi selecionado e a combinação de marcha e corrida de futebol foi adotada para análise do impacto. Resultados: Os resultados da pesquisa mostraram que nas primeiras 6 semanas, a tendência de mudança de resistência cardiopulmonar das estudantes universitárias não era diferente da anterior à experiência, mas havia um leve fenômeno de otimização. Após o experimento, a resistência cardiopulmonar das estudantes universitárias foi significativamente aprimorada. Conclusão: O treinamento intermitente de futebol para estudantes universitárias pode aperfeiçoar significativamente sua resistência cardiorrespiratória e melhorar seu desempenho esportivo, sendo uma importante ferramenta para otimização das funções físicas e o crescimento saudável das estudantes universitárias. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Futebol; Educação Física e Treinamento; Resistência Física; Estudantes.*

RESUMEN

Introducción: El desarrollo de la ciencia y la tecnología modernas ha llevado a los jóvenes a una disminución continua de la actividad física, lo que repercute negativamente en la calidad de la resistencia cardiopulmonar de los estudiantes universitarios. Se cree que la necesidad emergente de reforzar el entrenamiento de la resistencia física puede satisfacerse a través del deporte. El entrenamiento progresivo en fútbol es una práctica de interés por sus efectos lúdicos y deportivos. Objetivo: Estudiar el efecto del entrenamiento intermitente con fútbol sobre la resistencia física de estudiantes universitarias. Métodos: 12 clases de mujeres jóvenes participaron en entrenamientos de fútbol de dos horas de duración, dos veces por semana, según la organización del curso de fútbol escolar optativo. Durante el experimento, se seleccionó el modo de entrenamiento intermitente y se adoptó la combinación de fútbol caminando y corriendo para el análisis del impacto. Resultados: Los resultados de la investigación mostraron que en las primeras 6

semanas, la tendencia de cambio de la resistencia cardiopulmonar de las estudiantes universitarias no era diferente de la de antes del experimento, pero había un ligero fenómeno de optimización. Después del experimento, la resistencia cardiopulmonar de las estudiantes universitarias mejoró significativamente. Conclusión: El entrenamiento intermitente de fútbol para estudiantes universitarias puede mejorar significativamente su resistencia cardiorrespiratoria y mejorar su rendimiento deportivo, y es una herramienta importante para optimizar las funciones físicas y el crecimiento saludable de las estudiantes universitarias. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Fútbol; Educación y Entrenamiento Físico; Resistencia Física; Estudiantes.*

DOI: http://dx.doi.org/10.1590/1517-8692202329012023_0059 Article received on 02/01/2023 accepted on 02/16/2023

INTRODUCTION

Football is known as the largest sport in the world. It has a very high popularity in the world. Daily participation and frequency of sports often have a certain scale. With the development of sports science, interval training has gradually come into people's view.[1,2] Through the research of sports science, interval training can effectively improve their physical function and sports technical ability. And football is a sports event which mainly focuses on running, and it has high requirements for its own cardiopulmonary endurance.[3] The development of modern science and technology has brought great convenience to people's daily life, such as food, clothing, transportation and spiritual and cultural life. The popularity of elevators, cars, etc. has gradually reduced the amount of sports people need in their daily life, while the popularity of the Internet and games has shifted young people's entertainment activities from outdoor to online.[4] Many young people, especially college students, are facing the problems of obesity and decline in heart and lung endurance. Therefore, strengthening the improvement of college students' cardiopulmonary endurance is the focus of research on optimizing college students' physical quality.[5] Many female college students blindly use drugs or diet to control their weight in their daily life. Although this way can optimize the body shape in a short time, it has brought more damage to the functional quality of the body.[6] Therefore, this paper focuses on female college students among college students. How to improve the cardiopulmonary endurance of female college students through intermittent training, so as to indirectly improve the technical level of football, in order to achieve the purpose of improving sports performance needs in-depth research.[7]

METHOD

Because it is necessary to measure the cardiopulmonary endurance indexes of the research objects in detail and track their changes, the number of research objects should not be too large. The study and all the participants were reviewed and approved by Ethics Committee of Xi'an Aeronautical Institute (NO.XAAIPT20Z05). In this paper, 15 college students were recruited from the female college students who took football as an elective course in physical education for freshmen and sophomores of a university.

When the subjects are too unwell or absent from training due to busy classes, relevant indicators need to be excluded. After the whole experiment cycle, three subjects failed to complete the whole experiment due to physical reasons and learning schedule problems. Therefore, the number of subjects in this study is 12. Their age, height, weight, BMI, etc. are shown in Table 1. P>0.05 in the overall analysis will not cause differences in the experimental results.

The experiment lasted for 12 weeks. During the 12-week experiment, 12 subjects participated in football training activities twice a week, two class hours each time, according to the school's football elective curriculum arrangement. In football, the intermittent training mode was selected, and the combination of walking and football running was adopted. After a period of high-intensity training, the team took a slow rest in the form of walking, and learned football skills and related training. The heart rate, systolic blood pressure, diastolic blood pressure, tidal volume, oxygen uptake, etc. were measured and analyzed before the experiment, half way through the experiment and after the experiment.

Table 1. Basic information of the research object.

No.	Age	Height	Weight	BMI
1	18.795	158.111	48.441	20.39
2	18.443	155.951	48.388	20.339
3	19.758	161.145	59.716	21.389
4	20.059	156.299	58.423	23.384
5	19.129	164.014	57.895	22.294
6	19.447	164.359	46.721	22.839
7	19.388	162.568	60.266	21.495
8	18.988	163.121	51.886	22.414
9	19.836	159.508	47.683	18.288
10	18.742	163.8	60.905	19.248
11	19.297	156.963	55.974	19.374
12	19.008	164.483	49.23	19.274

In terms of data measurement, the wearable measuring instrument is selected. Before the test, gradually increase the exercise power, measure the changes of various indicators during the increase of exercise power, select the data when it is more stable, and calculate the average value as the data value of each research object at this point. Use Excel software to take the overall average of the data obtained and draw the relevant change curve.

RESULTS

Changes of the heart rate during the intervention

Figure 1 shows the change of the heart rate during the intervention. It can be seen from the figure that the two curves are almost the same in the time of week 0 and week 6, indicating that football in a short period has little impact on the change of heart rate. At the 12th week, there was a certain change in the numerical curve, which indicated that football intermittent training played a certain role in the change of the researchers' heart rate. From the curve itself, in the process of week 0 and week 6, when the exercise load power is 25w to 75w, it shows a stable rising state, and when the exercise power is 75w to 100w, it shows a relatively stable state, indicating that the athlete has reached the body's extreme heart rate at this time, and will not increase. After 12 weeks of intermittent football training, we can find that the athletes' heart rate still keeps a steady rising state during the 75w to 100w process, which indicates that after intermittent football training, the sports physical limit of female college students has been improved, and the cardiac function has also made some progress.

Changes of blood pressure during intervention

When judging the recovery effect of shoulder joint injury, straight arm forward flexion and upward lifting and straight arm backward extension

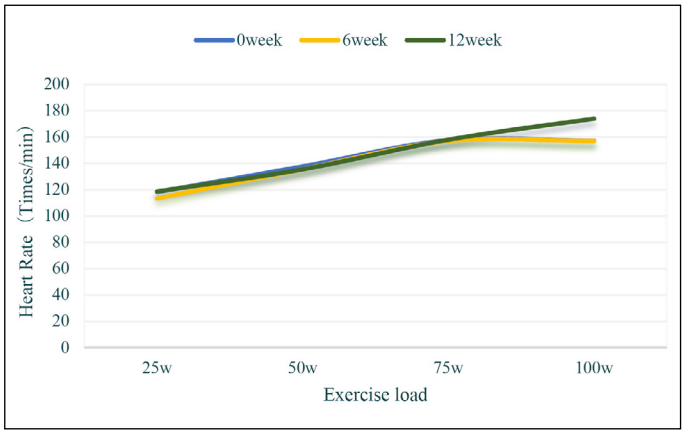

Figure 1. Change of the center rate during the intervention.

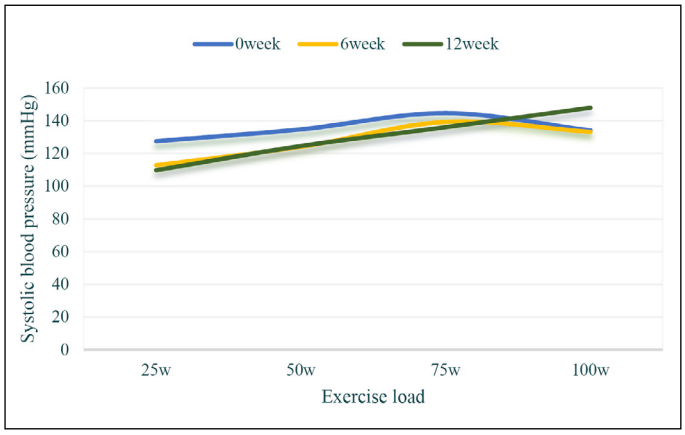

Figure 2. Changes of systolic blood pressure during intervention.

were selected as the judgment criteria. The athletes completed relevant actions as far as possible until they had to stop because of the pain, and their distances were calculated. The greater the distance, the greater the range of movements that the athlete can complete, which proves that the better the flexibility of the shoulder joint.

It can be seen from Figure 2 that the systolic blood pressure was higher at 25w before the start of the experiment, and showed a steady rising state. It reached a critical value at 75w, and the diastolic blood pressure gradually decreased during the subsequent exercise, indicating that 75w was the student's exercise limit. After six weeks of football intermittent training intervention, the systolic blood pressure of college students at 25w decreased, but the overall change was basically the same as before the experiment, and 75w was its critical value. After 12 weeks of football intermittent training intervention, the systolic blood pressure at 25w was almost the same as that at 6 weeks and showed a steady growth state. The critical value of exercise also exceeded 75w, and it developed to 100w. However, the systolic blood pressure was basically the same as the maximum value before the experiment, indicating that the cardiorespiratory capacity of the subjects had been improved to a certain extent.

Figure 3 shows the change of diastolic blood pressure during the intervention. It can be seen from the figure that in terms of the intervention of diastolic blood pressure, it has achieved initial results 6 weeks after the start of the experiment. Compared with the data image before the start of the experiment, through intermittent football training, the diastolic blood pressure of college students rose slowly after the start of the exercise and remained in a relatively stable state. It can be seen from the observation of the critical value that the original critical value of exercise power is 75w. After 12 weeks of exercise intervention, the diastolic blood pressure of college students rises slowly in the process of 100w, indicating that their cardiopulmonary capacity has made some progress.

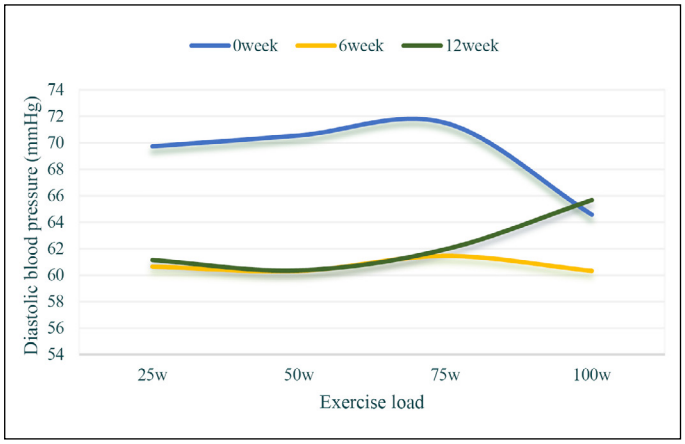

Figure 3. Changes of diastolic blood pressure during intervention.

Changes of pulmonary respiration during intervention

It can be seen from Figure 4 that in terms of the change of oxygen uptake, the optimization effect of intermittent football training on female college students' oxygen uptake is not significant enough. The three curves have little change before and after the beginning of the experiment. From week 0 to week 6 and then to week 12, the rate is gradually increasing. Before the beginning of the experiment, the phenomenon of critical value also appeared on the 75w sports load power. As the experiment continued, the maximum oxygen uptake gradually increased with the increase of exercise power, which proved that the cardiopulmonary endurance and physical function endurance of female college students were improved.

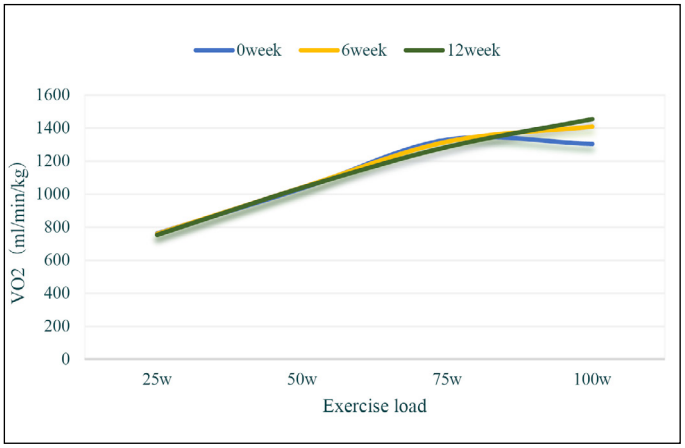

Figure 4. Changes of VO2 during intervention.

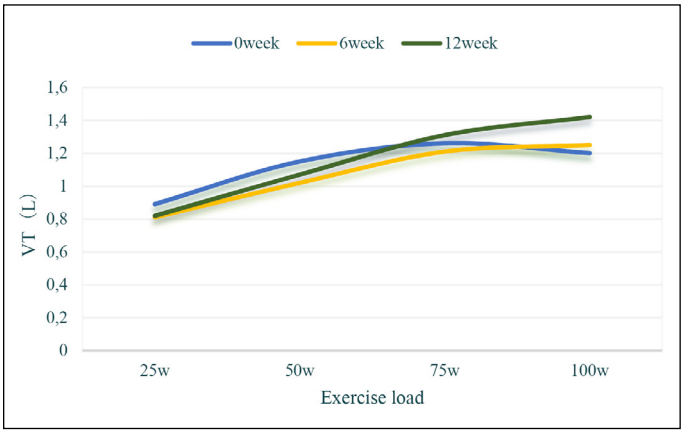

Figure 5. Change of tidal volume during intervention.

As shown in Figure 5, the change of tidal volume during the intervention process. It can be seen from the relevant data that the maximum value of exhaled and inhaled gas is at the critical point during the exercise power process of 50w to 75w before the start of the experiment, indicating that college students will feel tired at 75w. After 12 weeks of advanced football training, it can be seen from the pictures that the maximum tidal volume of the experimental subjects has been significantly improved, and its critical value has also been improved, which indicates that the physical function and tidal volume of female college students have been significantly optimized, and the cardiopulmonary endurance has been further improved.

DISCUSSION

With the progress of sports science, there are high-intensity interval training methods suitable for all kinds of sports in the world. Intermittent exercise can burn more fat in a short time. This kind of training method, which is at the forefront of world sports science, is very helpful to the improvement of athletes' ability. Intermittent training is more likely to cause fatigue than conventional training mode. Football training in regular mode takes about 80 to 120 minutes. The boundary training can effectively shorten the training time and improve the training efficiency. For the intermittent training of football, about 1/4 of the time is spent in the regular sequence. Necessary warm-up activities shall be carried out before the training session. Regular sports equipment can be used for warm-up activities, such as treadmill, bicycle, elliptical machine, etc. Warm up for 5-10 minutes. After the warm-up, perform the necessary stretching exercise. When stretching, the soft tissues such as ligaments and joints of the whole body shall be fully stretched. Make the body flexibility meet the requirements of sports. Due to the particularity of football, in high-level football competitions, players have to move about 10000 meters in regular time. It consists of walking, sprinting and constant speed running. Usually, a large number of explosive actions should be connected. Technical actions provide energy for the body through the oxidation of their own energy substances. And the sprint is an anaerobic functional link, which also plays a very important role. In daily training, upper limb strength can be trained through push ups, pull ups, presses and other equipment. You can use dumbbells as an aid to rowing to strengthen the back muscles. Secondly, through a series of methods, such as sit up, belly end, side lying, leg lifting, jumping and stagnating, the core strength of the waist and abdomen is strengthened. When the sports quality reaches a certain level, the training can be carried out under the weight bearing mode. Through all kinds of long jump. Or with the help of auxiliary equipment, squatting or climbing steps and other ways to strengthen the leg muscles. Through daily long-distance running training, we can improve our aerobic endurance. Daily sprint training can effectively improve the anaerobic endurance of athletes. The ability of body coordination and balance can be improved through training methods such as speed change running and side running. In the intermittent training mode, the key factor to improve training efficiency is to make your heart rate reach about 90% of the maximum heart rate. It is the core content of interval training to make oneself reach exhausted state periodically under training. After the training, the body should be fully stretched. Training in this mode can make your body feel tired in half an hour.

CONCLUSION

In the process of college physical education teaching, it is necessary to optimize the cardiopulmonary endurance of college students, so as to improve their physical functions and sports quality and enable them to develop in an all-round and healthy way. Football, as an interesting and effective sport, is also a popular elective course in the current college elective courses. This article takes this as an example to discuss the changes of cardiopulmonary endurance caused by related sports. The research results show that intermittent football training for female college students can significantly improve their cardiopulmonary endurance, and improve their critical value of sports, so that their physical functions can be optimized, thus contributing to the healthy growth of college students.

The author 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. Yang Bo: writing and execution.

REFERENCES

1. Bravo DF, Impellizzeri FM, Rampinini E, Castagna C, Bishop D, Wisloff U. Sprint vs. interval training in football. Int J Sports Med. 2008;29(8):668-74.
2. Faude O, Steffen A, Kellmann M, Meyer T. The effect of short-term interval training during the competitive season on physical fitness and signs of fatigue: a crossover trial in high-level youth football players. Int J Sports Physiol Perform. 2014;9(6):936-44.
3. Wright MD, Hurst C, Taylor JM. Contrasting effects of a mixed-methods high-intensity interval training intervention in girl football players. J Sports Sci. 2016;34(19):1808-15.
4. Williams CA, Stevens D. Physical activity and exercise training in young people with cystic fibrosis: Current recommendations and evidence. J Sport Health Sci. 2013;2(1):39-46.
5. Cheng JC, Chiu CY, Su TJ. Training and evaluation of human cardiorespiratory endurance based on a fuzzy algorithm. Int J Environ Res Public Health. 2019;16(13):2390.
6. Stanly SL, Maniazhagu D. Individual and combined interventions of tai chi, pilates and yogic practices on cardio respiratory endurance of b. ed. trainees. Pesy. 2020;10(4):25-31.
7. Vogel T, Leprêtre PM, Brechat PH, Lonsdorfer E, Benetos A, Kaltenbach G, et al. Effects of a short-term personalized Intermittent Work Exercise Program (IWEP) on maximal cardio-respiratory function and endurance parameters among healthy young and older seniors. J Nutr Health Aging. 2011;15(10):905-11.