

EFFECTS OF ORIENTEERING SPORT ON STUDENTS' PHYSICAL ENDURANCE



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EFEITOS DO ESPORTE DE ORIENTAÇÃO SOBRE A RESISTÊNCIA FÍSICA DOS ESTUDANTES

EFFECTOS DEL DEPORTE DE ORIENTACIÓN EN LA RESISTENCIA FÍSICA DE LOS ESTUDIANTES

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ABSTRACT

Introduction: In the orienteering sport, the orienteer has to pass through control points marked on the terrain in the shortest possible time, with the help of a map and a compass, using nature as a playing field. This activity has been with man since its origin. As a sport, it appeared in the Nordic countries more than a hundred years ago to perform an outdoor physical and intellectual activity with the potential to promote the aerobic endurance of university students. **Objective:** Study the effect of orienteering sports on the physical endurance of college students. **Methods:** Through experimental research method, 30 college students from different majors were taken as research objects, the physiological indices of each group were measured, and the effect of sport on cardiopulmonary function and aerobic endurance of college students and its physiological mechanism were discussed. **Results:** Orientation college students who have been engaged in sports training for a long time and physical education subjects have a significantly better cardiopulmonary function and aerobic endurance than ordinary college students to varying degrees. **Conclusion:** Orientation sports positively affected students' physical endurance, increasing their cardiopulmonary and aerobic endurance indexes. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

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

RESUMO

Introdução: No esporte de orientação, o praticante tem que passar por pontos de controle marcados no terreno no menor tempo possível, com o auxílio de um mapa e de uma bússola, usando a própria natureza como campo de jogo. Essa atividade acompanha o homem desde a sua origem e, como esporte, surgiu nos países nórdicos há mais de cem anos, com o propósito de realizar-se uma atividade física e intelectual ao ar livre, com o potencial de promover os a resistência aeróbica dos estudantes universitários. **Objetivo:** Estudar o efeito do esporte de orientação sobre a resistência física dos estudantes universitários. **Métodos:** Através do método de pesquisa experimental, 30 estudantes universitários de diferentes áreas de habilitação foram tomados como objetos de pesquisa, os índices fisiológicos de cada grupo foram medidos e o efeito do esporte sobre a função cardiopulmonar e resistência aeróbica dos estudantes universitários e seu mecanismo fisiológico foram discutidos. **Resultados:** Os estudantes universitários de orientação que se dedicam ao treinamento esportivo há muito tempo e as disciplinas de educação física têm função cardiopulmonar e resistência aeróbica significativamente melhores do que os estudantes universitários comuns em graus variados. **Conclusão:** O esporte de orientação demonstrou um efeito positivo sobre a resistência física dos estudantes, aumentando seus índices cardiopulmonares e de resistência aeróbica. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

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

RESUMEN

Introducción: En el deporte de orientación, el practicante tiene que pasar por puntos de control marcados en el terreno en el menor tiempo posible, con la ayuda de un mapa y una brújula, utilizando la propia naturaleza como campo de juego. Esta actividad acompaña a la humanidad desde su origen y, como deporte, apareció en los países nórdicos hace más de cien años, con el propósito de realizar una actividad física e intelectual al aire libre, con el potencial de promover la resistencia aeróbica de los estudiantes universitarios. **Objetivo:** Estudiar el efecto del deporte de orientación en la resistencia física de los estudiantes universitarios. **Métodos:** Mediante el método de investigación experimental, se tomaron como objeto de investigación 30 estudiantes universitarios de diferentes carreras, se midieron los índices fisiológicos de cada grupo y se analizó el efecto del deporte sobre la función cardiopulmonar y la resistencia aeróbica de los estudiantes universitarios y su mecanismo fisiológico. **Resultados:** Los estudiantes universitarios de orientación que han realizado un entrenamiento deportivo durante mucho tiempo y las asignaturas de educación física tienen una función cardiopulmonar y una resistencia aeróbica significativamente mejores que los estudiantes universitarios ordinarios en diversos grados. **Conclusión:** El deporte de orientación demostró un efecto positivo en la resistencia física de los estudiantes, aumentando sus índices de resistencia cardiopulmonar y aeróbica. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Estudiantes; Resistencia Física; Educación y Entrenamiento Físico.



INTRODUCTION

The unique project characteristics of orienteering are: "Strong ability to read pictures, skilled use of the compass, optimal choice of routes, concentration under fast and high intensity, and the ability to run in various terrains, complete the race according to the specified route in the shortest time".¹ It can be seen from this that orienteering sports is achieved with the help of the map and the north needle, in the shortest time and the fastest speed to complete the sports efficiently, this not only has high requirements on the ability to mobilize thinking and judgment, but also the physical fitness of the athletes is an important factor affecting the results of the game.²

Dijkma I thinks: Carrying out orienteering course in high school physical education is the most recent way to carry out quality education, and analyzes the current situation of orienteering in high school physical education courses in our country, and physical education teachers lack relevant professional knowledge and experience; Insufficient teaching funds and other factors, and put forward countermeasures and suggestions to solve the above problems.³ Selland C proposed: With the deepening of the curriculum reform, new requirements are also put forward for the secretary of higher education.⁴ Yang HL believes that: Orienteering is a cross-country sport with aerobic training as the main body, and the improvement of players' endurance quality is the interference of the pressure of physical exercise and the time of exercise persistence.⁵

There are few domestic reports on this research. The purpose of this study is to preliminarily explore the effect of orienteering exercise on the cardiopulmonary function and aerobic endurance of college students and its physiological mechanism. The research aims to provide a scientific theoretical basis and feasible practical support for the orienteering exercise to become an effective exercise method and means to improve the aerobic endurance of contemporary college students, and for the relevant educational decision-making departments to carry out the orienteering exercise generally in colleges and universities.^{6,7}

METHOD

Documentation method

Through CNKI database, Wanfang database, VIP periodical resource platform, National Library, and Library of Capital Institute of Physical Education, a large number of literature and materials related to the author's research were consulted.⁸ The author has read the journal literature and master's and doctoral dissertations similar to this research to provide a theoretical basis for this research.

Indicator test

Procedures, instruments and methods In this experiment, resting heart rate, blood pressure, VC (vital capacity), FVC (forced vital capacity), FVC1.0 (1.0s vital capacity), MVV (maximum pulmonary ventilation per minute), etc. were selected, a total of 6 resting state physiological indicators were tested, and then the pulse pressure and cardiac function index were calculated. The resting heart rate was measured by the PolarS610 heart rate telemeter made in Finland, the experimental subjects wore and turned on the heart rate telemeter after entering the laboratory, after sitting for 10 minutes, the resting heart rate value was directly read, and then the blood pressure at rest was tested. The specific operations are as follows:

The speed of the electric treadmill is set to 8km/h, the slope is 15°, the test subjects wear and turn on the heart rate telemeter device before going on the treadmill, and then prepare for the activity at a speed of 5km/h for 3 minutes (the slope is the same as before), rest for 5 minutes. At the beginning of the experiment, the staff adjusted the speed of the treadmill to 8km/h at the fastest speed, and the experimental subjects ran for 5 minutes, the heart rate value was quickly read from the heart rate monitor immediately after the exercise, the experimental subjects sat down and entered a rest state, and then read the heart rate values at each recovery time point in turn, all the above experimental data tests were completed by special personnel in the Sports Human Science Laboratory of the College of Physical Education, the mid- and long-distance running ability, which reflects aerobic endurance, is tested on a standard 400m track and field.⁹

Data processing

The test data of each index are expressed as mean \pm standard deviation ($x \pm sd$), and all data are processed on the computer with SPSS12.0 statistical software,¹⁰ the comparison between the two groups of data was performed using analysis of variance and t-test, with a significance level of 0.05 and a very significant level of 0.01. The research subjects randomly selected 12 college students from a university, 10 college students majoring in physical education, and 8 college students from the orienteering team, a total of 30 students were selected as the research subjects. The selected research subjects were divided into 3 experimental groups: The general professional college student group, the physical education college student group, and the orienteering college student group, the research subjects were free of respiratory and cardiovascular system diseases after examination.

Ethical Compliance

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

RESULTS

The effect of orienteering on the cardiovascular function of college students

It can be seen from Table 1 and Table 2 that, the heart rate and cardiac function index of the orienteering group at rest, immediately after exercise, at the end of 1 min of recovery, at the end of 2 min of recovery, at the end of 3 min of recovery, and at the end of 10 min of recovery were significantly different from those of the ordinary girl group ($P < 0.01$).

The effect of directional cross-country exercise on the pulmonary ventilation function of college students

Table 3 shows that the VC, FVC, FVC1.0, and MVV of the orienteering group were significantly different from those of the ordinary girl group ($p < 0.01$); There were very significant differences in vc, FVC, FVC1.0, and MVV between the physical education girls group and the ordinary college students group ($P < 0.01$). However, the indicators of college students in each group of orienteering are better than those of college students in each group of physical education.

Table 1. Effects of orienteering exercise on resting heart rate, blood pressure, pulse pressure and cardiac function index of college students ($x \pm sd$).

group	Number of people/n	resting heart rate/ (6-min-1)	systolic blood pressure/ (mmHg)	diastolic blood pressure/ (mmHg)	pulse pressure/ (mmHg)	heart function index --
Ordinary girls group	12	75.5 \pm 3.6	121.3 \pm 7.5	72.1 \pm 6.5	54.3 \pm 3.3	143.9 \pm 8.8
Physical education girls group	10	69.8 \pm 3.4**	116.4 \pm 6.0	68.7 \pm 7.0	48.3 \pm 2.4*	126.2 \pm 9.8**
Orienteering group	8	65.7 \pm 3.0**	114.7 \pm 6.7*	69.6 \pm 5.9	45.9 \pm 2.5**	117.5 \pm 7.9**

Note: # indicates a significant difference compared with the ordinary girl group, $P < 0.05$; ## indicates a very significant difference compared with the ordinary girl group, $P < 0.01$.

Table 2. The effect of orienteering exercise on the heart rate of college students in the immediate and recovery period of quantitative load exercise (x±sd).

group	Number of people/n	exercise instantly/ (b·min-1)	Recovery at the end of 1min/ (b·min-1)	Recovery at the end of 2min/ (b·min-1)	Recovery at the end of 3min/ (b·min-1)	Recovery at the end of 10min/ (b·min-1)
Ordinary girls group	12	163.3±8.1	145.4±6.3	127.7±5.0	92.4±4.9	84.6±4.2
Physical education girls group	10	149.6±7.5**	127.8±5.8**	105.3±4.7**	81.5±4.4*	73.8±3.9**
Orienteering group	8	145.7±7.0**	122.6±5.5**	101.8±4.3**	76.3±4.5**	68.8±3.3**

Note: # indicates a significant difference compared with the ordinary girl group, P < 0.05; ## indicates a very significant difference compared with the ordinary girl group, P < 0.01.

Table 3. Effects of orienteering on VC, FVC, FVC1.0 and MVV of college students (x±sd).

Group	Number of people/n	VC/L	FVC/L	FVC1.0/L	MVV/L
Ordinary girls group	12	3.2±4.8	3.2±4.7	2.7±0.3	113.6±13.5
Physical education girls group	10	3.9±4.6**	3.9±4.8**	3.2±0.2**	132.4±14.8**
Orienteering group	8	4.0±3.8**	4.0±3.8**	3.4±0.2**	136.3±11.6**

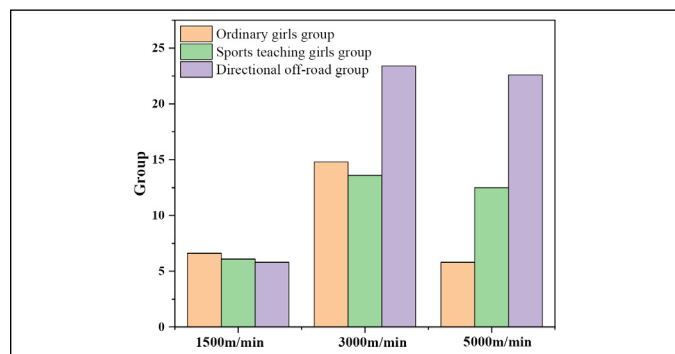
Note: # indicates a significant difference compared with the ordinary girl group, P < 0.05; ## indicates a very significant difference compared with the ordinary girl group, P < 0.01.

Influence of Orienteering Cross Country Sports on College Students' Middle and Long Distance Running Ability

It can be clearly seen from Figure 1 that, the middle and long-distance running ability of the orienteering group and the physical education girl group was significantly better than that of the ordinary girl group, and the orienteering group had the best performance. There were significant differences in the 3000m and 5000m performance of the orienteering group and the 5000m performance of the physical education girl group compared with the ordinary girl group (P<0.01); Compared with the ordinary college students group, the 1500m orienteering group and the 3 000m physical education girls group had very significant differences (P< (0.01); There was a significant difference between the physical education girl group and the ordinary girl group in the 1 500 m score (P<0.05).

DISCUSSION

After the quantitative load exercise, the heart rate of the orienteering girl group immediately after the exercise and at the end of the recovery period was significantly lower than that of the ordinary girl group, and the heart rate of the orienteering and physical education girl groups had basically returned to the quiet level at the end of 10 minutes. This study found that the orienteering group had better sports performance in running sports with longer distances, and there were significant differences compared with ordinary college students. Orienteering cross-country training with long duration, periodicity, endurance and moderate intensity can effectively improve the aerobic endurance of the body.

**Figure 1.** The effect of orienteering on the middle and long distance running ability of college students (x±sd).

CONCLUSION

Long-term directional cross-country exercise training can effectively improve the level of lung ventilation function of the body, and the vital capacity, time vital capacity and maximum ventilation volume per minute have been significantly improved. Orienteering cross-country exercise can improve the health level of lung function of the body. Orienteering cross-country exercise can increase the reserve of quiet heart pump in college students, and the cardiovascular system of the body is mobilized quickly, has a low response, and recovers quickly during quantitative load exercise. The long-term participation in orienteering training shows that the middle- and long-distance running ability of college students has been significantly improved. Orienteering cross-country exercise can improve the body's cardiopulmonary function, the ability of cardiovascular transport of oxygen and the ability of skeletal muscle to utilize oxygen, and the level of aerobic endurance is significantly improved.

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