EFFECTS OF PHYSICAL TRAINING ON SPEED AND STRENGTH IN LONG-DISTANCE RUNNERS

EFEITOS DO TREINAMENTO FÍSICO SOBRE A VELOCIDADE E A FORÇA DE CORREDORES DE LONGA DISTÂNCIA

EFECTOS DEL ENTRENAMIENTO FÍSICO EN LA VELOCIDAD Y LA FUERZA DE LOS CORREDORES DE FONDO

Original Article
Artigo Original
Artículo Original

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ABSTRACT

Introduction: Long-distance running is characterized by high speed and long-term endurance. It belongs to the group of long-duration high-speed sports dominated by long-term continuous muscular activity. Objective: Explore the effect of physical training in long-distance running on improving speed and strength in athletes. Methods: A total of 40 student-athletes at a university in a particular city were selected as research subjects. The experimental grouping was performed by lottery, with 20 in the control group and 20 in the experimental group. Results: After the independent sample t-test, the results exhibited P=0.023, less than 0.05, showing that long-distance running physical training is very effective in improving speed and strength; the baseline performance of the experimental group was slightly lower than that of the control group, after training, the mean score of the students in the experimental group elevated compared with the control group. Conclusion: Long-distance running physical training can significantly improve speed and strength. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Running; Physical Education and Training; Marathon Running.

RESUMO

Introdução: A corrida de longa distância é caracterizada por um alto grau de combinação de velocidade e resistência a longo prazo. Ela pertence ao grupo de esportes de alta velocidade de longa duração, dominado pela atividade muscular contínua de longo prazo. Objetivo: Explorar o efeito do treinamento físico em corrida de longa distância sobre a melhoria da velocidade e da força em seus atletas. Métodos: Um total de 40 estudantes de atletismo em uma universidade de uma determinada cidade foram selecionados como objetos de pesquisa, e o agrupamento experimental foi realizado por sorteio, com 20 no grupo de controle e 20 no grupo experimental. Resultados: Após o teste t de amostra independente, os resultados exibiram P=0,023, menos de 0,05, mostrando que o treinamento físico de corrida de longa distância é muito eficaz para melhorar a velocidade e a força; o desempenho basal do grupo experimental foi ligeiramente inferior ao do grupo controle, após o treinamento, a pontuação média dos alunos do grupo experimental elevou-se em relação ao grupo controle. Conclusão: O treinamento físico de corrida de longa distância pode melhorar significativamente a velocidade e a força. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Corrida; Educação Física e Treinamento; Corrida de Maratona.*

RESUMEN

Introducción: Las carreras de larga distancia se caracterizan por un alto grado de combinación de velocidad y resistencia a largo plazo. Pertenece al grupo de deportes de alta velocidad de larga duración en los que predomina la actividad muscular continua de larga duración. Objetivo: Explorar el efecto del entrenamiento físico en carreras de fondo sobre la mejora de la velocidad y la fuerza en sus atletas. Métodos: Se seleccionó como objeto de investigación a un total de 40 estudiantes de atletismo de una universidad de una ciudad determinada, y el agrupamiento experimental se realizó por sorteo, con 20 en el grupo de control y 20 en el grupo experimental. Resultados: Tras la prueba t de muestras independientes, los resultados arrojaron un P=0,023, inferior a 0,05, lo que demuestra que el entrenamiento físico de carrera de larga distancia es muy eficaz para mejorar la velocidad y la fuerza; el rendimiento de partida del grupo experimental fue ligeramente inferior al del grupo de control; tras el entrenamiento, la puntuación media de los alumnos del grupo experimental se elevó en comparación con la del grupo de control. Conclusión: El entrenamiento físico de carreras de larga distancia puede mejorar significativamente la velocidad y la fuerza. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Carrera; Educación y Entrenamiento Físico; Carrera de Maratón.*

DOI: http://dx.doi.org/10.1590/1517-8692202329012022_0348
Article received on 06/07/2022 accepted on 07/15/2022

INTRODUCTION

Today, athletes' strength training is the focus of the majority of sports researchers and coaches, and certain conclusions and results have also been drawn, which provides certain theoretical support for athletes' strength training.[1] Xia X Q published the article "On the Strength Exercises of Track and Field Athletes", through the literature method, listed that track and field athletes should pay special attention to the practice of their own strength, because the strength of their own strength will directly affect the endurance, explosiveness and strength of the game. The overall play range, thus affecting the final effect of the entire game.[2] Therefore, track and field athletes should actively strengthen the practice of strength in their daily training. Loyley P published the article "Empirical Research on Strengthening Core Strength Training to Improve Track and Field Athletes' Lower Limb Reaction" through literature, mathematical statistics, material analysis, and mathematical statistics to find that developing athletes' core strength is important to athletes' performance, qualities and skills have a significant impact, athletes should use reasonable training methods to develop their core strength, enhance the stability of their upper and lower limbs, and achieve better achievements according to their different specialties and physiological characteristics.[3]

Rennie M J In the article "Analysis of Track and Field Athletes' Strength Quality Training", he used the literature method to find that different strength training methods have specific laws on the influence of muscle strength.[4] Muscle strength increases consistently with exercise-trained muscle contraction models.

Fischerova P believes that the training methods and loads used in different special strength training are essentially different.[5] Research on improving athletes' quick strength quality through combined training method, the purpose is to provide ideas and references for the study of strength training methods for track and field athletes.[6]

Experimental subjects and methods

Comparative analysis method

Through a complete training cycle, collect data before training, mid-term and after training for comparative analysis.

Mathematical statistics

The independent sample t test was used to conduct statistics, testing and analysis on the data, all data processing was done on the computer using SPSS20 software.[7]

Experimental method

Through a 16-week experiment on 40 athletic track and field students in a university in a city, there are 3 training sessions per week (Monday, Wednesday, Friday), the training time starts at 6 pm every day, and the training time is 1.5 hours. The experimental subjects were randomly divided into the experimental group (group I) and the control group (group II), requiring no significant difference in the indicators of the two groups of subjects after grouping, the experimental group adopted the combination training method, and the control group adopted a single non-combination training method method.[8]

Experimental results

It can be seen from Table 1 that, a total of 40 students were included in the study and were randomly divided into two groups, 20 in the experimental group and 20 in the control group, all of whom were boys, with an average age of 21.4 ± 0.9 years old, the mean values of the control group and the experimental group were 0.8 and 0.7, respectively, and the corresponding p value was 0.250; In terms of height, the mean values of the control group and the experimental group were 4.0 and 3.9, respectively, and the corresponding p value was 0.665; In terms of body weight, the mean values of the control group and the experimental group were 4.3 and 6.9, respectively, and the corresponding p value was 0.763; In terms of BMT, the mean values of the control group and the experimental group were 1.48 and 1.44, respectively, and the corresponding p value was 0.636; On the index of exercise years, the mean values of the control group and the experimental group were 1.1 and 1.3, respectively, and the corresponding p value was 0.254; In the special data, the p values of the control group and the experimental group were 0.723, 0.363, 0.212, 0.723, 0.677, and 0.723, respectively.[9] The corresponding p values of these six indicators were all greater than 0.05, and there was no significant difference between the control group and the experimental group in the six indicators of age, height, weight, BMI, years of exercise, and specialties.

It can be seen from Table 2 that on the index of male pull-ups, the mean values of the control group and the experimental group are 24.90 and 24.55, respectively, and the corresponding p-values are 0.137; On the index of male sitting forward flexion, the mean values of the control group and the experimental group were 27.70 and 27.75, respectively, and the corresponding p values were 0.912; On the indicator of men throwing a medicine ball, the mean values of the control group and the experimental group were 21.55 and 21.35, respectively, and the corresponding p values were 0.829; In the index of men's touch height, the mean values of the control group and the experimental group were 2.95 and 2.90, respectively, and the corresponding p-values were 0.185; The corresponding p values of these four basic indicators are all greater than 0.05, and there is no significant difference between the control group and the experimental group in the four basic indicators of sitting forward flexion, pull-up, forward throwing a solid ball, and touching height.[10]

It can be seen from Table 3 that, in the men's standing long jump, the mean values of the control group and the experimental group were 2.64 and 2.63, respectively, and the corresponding p value was 0.748; In the men's 100 meters, the mean values of the control group and the experimental group were 13.03 and 12.92, respectively, and

Table 1. Initial diagnosis of students' physical fitness indicators.

Project	Control group (n=20)	Test group (n=20)	T/F	P
Age	21.35±0.8	21.65±0.7	-1.167	0.250
Height	171.7±4.0	171.2±3.9	-0.437	0.665
Weight	62.5±4.3	63±6.9	0.304	0.763
BMI	20.52±1.48	20.30±1.44	0.477	0.636

Table 2. Initial diagnosis of basic qualities of athletes.

Basic Qualities of Athletes	Control Group (N=20)	Test Group (N=20)	T/F	p
Man (n=40)				
Cause upward	24.90±2.49	24.55±3.32	0.377	0.137
Sitting forward bend	27.70±1.46	27.75±1.37	-0.112	0.912
Front Throwing Medicine Ball (2kg)	21.55±2.93	21.35±2.89	-0.217	0.829
touch high	2.95±0.12	2.90±0.10	1.351	0.185

Table 3. Analysis of the initial performance indicators of the control group and the experimental group.

Initial grades	Control group (n=20)	Test group (n=20)	T/F	P
Man (n=40)				
Standing long jump	2.64±0.07	2.63±0.08	-0.323	0.748
10 meters	13.03±0.49	12.92±0.52	-0.721	0.475
110m hurdles	21.38±1.16	21.55±1.01	0.485	0.631
high jump	1.48±0.44	1.50±0.05	1.082	0.286
shot put	8.61±0.96	8.56±0.81	-0.178	0.860
long jump	5.52±0.68	5.46±0.66	-0.271	0.787

the corresponding p value was 0.475; In the men's 110-meter hurdles, the mean values of the control group and the experimental group were 21.38 and 21.55, respectively, and the corresponding p value was 0.631; On the indicator of men's high jump, the mean values of the control group and the experimental group were 1.50 and 1.50, respectively, and the corresponding p value was 0.286; In the men's shot put, the mean values of the control group and the experimental group were 8.61 and 8.56, respectively, and the corresponding p values were 0.860; In men's long jump, the mean values of the control group and the experimental group were 5.52 and 5.46, respectively, and the corresponding p value was 0.787; The corresponding p-values obtained from the analysis of the above data indicators are all greater than 0.05, so it can be considered that: From a statistical point of view, before the start of the experiment, there was no significant difference between the control group and the experimental group in standing long jump, 100 meters, high jump, shot put, 110-meter hurdles, and long jump.[11] Taking the standing long jump as an example, the results are shown in Figure 1.

The mean changes in the standing long jump scores of the male control group and the male experimental group were as follows: 2.65m, 2.70m, the corresponding guard value is 0.023, and the P value is less than 0.05. From this, it can be concluded that using the combined training method to develop the students' rapid strength and quality, thereby improving the standing long jump performance of the students, is more efficient than using the traditional training method, and the training results are better than the single traditional training method.

There is no need for a code of ethics for this type of study.

Ethical Compliance

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

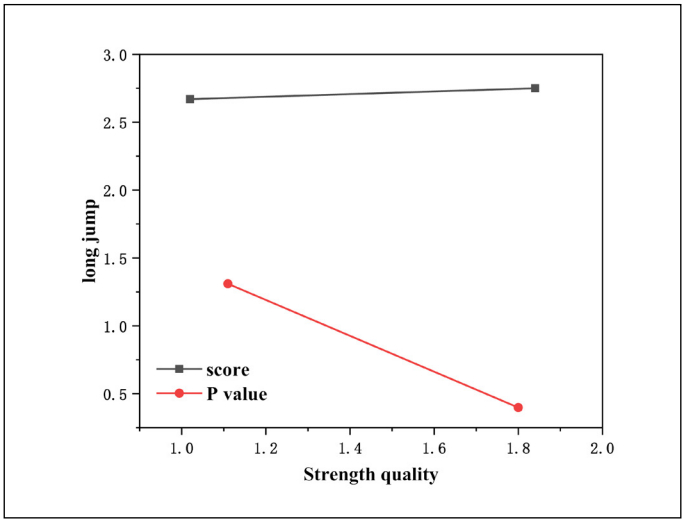

Figure 1. Standing long jump scores and changes in P value (broken line).

CONCLUSION

In the training process, teachers and students can carry out scientific and systematic training in strict accordance with the training plan, and have a strong interest in using combined training methods for training, actively cooperate with the completion of the training objectives and the collection of various data, and in the training process, timely feedback on the physical state and psychological state of the training, participate in the revision of the training plan, and actively put forward your own opinions, which greatly improves the training efficiency and training performance, and also enables the experiment to be successfully completed.

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

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript. Mengmeng Lei: writing; Shan Mi: data analysis, article review and intellectual concept of the article.

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