FITNESS TRAINING FOR COLLEGE SOCCER PLAYERS

TREINAMENTO DE APTIDÃO FÍSICA PARA JOGADORES DE FUTEBOL UNIVERSITÁRIO

ENTRENAMIENTO DE APTITUD FÍSICA PARA FUTBOLISTAS UNIVERSITARIOS

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ABSTRACT

Introduction: Physical fitness is an essential factor affecting soccer in China, and its high-level results from the overlapping training effects of various factors on the soccer athlete. Objective: This study aims to analyze the relationship between practical fitness training and performance in college soccer players. Methods: College soccer players volunteered for a fitness training session. Mathematical statistics were used to analyze volunteers' fitness and competition performance before and after training. The impact of soccer fitness training on the athletes' physical quality was also considered. Results: After eight weeks of fitness training, improvement in the performance of college soccer players was noticed. There was a statistical difference in performance and physical quality after physical training (P<0.01). Conclusion: College soccer players improved performance after fitness training. Such training can improve the physical fitness of college soccer players. ***Level of evidence II; Therapeutic studies - investigation of treatment outcomes.***

Keywords: Soccer; Athletes; Physical Exercise; Sports.

RESUMO

Introdução: A aptidão física é um fator essencial que afeta o futebol na China e seu elevado nível resulta da sobreposição dos efeitos do treinamento de vários fatores sobre o atleta de futebol. Objetivo: Este estudo tem como objetivo analisar a relação entre um treinamento experimental de aptidão física e o desempenho nos jogadores de futebol universitário. Métodos: Jogadores de futebol universitário voluntariaram-se para a realização de um treinamento de aptidão física. Utilizou-se estatística matemática para analisar a aptidão física dos voluntários e o desempenho na competição antes e depois do treinamento. O impacto do treinamento físico do futebol sobre a qualidade física dos atletas também foi considerado. Resultados: Após oito semanas de treinamento de aptidão física, percebeu-se melhora no desempenho dos jogadores de futebol universitário. Houve uma diferença estatística no desempenho e na qualidade física após o treinamento físico (P<0,01). Conclusão: Os jogadores de futebol universitário melhoraram o desempenho após o treinamento de aptidão física. Tal treinamento pode melhorar a aptidão física dos jogadores de futebol universitário. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Futebol; Atletas; Exercício Físico; Esportes.*

RESUMEN

Introducción: La aptitud física es un factor esencial que afecta al fútbol en China y su alto nivel es el resultado de la superposición de los efectos del entrenamiento de varios factores en el atleta de fútbol. Objetivo: Este estudio pretende analizar la relación entre un entrenamiento físico experimental y el rendimiento en jugadores de fútbol universitario. Métodos: Los jugadores de fútbol universitario se ofrecieron como voluntarios para un entrenamiento de aptitud física. Se utilizaron estadísticas matemáticas para analizar el estado físico de los voluntarios y su rendimiento en la competición antes y después del entrenamiento. También se estudió el impacto del entrenamiento físico en el fútbol sobre la calidad física de los deportistas. Resultados: Tras ocho semanas de entrenamiento físico, se percibió una mejora en el rendimiento de los jugadores de fútbol universitario. Hubo una diferencia estadística en el rendimiento y la calidad física después del entrenamiento físico (P<0,01). Conclusión: Los jugadores de fútbol universitario mejoraron su rendimiento tras el entrenamiento físico. Este tipo de entrenamiento puede mejorar la forma física de los jugadores de fútbol universitario. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Fútbol Atletas; Ejercicio Físico; Deportes.*

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INTRODUCTION

The physical characteristics of football sports are based on the game characteristics of "high speed and strong confrontation." This requires athletes to have the physical ability to withstand large exercise loads. Football requires players to have an excellent level of fitness. This paper finds a reasonable training method based on the unique characteristics of football sports and the quality of the required sports.[1] This paper establishes the effectiveness of the training scheme by setting up experiments. At the same time, our research aims to improve the existing physical training methods and introduce the concepts and methods of modern physical training. We tried to devise a suitable physical training method. At the same time, we summarize the common sports injuries of football players. The research in this paper provides some theoretical references for physical training methods of other types of sports.

METHOD

Research objects

The subjects of this study were 16 football athletes from a university. Volunteers undergo three-month physical training.[2] The general conditions of the experimental subjects include age, height, weight, years of training (primary school stage), and functional status, as shown in Table 1.

Documentation method

We searched the relevant literature of CNKI, excellent master's and doctoral dissertation database, Science foreign language search, and Wanfang Data. We used "physical training," "football physical training," and "youth football physical training" as search terms to search a large number of domestic and foreign literature related to football events.[3] At the same time, we read relevant books and consulted such studies in related sports fields. On this basis, we conduct detailed research and analysis of the data. Our research is mainly on the characteristics of football and physical training requirements. We have gained a lot of valuable experience and enlightenment through literature research. These research kinds of literature provide the theoretical basis for this paper's topic selection, research analysis, and writing.

Expert interview method

This paper wants to understand better the technical characteristics of physical training and football events, the actual training situation of football team coaches and players, the evaluation indicators of physical fitness of football players, and the combination of physical training and football events. I communicate with relevant experts and coaches in physical training and football programs through interviews, phone calls, and emails. The interviewees included researchers from the Institute of Sports Science and university professors. We listen extensively to the opinions and suggestions of experts.[4] This provides many inspirations for the correct formulation of physical fitness evaluation indicators and physical fitness training programs suitable for the particular characteristics of youth football projects.

Muscle biomechanical effects of football players

k_M represents muscle stiffness. γ_M stands for muscle damping. l_0 represents the initial length of the muscle fiber. Δl_m stands for muscle elongation. We use formula (1) to obtain the mechanical model of muscle contraction

$$F_m = \frac{k_M \times \gamma_M}{l_0 \times \Delta l_m} \times H^{(B)} \quad (1)$$

$H^{(B)}$ represents muscle fiber length at the maximal isometric contraction of the muscle. r represents the displacement vector from the joint rotation center to the force application point. ζ represents the muscle force vector. We use formula (2) to form the rotational torque generated by the muscle contraction force on the joint

$$T = \frac{r \times \zeta}{F} \times I \quad (2)$$

Table 1. Basic information of athletes (n=16).

Category	Mean ± standard deviation
Age	12.13±1.18
Height (cm)	168.69±7.34
Weight (kg)	51.21±17.25
Years of exercise	2.88±5.29
Resting heart rate (n)	68.13±5.46

F represents the muscle force vector. I represents the direction vector of the muscle tension line. $F_{an\max}$ represents a maximal active contraction of the muscle under maximal load training. $\mu(b, n)$ represents the probability distribution of the effect of the training load on the muscle at a particular moment.[5] We use formula (3) to obtain the adaptability of skeletal tissue under load training

$$F_a = \frac{F_{an\max}}{p_{(\beta)} \times \chi_{(q)}} \times \mu(b,n) \frac{l}{T_C} \times \varpi(k) \quad (3)$$

$p_{(\beta)}$ represents the elastic modulus of skeletal tissue under different loading states. $\chi_{(q)}$ represents the yield load of the skeletal tissue under different loading states. l stands for a syndrome of overtraining. T_C represents the trend of maximum load and yield stress. $\varpi(k)$ represents the changing law of skeletal biomechanical properties under football training conditions. $\delta(p)$ represents the overall number of bones. N_I represents the torque contribution of each muscle at different training stages.[6] We use Equation (4) to extract the biomechanical features of the muscles under different training stages

$$\partial(e) = \frac{N_I \times \beta(k) \times H(\chi)}{\delta(p)} \times \delta(l) \quad (4)$$

$H(\chi)$ stands for the flexible system. $\delta(l)$ represents the displacement vector. T_j represents the joint torque output by the model. We rely on a muscle impact model under load training.[7] We use the Newton-Eulerian inverse dynamics method to e formed influence model parameters dynamically. We use formula (5) to express:

$$\min \sum_{j=1}^{n} = [T_j^{-n} \times \partial(e)] \times F_a \quad (5)$$

Based on the formula result (5), the effect of load training on muscle can be effectively analyzed.

Mathematical Statistics

This paper uses the SPSS18.0 data package to input, count, and analyze the test data obtained by the experiment. The experimental group was analyzed by paired T-test before and after. The resulting data are presented as the mean plus or minus the standard deviation.[8] We use it to judge whether the training scheme is effective. P values represent statistical differences. P<0.05 indicates that the difference is significant. P<0.01 indicates that the difference is highly significant.

RESULTS

Comparative analysis of FMS motor function test data

In the United States, FMS is widely used in physical training and rehabilitation training. It is a movement test used to assess the basic functioning of athletes. It allows us to detect asymmetries in muscle strength and flexibility in athletes.[9] At the same time, it can detect weak links in the body that are manifested in sports. A lower overall score on the FMS test indicates poorer physical function. There is also an increased risk of injury.

Comparative analysis of test data of left and right side throwing solid balls before and after the experiment

The above test data shows (Table 2) that the athletes' performance in throwing medicine balls on the right and left after eight weeks of

physical training increased by 0.43m and 1.41m, respectively. The P value of the solid ball tossed on the right side is less than 0.05, and there is a significant difference.[10] The p-value for left-side solid ball throw was less than 0.01 and was highly significant. Some coordination training methods were arranged in the training program of this study. This suggests that this training regimen has some effect on overall coordinated effort.

Comparative analysis of the test data of the eight-level abdominal bridge test before and after the experiment

We have added steady-state static exercises to the physical training of the football team. From a physiological point of view, standing still can be beneficial to increase muscle endurance. Strength training in the core area can train smaller muscle groups.[11] The increased muscular endurance significantly improved the post-test pre-and post-test comparison of the eighth-grade abdominal bridge time. (Table 3)

Comparison and analysis of the test data of the speed sensitivity quality test before and after the experiment

After eight weeks of physical training, the Illinois running, 50-meter running, and standing long jump improved by 1.17, 0.54, and 0.11, respectively. The P values for the Illinois run, 50-meter run, and standing long jump were less than 0.05 and were significantly different.[12] There are many ways to coordinate training in the training program. (Table 4)

Table 2. Test results of left and right side throwing solid balls before and after the experiment (n=16).

Test indicators	Before experiment	After the experiment	Difference	P
Toss a solid ball on the right (m)	5.96±1.25	6.39±1.27	0.43	0.014
Left solid ball (m)	5.28±1.29	6.69±1.24	1.41	0.001

Table 3. Eight-level abdominal bridge test results before and after the experiment (n=16).

Test indicators	Before experiment	After the experiment	Difference	P
Eight-level abdominal bridge	2.114±0.312	2.226±0.223	0.112	0.02

Table 4. Speed sensitivity quality test results before and after the experiment (n=16).

Test indicators	Before experiment	After the experiment	Difference	P
Illinois running(s)	17.32±2.15	16.15±1.96	1.17	0.023
50m run(s)	8.50±1.42	7.96±1.22	0.54	0.014
Standing long jump (m)	2.09±0.26	2.2±0.19	0.11	0.023

DISCUSSION

The left and suitable medicine balls are used to evaluate the overall coordination of the upper and lower limbs and the core area of the athlete. Particular technical movements in football events require a stable center of gravity. This movement requires support and rotation in the core area. The core strength exercise drives the transfer of strength from the lower limbs to the upper limbs and finally reaches the overall coordination of the movement.[13] The quality of power transmission in the power chain will directly affect the improvement and play of the extraordinary technical level of football. Only when the overall "power chain" does not break and the overall coordinated effort can ensure the specification of specific technical actions.

Illinois running is mainly used to evaluate the agility and quality of athletes. The 50-meter run is mainly used to evaluate an athlete's short-distance speed level. Standing long jump is mainly used to evaluate athletes' level of explosive power. These physical qualities are all football players' must-haves. Sensitive quality is as important to football as it is to the needs of other ball games. A good football player's speed ability and explosiveness level are also essential. Each particular technical action that needs to be completed on the field requires these physical qualities.

CONCLUSION

First, we reasonably set up scientific and simple evaluation methods and methods according to the training content. This can increase the athlete's interest in training and ultimately improve athletic performance. Second, we recommend organizing relevant experts to formulate a long-term, effective and systematic core area strength training plan and physical training plan according to the characteristics of football. At the same time, it is also necessary to formulate scientific and reasonable evaluation indicators. Third, coaches should pay more attention to the athlete's movement completion process than just the number of completions. At the same time, the coach cannot train all the players in the same training method for simplicity. The coach designs a good training program according to the athlete's characteristics. Fourth, traditional strength training cannot be abandoned using modern physical training methods. The coach should organically combine the two practice methods to achieve the best results.

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