

TRAINING OPTIMIZATION IN SOCCER PLAYERS WITH SPORTS INJURIES



ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

OTIMIZAÇÃO DE TREINAMENTO EM JOGADORES DE FUTEBOL COM LESÕES ESPORTIVAS

OPTIMIZACIÓN DEL ENTRENAMIENTO EN FUTBOLISTAS CON LESIONES DEPORTIVAS

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ABSTRACT

Introduction: Strengthening the optimization of soccer skills training and strengthening the prevention of sports injuries are important research topics for soccer development in the post-injury rehabilitation phase. Functional training control has been empirically shown to be effective in accelerating rehabilitation. **Objective:** Investigate the situation of sports injuries in soccer and the effect of optimizing skill training on people with sports injuries in functional training for rehabilitation. **Methods:** During a 6-week experiment, the experimental group was inserted into the functional training mode, while the control group performed traditional training. The functional training was performed thrice a week for one hour per session. After 6 weeks, physiological and functional data were compared, classified, and analyzed. **Results:** The total FMS score of the experimental group increased from 13.61 to 17.30, while that of the control group ranged from 14.04 to 15.54. **Conclusion:** Selecting multiple training methods focused on different sports skills, focusing on balance, strength, and coordination, can optimize the sports skills of soccer players who have sports injuries. The researched protocol was shown to improve the competitive level of athletes and reduce the risk of future sports injuries. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Soccer; Sports Injuries; Exercise Therapy.

RESUMO

Introdução: Reforçar a otimização do treinamento das habilidades futebolísticas e fortalecer a prevenção de lesões esportivas são tópicos de pesquisa importantes para o desenvolvimento do futebol na fase de reabilitação pós-lesão. O controle de treinamento funcional tem se mostrado empiricamente eficaz no processo de aceleração da reabilitação. **Objetivo:** Investigar a situação das lesões esportivas no futebol e o efeito da otimização do treinamento de habilidades em pessoas com lesões esportivas inseridas no treinamento funcional para reabilitação. **Métodos:** Durante uma experiência com duração de 6 semanas, o grupo experimental foi inserido no modo de treinamento funcional, enquanto o grupo controle efetuou o treinamento tradicional. O treinamento funcional foi realizado três vezes por semana, com duração de uma hora por sessão. Após 6 semanas, os dados fisiológicos e funcionais foram comparados, classificados e analisados. **Resultados:** A pontuação total de FMS do grupo experimental aumentou de 13,61 para 17,30, enquanto a do grupo de controle oscilou de 14,04 para 15,54. **Conclusão:** Selecionar múltiplos métodos de treinamento focados nas distintas habilidades esportivas, com foco ao equilíbrio, força e coordenação pode otimizar as habilidades esportivas dos jogadores de futebol que tiveram lesões esportivas. O protocolo pesquisado mostrou-se capaz de melhorar o nível competitivo dos atletas e reduzir o risco de lesões esportivas futuras. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Futebol; Lesões Esportivas; Terapia por Exercício.

RESUMEN

Introducción: Reforzar la optimización del entrenamiento de habilidades futbolísticas y reforzar la prevención de lesiones deportivas son temas de investigación importantes para el desarrollo del fútbol en la fase de rehabilitación posterior a la lesión. El control del entrenamiento funcional ha demostrado empíricamente su eficacia en el proceso de aceleración de la rehabilitación. **Objetivo:** Investigar la situación de las lesiones deportivas en el fútbol y el efecto de la optimización del entrenamiento de habilidades en personas con lesiones deportivas sometidas a entrenamiento funcional para su rehabilitación. **Métodos:** Durante un experimento de 6 semanas, el grupo experimental se insertó en la modalidad de entrenamiento funcional, mientras que el grupo de control realizó un entrenamiento tradicional. El entrenamiento funcional se realizó tres veces por semana, con una duración de una hora por sesión. Tras 6 semanas, se compararon, clasificaron y analizaron los datos fisiológicos y funcionales. **Resultados:** La puntuación total de FMS del grupo experimental aumentó de 13,61 a 17,30, mientras que la del grupo de control osciló entre 14,04 y 15,54. **Conclusión:** La selección de múltiples métodos de entrenamiento centrados en diferentes habilidades deportivas, centrándose en el equilibrio, la fuerza y la coordinación puede optimizar las habilidades deportivas de los jugadores de fútbol que sufrieron lesiones deportivas. El protocolo investigado demostró ser capaz de mejorar el nivel competitivo de los deportistas y reducir el riesgo de futuras lesiones deportivas. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptores: Fútbol; Lesiones en Deportes; Terapia por Ejercicio.



INTRODUCTION

Football is a popular sport all over the world, and its participation is extremely high. Football has the characteristics of strong intensity and competitiveness.¹ High intensity sports environment is always accompanied by the risk of sports injury.² In the training link of daily football projects, the traditional skills training methods have been gradually eliminated. Combining the theory of sports science and optimizing a more efficient training mode can improve the technical level faster. Therefore, it is an important research topic for the development of football at this stage to focus on the injury in the process of football and the training optimization in the training link.³

METHOD

Research on sports injuries in football

Research method: questionnaire survey

Study time: one week

Problem design: the position and type of sports injury in football

Research process: A total of 60 football major college students who have had sports injuries and have basically recovered at present were collected as research objects, and relevant questionnaires were distributed to them to investigate the sports injuries. The study and all the participants were reviewed and approved by Ethics Committee of Guangdong Medical University (NO.GDMU018-S006). Excel software was used to process the data of the returned questionnaire, and the damage location and type were analyzed.

Research on Optimization of Football Skills Training

Research method: control variable method

Study duration: 6 weeks

Subjects: 60 volunteers were randomly divided into experimental group and control group with 30 people in each group. The basic information of the two groups of subjects is shown in Table 1, $P > 0.05$, indicating that there is no significant difference.

Research plan design: The experimental group chose diversified skills training, with the purpose of improving the efficiency of strength use and focusing on the common development of strength and coordination.⁴ The control group chose the traditional skill training method, with the goal of enhancing the physical function of the athletes and improving the sports proficiency.

Implementation process of the experiment: except for the training program, the experimental group and the control group basically kept the same training plan, rest time, diet, etc. During the 6-week experiment, the experimental group chose the functional training mode, while the control group chose the traditional training mode. The relevant training was carried out three times a week, each time for one hour. After 6 weeks, relevant data shall be sorted and analyzed.

Observation data: FMS test (including seven options, such as top squat test, step up test, straight step lunge test, shoulder flexibility test, straight leg lifting test, torso stability test, rotation stability test, etc.), football broken line run test (including 5m, 15m and 30m distances)

Training and data measurement location: football field, indoor stadium

Data processing software: Excel, SPSS

Table 1. Basic information of the two groups of subjects.

Group	Number of people	Age	Height	Weight
Intervention group	30	20.03 ±1.003	179.25 ±3.289	72.01 ±4.901
Control group	30	19.40 ±0.814	174.89 ±2.653	72.83 ±4.030

RESULTS

Analysis of sports injuries in football

The 60 volunteers selected in this paper have had a history of sports injury in football. The location of sports injury is shown in Figure 1, and the type of sports injury is shown in Figure 2.

As shown in Figure 1, it shows the situation of injured parts in football. It can be seen from the picture that the number of ankle injuries is the largest, 19; The second is knee joint, with 15 injured; The third is the injury of leg muscles, 11 athletes have had such a situation; The injury at the core of the waist and abdomen ranked next, with 5 athletes in this category. Other injuries, including shoulder joint, elbow joint, wrist joint, head and arm muscle injuries, occurred in the survey population, but the number was relatively small. It can be seen from the comprehensive analysis that the current football sports injuries are more concentrated in the lower limbs and core strength parts, which is also related to the characteristics of football that pays more attention to lower limb sports. Knee joint, ankle joint and leg muscle are the main parts of the lower limb, and the proportion of damage is relatively higher.

Figure 2 shows the types of sports injuries in football. Because some of the 60 athletes suffered more than one sports injury, the questionnaire in this paper is designed to be a multi choice form. A total of 105 injuries occurred in 60 athletes. Among the 105 injuries, the most frequent was skin abrasion, which was relatively mild, with 42 cases. Among the more serious injuries, sprain occurred most frequently, with 21 cases; The next were strain and contusion, corresponding to 13 and 14 injuries; Strain and fracture, as two types of injury with fewer cases, were 8 cases and 7 cases respectively. According to the overall analysis of injury types, although the number of injuries is relatively high, most of them are relatively minor injuries, such as skin abrasions, which can be cured by timely cleaning and dressing. The strain is mainly caused by long-term overload exercise, which will have a certain impact on the athletes. Therefore, timely care is required. In the process of exercise, attention should also be paid to the standardization of movement and the alleviation of sports fatigue. To sum up, it is necessary to strengthen the prevention of sports risks in the process of sports, and protect your own health in time, so as to provide a more healthy physical quality basis for football.

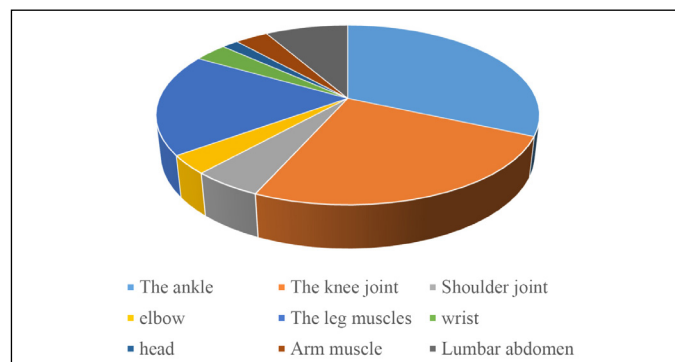


Figure 1. Analysis of Sports Injuries in Football.

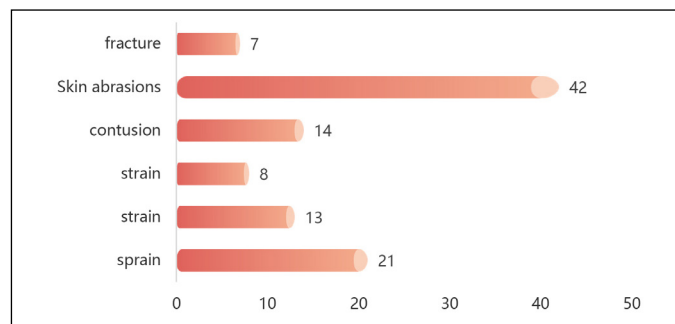


Figure 2. Analysis of injury types in football.

Preventive effect of skill training optimization on sports injury risk

In order to further study the prevention of sports injury risk by skill training optimization and prevent these football players with sports injury history from sports injury again, this paper takes the common FMS test as the judgment standard and collates the data obtained in the form of a three-point system. The distribution of test scores of the experimental group is shown in Table 2, and that of the control group is shown in Table 3.

It can be seen from Table 2 that the FMS score of the experimental group before the experiment was (13.61 ± 2.181) points, which was improved to (17.30 ± 2.117) points after the experiment, making great progress. Four of the seven tests before the experiment were below two points, and all of the seven tests after the experiment reached more than two points, and the score was basically above 2.3 points, indicating that the diversified skill training of the experimental group can improve the FMS performance of the experimental group and reduce sports injuries.

It can be seen from Table 3 that the FMS score of the control group has improved from (14.04 ± 1.715) before the experiment to (15.54 ± 1.738) after the experiment, making some progress. From the seven individual scores, five of the seven scores before the experiment were below two points, six of them were above two points after the experiment, and one of them was below two points. However, the scores of most of the items above two points were relatively low within the range of two points. This shows that the traditional skill training can improve the FMS performance of the control group, but it is not ideal.

Effect of skill training optimization on improving football sports ability

The most intuitive performance of skill training optimization is the effect of improving football sports ability. Here, the common broken line running in football is selected as the index for comparison. The specific data are shown in Table 4. Three test indexes of 5m, 15m and 30m are selected to correspond to different distance movements on the football field.

As shown in Table 4, the speed of the experimental group increased from (3.88 ± 0.214) m/s to (4.64 ± 0.376) m/s, an increase of 16.911%, and a decrease of 0.256% in the control group during the 5 m zigzag run; In the 15m zigzag running, the speed of the experimental group

Table 2. Analysis of FMS test scores of experimental group (n=30).

Option	Before experiment	After experiment	p
Over top squat test	2.19 \pm 0.799	2.34 \pm 0.566	<0.05
Step up the hurdle test	1.85 \pm 0.532	2.38 \pm 0.487	<0.05
Straight Lunge Test	2.17 \pm 0.666	2.53 \pm 0.328	>0.05
Shoulder flexibility test	1.32 \pm 0.497	2.18 \pm 0.634	<0.01
Straight Leg Lift Test	1.72 \pm 0.884	2.44 \pm 0.320	<0.05
Torso stability test	2.70 \pm 0.209	2.84 \pm 0.119	>0.05
Rotating stability test	1.59 \pm 0.622	2.32 \pm 0.695	<0.05
Total score	13.61 \pm 2.181	17.30 \pm 2.117	<0.01

Table 3. Analysis of FMS test results in the control group (n=30).

Option	Before experiment	After experiment	p
Over top squat test	1.46 \pm 1.150	1.53 \pm 1.208	<0.05
Step up the hurdle test	1.85 \pm 0.358	2.11 \pm 0.258	>0.05
Straight Lunge Test	1.85 \pm 0.517	2.03 \pm 0.386	<0.05
Shoulder flexibility test	1.66 \pm 0.822	2.05 \pm 0.644	>0.05
Straight Leg Lift Test	2.51 \pm 0.436	2.65 \pm 0.324	>0.05
Torso stability test	2.81 \pm 0.013	2.88 \pm 0.102	>0.05
Rotating stability test	1.72 \pm 0.454	2.05 \pm 0.378	>0.05
Total score	14.04 \pm 1.715	15.54 \pm 1.738	<0.05

Table 4. Analysis of broken line running speed in football (experimental group n=30, control group n=30).

Option	Group	Before experiment	After experiment	Growth rate	p
5m	Experience group	3.88 \pm 0.214	4.64 \pm 0.376	16.911%	<0.01
	Control group	4.05 \pm 0.419	4.16 \pm 0.368	-0.256%	>0.05
15m	Experience group	4.39 \pm 0.169	4.96 \pm 0.173	9.816%	<0.05
	Control group	4.54 \pm 0.254	4.71 \pm 0.218	0.670%	>0.05
30m	Experience group	4.99 \pm 0.199	5.42 \pm 0.148	6.278%	<0.05
	Control group	5.01 \pm 0.162	5.20 \pm 0.184	1.005%	>0.05

increased from (4.39 ± 0.169) m/s to (4.96 ± 0.173) m/s, increased by 9.816%, and the control group increased by 0.670%; In the 30 m zigzag running, the speed of the experimental group increased from (4.99 ± 0.199) m/s to (5.42 ± 0.148) m/s, an increase of 6.278%, and the control group increased by 1.005%. Through data comparison, it can be seen that the traditional skill training method is not effective enough for people with sports injury history. The diversified skill training mode selected in this paper can significantly improve the speed of football sports' broken line running, improve the athletes' agility and body coordination on the football field, and the improvement effect of short distance broken line running is particularly significant.

DISCUSSION

Prevention of sports injuries in football

For football, there is always a risk of sports injury in the competitive environment and training content under high intensity.⁵ And through the analysis of most cases, it is known that lower limb sports injuries account for the highest proportion of sports injuries in football. Therefore, how to effectively reduce the probability of sports injuries in football is a key issue to be studied.⁶ First, make full preparations before training. The necessary warm-up activity is an important link to effectively reduce the occurrence of sports injuries. By stretching your own limbs, you can make the tissues, muscles and nervous system all over your body active and meet the requirements of sports. The second is to improve their physical quality. Strong muscle strength can share the force for joints. Under the high intensity sports environment of football, joints around the body are vulnerable to excessive stress. Once the stress exceeds the acceptable range of the joint, it will lead to various sports joint injuries. Therefore, by training to improve their muscle mass, we can effectively reduce the probability of sports events. The next step is to use standard technical actions during the movement.⁷ The application of technical actions is not standardized, which is easy to lead to force generation errors. The wrong way of exerting force is a common cause of sports injury. Then, choose a professional football stadium. Football is seriously affected by environmental factors. An unprofessional venue is likely to increase the severity of sports injuries in the event of an accident during sports. Finally, choose the protective equipment suitable for the football project and the sports protective equipment that can provide good safety protection for oneself.⁸ Effectively reduce the probability of sports injuries, or reduce the severity of injuries when sports risks occur.

Optimization of football skill training

Daily training links are the main influencing factors to improve the project level. We should attach great importance to daily training, and the training should be targeted and comprehensive. The training is aimed at comprehensively improving the technical level. Strengthen training according to their own weak links. Because football has strong antagonism. Therefore, the first step is to strengthen the muscle strength. It enables you to accurately control the tightness of your muscles when playing football. Through different ways of

high-intensity training, to enhance the muscle's explosive power. With the help of various sports equipment, or by pushing, squatting and other methods of high intensity and increasing difficulty to improve their muscle strength. It can effectively improve your body control ability. And through different training methods, the muscles in all parts of the body are trained accordingly. The second is self sensitivity training. Through the research of sports science, the sensitivity ability plays a key role in football. It has excellent sensitivity and can make high standard technical movements on the court. Sensitivity is the key performance of football players' core strength level. In general, self sensitivity is related to the activity of the nervous system in the cerebral cortex. It can be improved through daily optimized sensitivity training. Improve your own sensitivity and responsiveness, which will help you play on the spot. Indirect help to improve performance. The last is the related exercise of physical strength and endurance. When football is playing, the game lasts a long time and the intensity is high. It puts forward higher requirements for athletes' physical ability and endurance. In football, players have a long running distance, and some sprints need to be explosive enough. These events are characterized by

the main participation of aerobic exercise. Therefore, we need to attach great importance to daily physical training and endurance training.

CONCLUSION

For football players with a history of sports injury, how to optimize their sports skill training skills under the condition of ensuring their physical health, make their sports more smooth, reduce the risk of sports injury, and improve their agility and physical coordination according to the actual situation of football players, so as to make them have better performance on the football field and improve their competitive level, is a major focus of current research. The research results of this paper show that selecting diversified sports skill training methods, paying more attention to the balance between strength and coordination and movement skills, can more specifically optimize the sports skills of football players who have had sports injuries, so as to improve their competitive skills and reduce the risk of sports injuries.

All authors 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. Every author has made an important contribution to this manuscript. Li Chen and Wenlie Chen: writing and execution.

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