

ANALYSIS AND PREVENTIVE MEASURES FOR NON-CONTACT INJURIES IN SOCCER

ANÁLISE E MEDIDAS PREVENTIVAS DE LESÕES SEM CONTATO NO FUTEBOL

ANÁLISIS Y MEDIDAS PREVENTIVAS DE LAS LESIONES SIN CONTACTO EN EL FÚTBOL



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Lin Xiao¹ 
(Physical Education Professional)

1. Zhaoqing University,
Department of Sports and Health,
Guangdong, Zhaoqing, China.

Correspondence:

Lin Xiao
Guangdong Zhaoqing, China.
526061.
xiaolin@zqu.edu.cn

ABSTRACT

Introduction: Soccer is characterized by high intensity and great competitiveness, and several sports injuries frequently occur; one of the main categories of injuries is the non-contact ones. **Objective:** Study the situation of non-contact injuries in soccer and analyze its preventive measures. **Methods:** The experimental group adopted the intermittent training method to strengthen the proprioception and coordination ability of the athletes. In contrast, the control group adopted mainly traditional aerobic training, with a 40-day duration. **Results:** Among non-contact injuries in soccer sports, lower limb sprain and joint injuries represented an eminently serious proportion. After preventive exercise, the total FMS test score of the experimental group was 16.75 points, an increase of 26.03%, and that of the control group was 14.14 points, an increase of 3.49%. The performance of the experimental group was significantly improved. **Conclusion:** The sports training mode proposed in this study significantly reduces the probability of non-contact injuries during sports. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Soccer; Injuries, Sports; Accident Prevention.

RESUMO

Introdução: O futebol caracteriza-se por alta intensidade e grande competitividade, havendo também diversas lesões esportivas que ocorrem com frequência, sendo uma das principais categorias de lesões as sem contato. **Objetivo:** Estudar a situação das lesões sem contato no futebol e analisar suas medidas preventivas. **Métodos:** O grupo experimental adotou o método de treinamento intermitente para fortalecer a propriocepção e a capacidade de coordenação dos atletas, enquanto o grupo de controle adotou principalmente o treinamento aeróbico tradicional, com duração de 40 dias. **Resultados:** Entre as lesões sem contato nos esportes futebolísticos, a distensão dos membros inferiores e as lesões articulares representaram uma proporção eminentemente grave. Após o exercício preventivo, a pontuação total do teste FMS do grupo experimental foi 16,75 pontos, incrementada em 26,03%, e a do grupo de controle foi 14,14 pontos, incrementada em 3,49%. O desempenho do grupo experimental foi significativamente aperfeiçoado. **Conclusão:** O modo de treinamento esportivo proposto neste trabalho permite reduzir significativamente a probabilidade de lesões sem contato durante o esporte. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Futebol; Lesões Esportivas; Prevenção de Acidentes.

RESUMEN

Introducción: El fútbol se caracteriza por alta intensidad y gran competitividad, teniendo también varias lesiones deportivas que ocurren con frecuencia, siendo una de las principales categorías de lesiones las de no contacto. **Objetivo:** Estudiar la situación de las lesiones sin contacto en el fútbol y analizar sus medidas preventivas. **Métodos:** El grupo experimental adoptó el método de entrenamiento intermitente para reforzar la propiocepción y la capacidad de coordinación de los atletas, mientras que el grupo de control adoptó principalmente el entrenamiento aeróbico tradicional, con una duración de 40 días. **Resultados:** Entre las lesiones sin contacto en los deportes de fútbol, los esguinces de miembros inferiores y las lesiones articulares representaron una proporción eminentemente grave. Tras el ejercicio preventivo, la puntuación total de la prueba FMS del grupo experimental fue de 16,75 puntos, con un aumento del 26,03%, y la del grupo de control fue de 14,14 puntos, con un aumento del 3,49%. El rendimiento del grupo experimental mejoró significativamente. **Conclusión:** El modo de entrenamiento deportivo propuesto en este estudio reduce significativamente la probabilidad de lesiones sin contacto durante la práctica deportiva. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptorios: Fútbol; Lesiones en Deportes; Prevención de Accidentes.



INTRODUCTION

Football is a very popular sport in the world. And football has the characteristics of high intensity and strong competitiveness.¹ In the high intensity sports environment, various sports injuries often occur. There are two types of sports injuries: contact injury and non-contact injury.² By analyzing the causes of various kinds of non-contact damage, the corresponding damage prevention measures are proposed.³ It can effectively avoid accidents in the sports environment, effectively protect the safety of athletes, and prevent leaving the field due to injuries, which is conducive to the positive development of football.⁴ Popularize the various preventive measures obtained from the analysis, which is conducive to better sports experience.⁵ Therefore, this paper first investigates the situation of non-contact injuries in football, understands the actual situation of non-contact injuries in football, and puts forward some targeted strategies, and then analyzes the preventive effect of non-contact injuries in combination with sports measures.⁶

METHOD

Investigation on non-contact injuries in football

Firstly, this paper analyzes the actual situation of non-contact injuries in football. A questionnaire survey was conducted among the football majors in a university to analyze the number of injuries and the distribution of non-contact injuries. The study and all the participants were reviewed and approved by Ethics Committee of Zhaoqing University (NO.ZQUTF-20TD019). A total of 37 physical education students with non-contact injuries in this survey were counted and analyzed. The data results were sorted out using Excel software and relevant analysis pictures were drawn.

Experiment on the prevention of non-contact injuries in football

In football, sports injury is an unavoidable topic. In terms of research on the prevention of sports injuries, it is not possible to judge the prevention effect by the actual number of sports injuries. Instead, FMS tests are used to judge the athletes' situation on the field by the smoothness of their actions. Therefore, the higher the score, the more fluent the athletes' actions are, the smaller the probability of non-contact injuries, which indicates that the prevention effect is better. In this experiment, the method of control experiment was selected, and the judgment index was FMS test score.

In the selection of research objects, 30 sports football students were selected as research objects. 30 athletes were divided into 15

experimental groups and 15 control groups by drawing lots. Their age, height, weight and BMI index were statistically analyzed. The data obtained were arranged as shown in Table 1. P in each statistic was greater than 0.05, indicating that the selection of experimental subjects would not affect the experimental results.

The experiment was conducted in a controlled way. The experimental group selected the intermittent training methods represented by the half squat jump, step jump, split leg squat jump, and single leg lateral jump, with the purpose of strengthening the athletes' proprioception ability, balance ability, coordination ability and other aspects of the sports level. The control group was dominated by traditional aerobic training. The experimental group and the control group were conducted at the frequency of one training every time and one day apart, lasting for a total of 40 days. In addition to the different training content, the two groups of athletes kept the same course design, work and rest, and sports training, so as to reduce the interference of unrelated variables. Before and after the experiment, the FMS indexes of the two groups of athletes were tested, and their individual scores and total scores were collated and compared in the form of three-point system.

RESULTS

Analysis of non-contact injuries in football

In this section, the research results of non-contact sports injuries in football mentioned above are analyzed, as shown in Figure 1 and Figure 2.

It can be seen from Figure 1 that the non-contact injuries in current football sports are prone to recurrence. Among 37 athletes, 23 suffered sports injuries for the first time, 9 suffered sports injuries twice, and 5 suffered sports injuries three or more times.

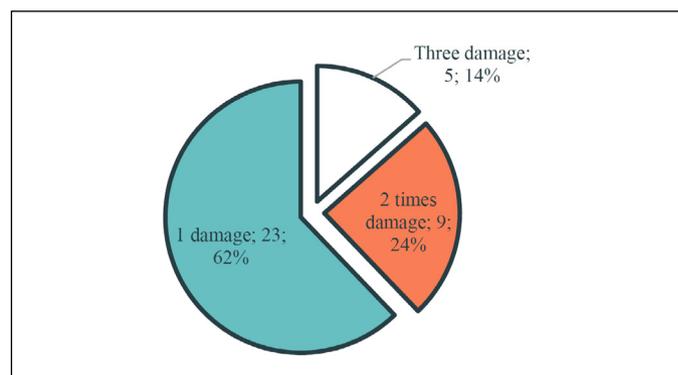


Figure 1. Number of non-contact injuries in football.

Table 1. Data arrangement of experimental group and control group.

Experiment group No	Age (y)	Height (m)	Weight (kg)	BMI (kg/m ²)	Control group No	Age (y)	Height (m)	Weight (kg)	BMI(kg/m ²)
1	19.03	1.83	61.01	22.27	1.00	20.13	1.77	68.85	20.27
2	20.12	1.75	67.19	22.06	2.00	20.02	1.77	66.92	23.29
3	19.59	1.73	69.38	20.37	3.00	19.43	1.71	67.91	22.67
4	21.71	1.71	70.67	22.77	4.00	18.48	1.74	70.79	21.07
5	21.27	1.71	69.86	22.80	5.00	20.40	1.83	69.37	21.52
6	19.70	1.75	74.53	20.97	6.00	20.00	1.81	69.57	23.35
7	21.73	1.83	66.87	20.95	7.00	18.50	1.72	71.63	23.67
8	19.11	1.71	74.14	20.53	8.00	18.49	1.73	61.00	21.49
9	20.57	1.81	64.34	21.87	9.00	18.35	1.81	64.58	20.70
10	18.64	1.72	61.17	23.44	10.00	20.98	1.73	66.34	22.92
11	21.28	1.77	66.03	22.72	11.00	19.84	1.77	75.28	20.91
12	18.50	1.75	69.46	20.89	12.00	21.47	1.77	71.83	22.57
13	20.73	1.83	76.91	19.83	13.00	20.99	1.82	64.69	20.99
14	21.02	1.81	66.91	19.93	14.00	20.09	1.75	66.93	22.88
15	19.17	1.73	61.30	23.82	15.00	19.94	1.73	74.73	22.90

It can be seen from Figure 2 that the current non-contact injuries in football are mainly distributed in the lower limbs, including 34 cases of injuries to the lateral collateral ligament of the ankle, 14 cases of injuries to the triceps surae, and 8 cases of injuries to the hamstring muscles. It can be seen that among the non-contact injuries in football, the injuries to the lower limbs and joints are relatively serious. Athletes need to pay more attention to prevent injuries during running and changing movements.

Prevention effect of non-contact injury in football

In the research on the effect of non-contact injury prevention in football, the FMS test results are selected as the evaluation criteria for training.

As shown in Table 2, the results of the experimental group before and after training have changed. From the data, the squatting performance of the experimental group before and after training has increased by 8.2082%, $P=0.4423$, $P>0.05$, indicating that there is no significant difference; Hurdle performance increased by 39.2116%, $P=0.0029$, $P < 0.05$, indicating a significant difference; The result of straight lunge increased by 26.4302%, $P=0.0286$; Shoulder flexibility improved by 32.0171%, $P=0.0403$; The score of taking the initiative to retreat and lift up increased by 19.4736%, $P=0.0277$; The result of rotation stability increased by 39.5627%, $P=0.0010$; The trunk stability score increased by 30.7515%, $P=0.0041$, $P < 0.05$, indicating a significant difference; The total score increased by 26.0331%, $P=0.000$, $P < 0.01$, indicating a very significant difference. This shows that after 40 days of experimental training, the risk of sports injury in the experimental group has been reduced to a certain extent.

As shown in Table 3, the results of the control group before and after training have changed. It can be seen from the data that before and after training, the squatting performance of the control group has increased by 12.8933%, $P=0.2768$; Hurdle performance increased by 2.4156%, $P=0.4245$; The straight lunge score increased by 0.5290%, $P=0.3298$;

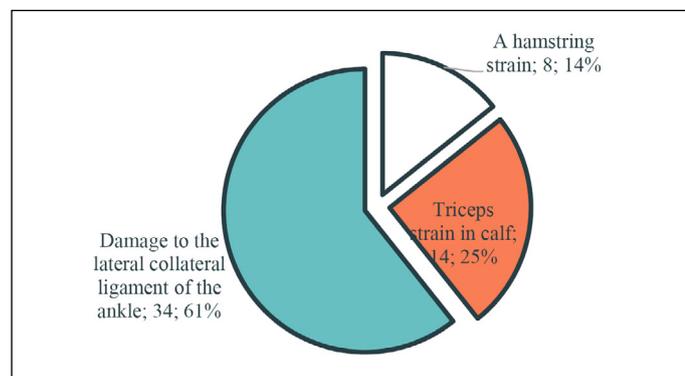


Figure 2. Distribution of non-contact injuries in football.

Table 2. Changes of FMS test scores in the experimental group before and after training.

Option	After the training of the experimental group	Before the training of the experimental group	T	P	Promotion rate
Squat	2.159 ±0.3547	1.995 ±0.5495	-0.8179	0.4423	8.2082%
Hurdle	2.310 ±0.4681	1.659 ±0.4988	-3.7238	0.0029	39.2116%
Straight Lunge	2.585 ±0.5166	2.044 ±0.4570	-2.4017	0.0286	26.4302%
Shoulder flexibility	2.503 ±0.5270	1.896 ±0.5895	-2.2505	0.0403	32.0171%
Active straight backward and upward	2.860 ±0.4090	2.394 ±0.5210	-2.4063	0.0277	19.4736%
Rotational stability	2.098 ±0.2555	1.503 ±0.5291	-3.9302	0.0010	39.5627%
Torso stability	2.247 ±0.4074	1.719 ±0.4662	-3.4914	0.0041	30.7515%
Total score	16.759±0.7308	13.297±1.5362	-6.4902	0.0000	26.0331%

Table 3. Changes of FMS test scores in the control group before and after training.

Action mode	After the training of the Control group	Before the training of the Control group	T	P	Promotion rate
Squat	2.027 ±0.5473	1.796 ±0.570	-1.1615	0.2768	12.8933%
Hurdle	1.964 ±0.6105	1.918 ±0.459	0.2422	0.4245	2.4156%
Straight Lunge	2.115 ±0.2583	2.103 ±0.348	0.9875	0.3298	0.5290%
Shoulder flexibility	2.159 ±0.3547	1.700 ±0.727	-2.4430	0.0275	27.0059%
Active straight backward and upward	2.523 ±0.5187	2.524 ±0.531	0.3174	0.7416	-0.0227%
Rotational stability	1.551 ±0.5109	1.700 ±0.814	1.2075	0.4699	-8.7704%
Torso stability	1.910 ±0.3477	1.788 ±0.416	-0.9975	0.3385	6.8167%
Total score	14.144±0.6913	13.666±1.476	-0.5372	0.5846	3.4940%

The score of active direct retreat and promotion decreased by 0.0227%, $P=0.7416$; Rotational stability score decreased by 8.7704%, $P=0.4699$; The trunk stability score increased by 6.8167%, $P=0.3385$, $P>0.05$, indicating that there was no significant difference; Shoulder flexibility improved by 27.0059%, $P=0.0275$, $P < 0.05$, indicating a significant difference. The total score increased by 3.4940%, $P=0.5846$, $P>0.05$, indicating that there was no significant difference. This shows that the control group has also improved its ability to resist the risk of non-contact injury, but the overall effect is poor.

Table 4 shows the comparative analysis of the test results of the experimental group and the control group after the intervention. It can be seen from the data results that the improvement rate of students in the experimental group in the seven scores is much higher than that of the control group. The total score of FMS test in the experimental group was (16.759 ± 0.7308) points, increased by 26.0331%, and that in the control group was (14.144 ± 0.6913) points, increased by 3.4940%. The performance of the experimental group was significantly improved. This shows that the intermittent training mode selected in this paper can better strengthen the proprioception and balance ability of athletes, promote the coordinated development of athletes' bodies, enable students to obtain better injury prevention effect in football, and ensure the physical health of student athletes.

DISCUSSION

Analysis of non-contact damage

Football is an antagonistic sport in which the technical ability dominates the outcome of the game. Therefore, it has super antagonism and sports intensity. In the process of sports, some sports injuries will inevitably occur. The water tank causes of sports injury can be classified into contact injury and non-contact injury. The contact injury is caused by the athletes' own sports injury when they collide with each other in the process of competition. The non-contact injury refers to the sports injury of athletes in the state of non-contact and non confrontation. During the football match, players often have to perform technical movements in the process of dribbling football. Use this type of technique to get rid of the defender. This kind of technical action often brings some burden to the knee joint and ankle joint of athletes. Under the condition of high intensity competition, athletes often exert their ability to the limit. Weak joints cannot bear excessive stress, resulting in non-contact joint sports injury. Common injuries include joint injuries, soft tissue strains and sprains. And a large part of non-contact sports injuries are caused by environmental factors, first of all, athletes' sports equipment. In the state of high intensity competition, professional sports equipment should be selected for mobilization, for example, professional football shoes can increase the friction between shoes and the ground. Potential injury of athletes. In addition, professional sports protective

Table 4. Analysis of FMS test results of students in experimental group and control group after intervention.

Variable	Experience group		Control group		T	P
	X±SD	Promotion rate	X±SD	Promotion rate		
Squat	2.159 ±0.3547	8.2082%	2.027 ±0.5473	12.8933%	0.8179	0.4352
Hurdle	2.310 ±0.4681	39.2116%	1.964 ±0.6105	2.4156%	2.0210	0.0550
Straight Lunge	2.585 ±0.5166	26.4302%	2.115 ±0.2583	0.5290%	3.0910	0.0040
Shoulder flexibility	2.503 ±0.5270	32.0171%	2.159 ±0.3547	27.0059%	2.0609	0.0472
Active straight backward and upward	2.860 ±0.4090	19.4736%	2.523 ±0.5187	-0.0227%	1.9160	0.0602
Rotational stability	2.098 ±0.2555	39.5627%	1.551 ±0.5109	-8.7704%	3.5156	0.0010
Torso stability	2.247 ±0.4074	30.7515%	1.910 ±0.3477	6.8167%	2.3702	0.0253
Total score	16.759 ±0.7308	26.0331%	14.144 ±0.6913	3.4940%	9.4666	0.0000

equipment can provide effective protection for athletes. Secondly, it is the athletes who exercise in the non professional field, which is also the cause of non-contact sports injury. Professional artificial turf is used in professional football fields. Athletes who exercise under natural turf are easy to cause sports accidents. Due to the large moisture content of natural turf, the friction force cannot meet the needs of football. In this environment, it is very easy to cause the danger of slipping and falling down at high speed. Next is the lack of necessary warm-up activities. When the warm-up activities fail to meet the sports requirements, the flexibility and flexibility of the body are in a low state. The body may also be stiff. It is easy to cause various sports injuries when exercising in these states. All joints of the body are in a state of long-term strain, which is also the direct cause of non-contact injury. Long time, high frequency and high intensity exercise makes all tissues and organs of the body in a state of fatigue for a long time, and joint wear is serious. Days and months tired, causing irreversible sports injury.

Damage prevention measures

In view of various causes of non-contact sports injury, corresponding injury prevention measures can be given by analyzing the causes. First, select professional sports protective equipment. Wear equipment to protect vulnerable joints of the body. Good exercise equipment can share the pressure for joints and effectively reduce the risk of sports injury. Then choose a professional football field to play football. The professional sports ground can provide the friction force suitable for the sports and the soft and hard degree of the ground. Next, you must

do a full warm-up before exercise, and fully open your own sports activity. It makes the soft tissue reach a certain flexibility. The self nervous system reaches a certain degree of activity. Then it is to avoid long-term exercise with high intensity, and to avoid the burden of long-term strain in the state of tiredness. In the process of exercise, once you feel tired, you should stop the exercise, so that your body can have a full rest, and then exercise. Athletes can also avoid various non-contact sports injuries by improving their physical fitness. Through all kinds of special training to improve their physical function, can support athletes to better use technical movements. The standardized use of technical movements can enable athletes to exert force correctly and avoid sports injuries to vulnerable tissues.

CONCLUSION

Therefore, the intermittent training method designed in this paper can improve the FMS test results of athletes, and the improvement range of test results is stronger than that of the control group of ordinary aerobic training, which shows that the sports training method proposed in this paper can better improve the flexibility and coordination of athletes' bodies, enhance the ability of ontology perception, thus reducing the probability of non-contact injuries in the course of sports, Create a safer sports environment for athletes, and promote athletes to conduct sports training and competition in a healthy and orderly state.

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