PREVENTION AND REHABILITATION OF ANKLE SPRAIN IN SOCCER TRAINING

PREVENÇÃO E REABILITAÇÃO DE ENTORSE DE TORNOZELO NO TREINAMENTO DE FUTEBOL

PREVENCIÓN Y REHABILITACIÓN DEL ESGUINCE DE TOBILLO EN EL ENTRENAMIENTO DE FÚTBOL

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ABSTRACT

Introduction: In soccer training, many impacts in running and defense make ankle sprain a very common sports injury; therefore, prevention and rehabilitation management of ankle sprain is particularly important. Objective: Explore the strategy of preventing and rehabilitating ankle sprain in soccer training. Methods: 10 athletes with ankle sprain were selected and randomly divided into the experimental and control group. Both groups received rehabilitation training, the control group received only manual therapy, and the experimental group received active and passive rehabilitation management. The indices relevant to ankle rehabilitation were analyzed daily: active extension and flexion angle, in addition to the degree of joint edema. Results: By the third day, the experimental group's recovery rate was significantly higher. By the end of the seventh day, the active plantar flexion angle in the control group was 28.0133, while in the experimental group, it was 32.0512. As for the degree of joint swelling on day 5, the experimental group was 2.2059 and 1.0057 in the control group. The control group only achieved this level of recovery in the experimental group on the seventh day. Conclusion: Using comparative analysis, the rehabilitation strategy associated with the active and passive techniques proposed in this article showed a better performance than the traditional protocol. Studies are suggested popularizing rehabilitation combined with active training with passive traction. ***Level of evidence II; Therapeutic studies - investigation of treatment results.***

Keywords: Soccer; Ankle Injuries; Rehabilitation.

RESUMO

Introdução: No treinamento do futebol, um grande número de impactos na corrida e na defesa fazem da entorse do tornozelo uma lesão esportiva muito comum, portanto, a prevenção e o manejo da reabilitação da entorse do tornozelo são particularmente importantes. Objetivo: Explorar a estratégia de prevenção e reabilitação da entorse de tornozelo no treinamento de futebol. Métodos: 10 atletas com entorse de tornozelo foram selecionados e divididos aleatoriamente em grupo experimental e controle. Ambos grupos receberam treinamento de reabilitação, o grupo controle recebeu apenas terapia manual e o grupo experimental recebeu um manejo ativo e passivo da reabilitação. Os índices relevantes à reabilitação do tornozelo foram analisados diariamente, dentre eles: ângulo de extensão e flexão ativa além do grau de edema articular. Resultados: Até o terceiro dia, a taxa de recuperação do grupo experimental foi significativamente maior e ao final do sétimo dia, o ângulo ativo de flexão plantar no grupo controle foi de 28,0133 enquanto no grupo experimental foi de 32,0512. Quanto ao grau de inchaço articular ao quinto dia, no grupo experimental foi de 2,2059 e 1,0057 no grupo controle. Esse nível de recuperação do grupo experimental somente foi atingido pelo grupo controle ao sétimo dia. Conclusão: Por meio de análise comparativa, a estratégia reabilitação associada a ativos e passivos propostos neste artigo evidenciou melhor desempenho frente ao protocolo tradicional. Sugere-se estudos para a popularização da reabilitação combinada ao treinamento ativo com tração passiva. ***Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.***

Descritores: *Futebol; Lesões do Tornozelo; Reabilitação.*

RESUMEN

Introducción: En el entrenamiento de fútbol, un gran número de impactos en la carrera y la defensa hacen que el esguince de tobillo sea una lesión deportiva muy común, por lo que la gestión de la prevención y la rehabilitación del esguince de tobillo son especialmente importantes. Objetivo: Explorar la estrategia de prevención y rehabilitación del esguince de tobillo en el entrenamiento de fútbol. Métodos: Se seleccionaron 10 atletas con esguince de tobillo y se dividieron aleatoriamente en grupo experimental y grupo de control. Ambos grupos recibieron entrenamiento de rehabilitación, el grupo de control sólo recibió terapia manual y el grupo experimental recibió gestión de rehabilitación activa y pasiva. Se analizaron diariamente los índices relevantes para la rehabilitación del tobillo, entre ellos: la extensión activa y el ángulo de flexión, además del grado de edema articular. Resultados: Al tercer día, la tasa de recuperación del grupo experimental fue significativamente mayor y al final del séptimo día, el ángulo de flexión plantar activo en el grupo de control era de 28,0133 mientras que en el grupo experimental era de 32,0512. En cuanto al grado de inflamación articular en el día 5, en el grupo experimental fue de 2,2059 y de 1,0057 en el grupo de control. Este nivel de recuperación en el grupo experimental sólo lo alcanzó el grupo de control al séptimo día. Conclusión: A través del análisis comparativo, la estrategia de rehabilitación asociada a las técnicas activas y pasivas propuestas en

este artículo evidenció un mejor desempeño que el protocolo tradicional. Se sugieren estudios para la popularización de la rehabilitación combinada con el entrenamiento activo con tracción pasiva. ***Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.***

Descriptores: *Fútbol; Traumatismos del Tobillo; Rehabilitación.*

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INTRODUCTION

In football, the intensity of competition and physical confrontation is very high, so that the usual training intensity will be higher than other competition events. With the development of football projects, the state also attaches great importance to the development of college football. The environment and atmosphere of college football are improving day by day. At the same time, it also has higher requirements for the performance of football.[1] Because football is mainly a sport based on running and jumping, it has special requirements for legs. In daily training, it pays more attention to the strength training of legs, the strength training of leg joints, the coordination between legs and the whole body, and the training of leg balance.[2] As a result, the amount of lower limb strength training will be particularly large, and the training intensity will also be particularly large, which will increase the exercise burden of the joint and the number of joint forces, especially the probability of ankle injury.[3] In many different situations, for example, unscientific training methods, non-standard training actions, strong training confrontation, uneven ground when landing, wrong foot force point when landing, etc., ankle sprain is easy to occur. How to effectively avoid ankle sprain is an important topic we need to study.[4] Colleges and universities should improve the training venues, training facilities, and training facilities of athletes in Colleges and universities.[5] For athletes who have suffered from ankle sprain, how to carry out rehabilitation management? This is the second topic we need to study. We need to start with the severity of the injury. Formulate relevant rehabilitation plans for them, and require individuals to actively cooperate to avoid secondary injury caused by sports injury. Help athletes reduce the life impact and later impact caused by injuries, and improve the overall sports health level of college athletes.[6]

METHOD

In terms of the selection of research objects, this paper recruited 20 football players with ankle sprain through volunteer recruitment. The study and all the participants were reviewed and approved by Ethics Committee of Henan Polytechnic (NO. 19HNPN-Z012). The specific information is shown in Table 1.

The two groups of football players with ankle sprain were given certain rehabilitation training, in which the control group only received the traditional massage rehabilitation method, and the experimental group received certain traction training guidance, so as to train the athletes' joint part and skeletal muscle contraction. On the premise of ensuring the bearing strength of the ankle joint, the passive traction training was completed until the ankle joint was gradually well adapted. Then carry out independent ankle flexion and extension activities, so as to train its muscle resistance. Through the combination of passive rehabilitation and active rehabilitation, the effect of ankle rehabilitation can be improved.

In the comparison of ankle rehabilitation progress, at the beginning of the experiment and after the rehabilitation training every day, the ankle indexes of the two groups of athletes were recorded, including three parts: active back extension angle, active plantar flexion angle and joint swelling degree, and the chart was drawn to make its change trend more intuitive.

In the evaluation of ankle injury and rehabilitation effect, Baird ankle score scale is introduced to evaluate walking ability, running ability, ankle stability and working ability. Those who recovered in all aspects were more than 90 points; 75 ~ 90 points for those who are basically intact but still have some problems; Able to complete basic daily life, 50 ~ 70 points; Those who seriously affect daily life are less than 50 points. Integrate and process relevant data.

Table 1. Basic information of research object.

Option	Experience group	Control group
Height (CM)	174.97±9.3322	175.01±3.4955
Weight (kg)	66.38±8.4720	65.58±4.0910
BMI	21.55±1.4034	21.37±1.0964
Age (years old)	19.77±0.8028	20.85±1.3045
Training period	8.37±1.6978	8.78±1.0986

RESULTS

Comparison of ankle rehabilitation progress

This section discusses the comparison of ankle rehabilitation progress and the process of gradual improvement of various indicators within the whole week of the experiment. By analyzing the range and rate of change, this paper discusses the effects of different rehabilitation management methods.

(Figure 1) shows the effect of rehabilitation management on the active dorsiflexion angle after ankle sprain. It can be seen from the picture that on day 0, the active back extension angle of the two is basically the same, about 6.35 ~ 6.4; From day 1 to day 3, the recovery rate and range of the experimental group were significantly higher than those of the control group; From day 3 to day 7, the rehabilitation rate and amplitude of the control group increased in a certain range. The rehabilitation rate was not different from that of the experimental group, but on the whole, the rehabilitation amplitude was still lower than that of the experimental group. After rehabilitation management, the active back extension angle of the control group was 12.4054, which was significantly lower than 15.6778 of the experimental group. This proves that the rehabilitation management strategy of the experimental group has significant advantages over the control group in the recovery of active dorsiflexion angle after ankle sprain.

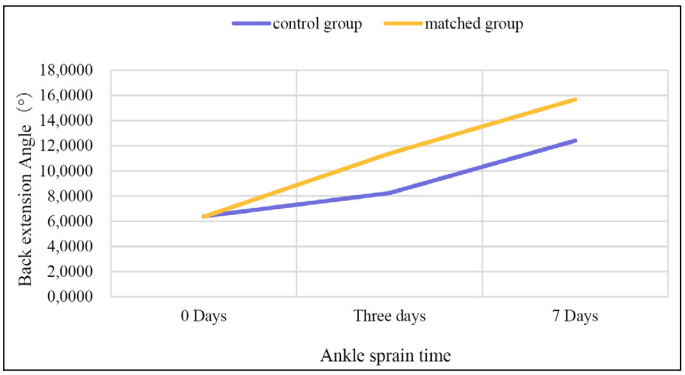

Figure 1. Effect of rehabilitation management on active dorsiflexion angle after ankle sprain.

(Figure 2) shows the effect of rehabilitation management on the angle of plantar flexion after ankle sprain. It can be seen from the picture that on day 0, the active plantar flexion angles of the two were basically the same, about 10.2 ~ 10.4; From day 0 to day 3, the recovery rate and recovery amplitude of the experimental group were significantly higher than those of the control group; On the third day, there was a turning point in the experimental group. From the third day to the seventh day, the relative values of recovery rate and recovery amplitude in the experimental group were slightly lower than those in the control group. But overall, the recovery range of active plantar flexion angle in the experimental group was higher than that in the control group. At the end of the seventh day, the active plantar flexion angle in the control group was 28.0133 and that in the experimental group was 32.0512. This shows that the rehabilitation management strategy of the experimental group has significant advantages over the control group in the recovery of active plantar flexion angle after ankle sprain.

(Figure 3) shows the effect of rehabilitation management on the degree of joint swelling after ankle sprain. It can be seen from the picture that on day 0, the degree of joint swelling of the two was basically the same, about 4.6; During the rehabilitation management from day 0 to day 1, the degree of joint swelling in the control group was very little, only 0.16. The recovery rate and range of joint swelling in the experimental group were higher than those in the control group; During the rehabilitation management from day 1 to day 3, the relief degree of joint swelling in the control group was 0.9 and that in the experimental group was 1.2. The difference between the two became smaller, but the recovery rate and recovery range of the experimental group were still higher than those in the control group. During the rehabilitation management from day 3 to day 5, the relief degree of joint swelling in the control group was 1.3 and that in the experimental group was 1.6. The difference between the two was almost unchanged, and the recovery rate and recovery amplitude were roughly the same in these two days. During the rehabilitation management from day 5 to day 7, the relief degree of joint swelling in the control group was 1.05 and that in the experimental group was 0.52, showing that the relief degree and rate of joint swelling in the control group were greater than those in the experimental group. By comparing the changes of joint swelling from day 0 to day 7, it can be seen that the degree of joint swelling in the control group alleviated from 4.6020 on day 0 to 1.1566 on day 7, with a change range of 3.4454; The degree of joint swelling in the experimental group alleviated from 4.5924 on day 0 to 0.4892 on day 7, with a change range of 4.1032.

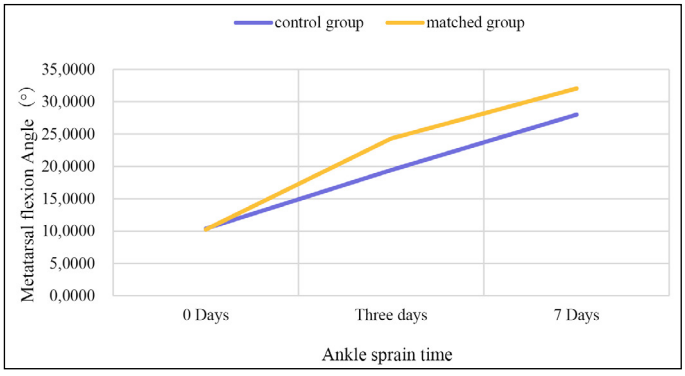

Figure 2. Effect of rehabilitation management on plantar flexion angle after ankle sprain.

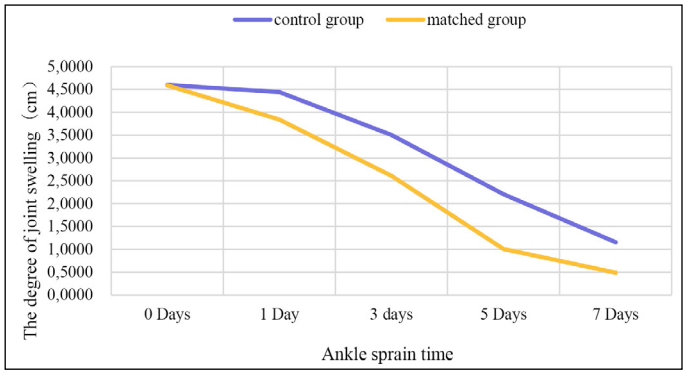

Figure 3. Effect of rehabilitation management on the degree of joint swelling after ankle sprain.

In addition, it can be seen from the comparison of the change range that the degree of joint swelling in the experimental group was 2.2059 and that in the control group was 1.0057 on the fifth day. Obviously, on the 5th day, the recovery of ankle swelling in the experimental group has reached the recovery effect of the control group on the 7th day. Therefore, using the rehabilitation management method proposed in this paper can better shorten the recovery time of ankle sprain, improve the efficiency of ankle sprain recovery, and reduce the interference of ankle sprain to daily learning and physical training as much as possible.

Effect analysis of ankle rehabilitation management

After a week of rehabilitation management training, although the recovery effects of ankle sprain in the two groups are different, on the whole, it has little impact on daily life. As long as the follow-up optimization and improvement are carried out, they can return to the football field well. In order to explore the effect of ankle rehabilitation management, this paper introduces Baird scale score to analyze four aspects: walking ability, running ability, ankle stability and working ability.

(Table 2) shows the comparison of Baird scale scores after rehabilitation management. In terms of walking ability score, the experimental group was 92.32 ± 6.4853 after rehabilitation management, which was significantly higher than 79.78 ± 6.9407 in the control group ($P < 0.01$); In terms of running ability score, the experimental group was 91.36 ± 6.7181 after rehabilitation management, which was significantly higher than 79.19 ± 6.8666 in the control group ($P < 0.01$); In terms of ankle stability score, the experimental group was 80.07 ± 6.9772 after rehabilitation management, which was significantly higher than 92.93 ± 6.4089 in the control group ($P < 0.01$); In terms of work ability score, the control experimental group was 92.33 ± 6.2131 after rehabilitation management, which was significantly higher than 80.34 ± 6.7695 in the control group. Through comparative analysis, it can be seen that the rehabilitation management strategy of the combination of active and passive proposed in this paper has better effect than the traditional massage rehabilitation. There are obvious differences in the Baird scale scores of walking ability, running ability, ankle stability and working ability. Therefore, the rehabilitation management form of the combination of active training and passive traction is worth popularizing.

DISCUSSION

In order to effectively avoid ankle sprain, 1 We should evaluate the joint ability of trainers, formulate reasonable and scientific targeted training plans, and avoid excessive exercise volume and training intensity, which makes the joint exercise burden too heavy. The excessive exercise

Table 2. Comparison of Baird scale scores after rehabilitation management.

Option	Test group	Control group	t	P
Walking ability	92.32±6.4853	79.78±6.9407	7.3864	0.000
Running ability	91.36±6.7181	79.19±6.8666	6.7201	0.000
Ankle stability	92.93±6.4089	80.07±6.9772	7.4516	0.000
Ability to work	92.33±6.2131	80.34±6.7695	7.4668	0.000

burden is the main factor that the joint is easy to be damaged. 2. Guide the trainers in the training movements, standardize the training movements of the trainers, conduct real-time assessment of the training level of the trainers, refuse the blind training of the trainers, and avoid using the wrong force point, resulting in serious joint force, which is easy to cause permanent damage to the joint. Guide the trainers to fall to the ground in a standardized way in the running and jumping links, so as to effectively avoid joint sprain. 3. Improve the training level of trainers, timely guide and teach trainers, coaches and other relevant personnel, update advanced and scientific training knowledge in real time, and train relevant trainers and coaches. Improving the overall theoretical knowledge level and professional level of the sports team will help to avoid all kinds of sports injuries of the trainers. 4. Improve the sports training venues and facilities in Colleges and universities. Colleges and universities should improve the sports venues of their own schools in time to avoid students' training on the ground of unprofessional venues and improve sports facilities, so that students can do targeted training and avoid unnecessary exertion of sports joints, resulting in the burden of sports joints. 5. Cultivate good training habits of athletes, pay attention to the warm-up guidance of trainers before training, emphasize the importance of warm-up, and carry out training after the joints and muscles meet the requirements through warm-up exercise.

For trainers who have suffered joint sprain, they should carry out rehabilitation training under the guidance of doctors, and refuse to judge their injury according to their own judgment to avoid secondary injury. Taking targeted drugs is also a reasonable work and rest. After detumescence, gently massage the injured part, which is helpful for the rapid recovery of the injured part. Give real-time information to doctors about their rehabilitation and get real-time feedback from doctors. The training team in Colleges and universities should take restorative training after the injured trainers recover to a certain extent, and formulate targeted rehabilitation training plans with scientific knowledge. At the beginning of recovery, only low-intensity strength recovery training can be carried out.

CONCLUSION

In the process of football, a large number of behaviors such as running and defensive confrontation make ankle sprain a very common sports injury. If you do not carry out timely recovery and treatment, or train again if the rehabilitation is not in place, it is easy to cause habitual ankle sprain, which will seriously affect future work and life. Therefore, the prevention and rehabilitation management of ankle sprain is particularly important. Through the research of this paper, it can be seen that using passive traction and active movement to carry out certain rehabilitation training within the force range that the injured ankle can bear can effectively improve the degree of ankle swelling, improve the flexibility of ankle and the scores of Baird scale, which has better advantages than traditional massage training. Therefore, the management should actively study and introduce corresponding instruments and equipment. Physical education teachers and coaches should scientifically design their own rehabilitation plan for ankle sprain according to the actual situation of athletes' injury. Athletes should have a good understanding of sports rehabilitation, actively cooperate with the scientific recovery plan provided by coaches, and do not rush to exercise violently before the complete recovery of ankle joint, so as to protect their own ankle joint health, improve sports life and obtain a better economic state.

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

AUTHORS' CONTRIBUTIONS: Each author made significant individual contributions to this manuscript: Every author has made an important contribution to this manuscript. RS: writing and execution; ZZ: data analysis and execution manuscripts.

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