

NURSING IN SPORTS ANKLE INJURY BASED ON THE FITNESS EXERCISE

A ENFERMAGEM NAS LESÕES DE TORNOZELO COM BASE NO EXERCÍCIO DE APTIDÃO FÍSICA

LA ENFERMERÍA EN LAS LESIONES DEL TOBILLO BASADA EN EL EJERCICIO DE APTITUD FÍSICA



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ABSTRACT

Introduction: Ankle injury is an acute soft tissue pathology where the ankle ligaments are distended, lacerated, or ruptured due to violence during sport. This joint is also one of the most vulnerable in sports. After an injury, immediate and adequate care is significant in reducing pain and complication. **Objective:** Statistically analyze the sports injuries of the ankle cases, determining the principal reasons for injury and outlining preventive measures. **Methods:** A statistical investigation on the sports injuries of 275 Qiqihar higher education students was performed with questionnaires and teaching practice methods. The research was focused on the injured structures and the injury causes analysis. In parallel, corresponding proposals aimed at preventing these sports injuries were raised. **Results:** Joint injuries and ankle sprains followed by hematomas represented the most significant proportion of ankle injuries. The reasons are lack of physical fitness, lack of awareness of self-protection, inadequate preparation in the sporting environment facilities, and performing tasks outside what the superior specified was specified. **Conclusion:** Medical work needs to increase dissemination so that people realize the causes of sports injuries. At the same time, it helps people master the care measures before and after the injury. This reduces the incidence of sports injuries and reduces the occurrence of complications. **Evidence level II; Therapeutic Studies - Investigating the results.**

Keywords: Fitness testing; Athletic injuries; Clinical nursing research; Sports.

RESUMO

Introdução: A lesão no tornozelo é uma patologia aguda dos tecidos moles na qual os ligamentos do tornozelo são distendidos, lacerados, ou rompidos devido a violência durante o esporte. Essa articulação é também uma das mais vulneráveis nos esportes. Depois de uma lesão, o cuidado imediato e correto é significativo para aliviar a dor e reduzir complicações. **Objetivo:** Analisar estatisticamente os casos de lesões esportivas do tornozelo, levantando as principais razões de lesão e traçar condutas preventivas. **Métodos:** Uma investigação estatística sobre as lesões esportivas de 275 estudantes do ensino superior de Qiqihar foi executada com questionário e métodos de prática de ensino. A pesquisa foi concentrada na análise das estruturas lesionadas e a causa da lesão. Paralelamente foram levantadas propostas correspondentes visando a prevenção dessas lesões esportivas. **Resultados:** As lesões articulares e entorses do tornozelo seguidas por hematomas representaram a maior proporção de lesões no tornozelo. Dentre os motivos, destacaram-se a falta de preparo físico, falta de consciência de autoproteção, preparação inadequada nas instalações do ambiente esportivo e execuções de tarefas fora do especificado pelo superior. **Conclusão:** O trabalho médico precisa aumentar a divulgação para que as pessoas percebam as causas das lesões esportivas. Ao mesmo tempo, ajuda as pessoas a dominar as medidas de cuidado antes e depois da lesão. Isso reduz a incidência de lesões esportivas e reduz a ocorrência de complicações. **Nível de evidência II; Estudos terapêuticos - Investigação de resultados.**

Descritores: Teste de Esforço; Traumatismos em Atletas; Pesquisa em Enfermagem Clínica; Esportes.

RESUMEN

Introducción: La lesión de tobillo es una patología aguda de las partes blandas en la que los ligamentos del tobillo se distienden, desgarran o rompen debido a la violencia durante la práctica deportiva. Esta articulación es también una de las más vulnerables en el deporte. Después de una lesión, una atención rápida y correcta es importante para aliviar el dolor y reducir las complicaciones. **Objetivo:** Analizar estadísticamente los casos de lesiones esporádicas del tobillo, levantando las principales causas de lesión y trazar conductas preventivas. **Métodos:** Se realizó una investigación estadística sobre las lesiones deportivas de 275 estudiantes de educación superior en Qiqihar con métodos de cuestionario y práctica docente. La investigación se centró en el análisis de las estructuras lesionadas y la causa de la lesión. Paralelamente, se plantearon las correspondientes propuestas encaminadas a la prevención de estas lesiones deportivas. **Resultados:** Las lesiones articulares y los esguinces de tobillo, seguidos de los hematomas, representaron la mayor proporción de lesiones de tobillo. Entre los motivos, destacaron la falta de preparación física, la falta de conciencia de autoprotección, la preparación inadecuada en las instalaciones del entorno deportivo y la ejecución de tareas fuera de lo especificado por el superior. **Conclusión:** El trabajo médico debe aumentar la difusión para que la gente se dé cuenta de las causas de las lesiones deportivas. Al mismo tiempo, ayuda a las personas a dominar las medidas de cuidado antes y después de la lesión. Esto reduce la incidencia de las lesiones deportivas y disminuye la aparición de complicaciones. **Nivel de evidencia II; Estudios terapéuticos - Investigación de resultados.**

Descriptores: Prueba de Esfuerzo; Traumatismos en Atletas; Investigación en Enfermería Clínica; Deportes.



INTRODUCTION

Sports ankle injury is an acute soft tissue injury disease in which the ankle ligaments are sprained, lacerated, or avulsed due to violence during sports. This is also one of the most vulnerable joints in sports. After the injury, the patient's normal walking ability is severely affected, and the recurrence rate is extremely high. This injury has been paid attention to by most sports and medical workers.¹ A good sense of self-protection and adequate preparation before exercise are important measures to prevent injuries. After an injury, prompt and correct care is positively significant to relieve pain and reduce complications. This article has carried on the statistical analysis to the sports ankle joint injury cases. We tried to find out the main reason for the injury. We expect to achieve the purpose of prevention and treatment.

METHOD

Survey data

From June to November 2019, 120 college students came to our infirmary for sports ankle injuries, including 70 males and 50 females.

Research methods

We use questionnaires to understand the causes of sports ankle injuries of college students and their mastery of post-injury nursing knowledge.² At the same time, we teach students about prevention and nursing knowledge. Instruct students how to deal with an ankle joint injury on the spot. A questionnaire survey was conducted on these students 6 months after the mission. Compare the incidence of sports ankle joint injuries and the mastery of preventive nursing knowledge among college students.

Simulation of posture optimization and correction of sports injury images

F_{uyu} represents the original image of the athlete's starting posture.³ d''_{sdr} represents the number of pixels in the original image. j_{cgl} represents the Gaussian model of each pixel. \wp_{lpk} represents the standard deviation between pixels. Then use formula (1) to give the average value of all pixels in the athlete's starting posture image after filtering.

$$A_{ase} = \frac{d''_{sdr} \times j_{cgl}}{F_{uyu} * \wp_{lpk}} * k_{lp} \quad (1)$$

k_{lp} represents the initial sample set. X_{we} represents any pixel and i_{opo} represents the probability density function of the Gaussian distribution function of the pixel. ω_{opi} represents the total number of Gaussian model distribution patterns of each pixel in the pose image. X_{wer} represents the gray value of the target pixel in the starting posture. v_{kpi} stands for measurement noise.⁴ e_{iu} stands for the time coordinate. Use formula (2) to detect the athlete's starting posture area.

$$d'_{fhy} = \frac{k_{wer} \times v_{kpi} \mp \{X_{we} \times L_{opo}\}}{e_{iu} \times \omega_{opi} \quad j_{yiu}} \quad (2)$$

j'_{yiu} represents the logical connection between pixels. j'_{po} represents the threshold of each frame of image.⁵ E'_{hgh} represents the threshold of candidate foreground features. Then use formula (3) to give the athlete's starting posture characteristic function expression.

$$e'_{dry} = \frac{E'_{hgh} \times j_{po}}{g'_{drt} \mp p_{fhy}} \times \frac{d'_{iop}}{h'_{ghj}} \quad (3)$$

g'_{drt} represents the analytic function of motion rationality based on the three-dimensional image. p'_{fhy} represents the feature set of the athlete's starting posture. d'_{iop} represents the number of bones and muscles of the athlete. h'_{ghj} represents the feature set of the starting posture. We divide the athlete's body structure into h segments.⁶ The human body state characteristics of each segment are represented by a set n'_{fui} . g'_{pop} represents the starting posture feature of the database. Then, formula (4) is used to set the threshold for judging the rationality of the athlete's starting posture characteristics.

$$E'_{wer} = \frac{n'_{fui} \times g'_{pop}}{g'_{fj} \times e'_{dry}} + k'_{ghk} \times h \quad (4)$$

k'_{ghk} represents the background clutter estimated by low-pass filtering and g'_{fj} represents the Spatio-temporal non-stationary characteristics of the image.

RESULTS

The causes of sports ankle joint injuries of college students include insufficient pre-exercise preparation activities, lack of self-protection awareness, insufficient preparation of the sports environment and facilities, and non-compliance with the standards during exercise.⁷ See Table 1 for the percentage of injury caused by various reasons.⁷ After the education of prevention and nursing knowledge, the number of students who mastered sports injuries and the treatment methods after injuries has increased significantly. The number of injuries per capita has been significantly reduced (Table 2).

In all people with ankle joint injuries, a larger part of the trainees did not prepare for activities in time, which led to the body's ankle joint injuries. This reflects the lack of self-awareness of the trainees and the negligence of the education of related sports instructors.⁸ The coach did not do a good job of supervising. From the analysis of planning science, it is known that the muscle has the characteristics of density and elasticity. Adequate preparation activities enable the trainees to achieve good motor coordination in the psychological and physical aspects. Sports injuries are also related to sports collisions and fierce competition. Insufficient ankle strength, jumping and landing on other people's feet, excessive movements may also cause ligament tears.

DISCUSSION

In recent years, ankle joint injuries and other diseases have increased, which seriously affects people's daily lives and physical health. Ankle

Table 1. Percentage of sports ankle joint injuries caused by various reasons.

Cause of injury	N	Percentage (%)
Insufficient preparation	35	29.17
Lack of self-protection awareness	29	24.17
Inadequate preparation of sports environment facilities	28	23.33
The action does not conform to specifications	14	11.67
other	14	11.67

Table 2. Comparison of prevention and nursing knowledge.

	Before mission	Post mission
Percentage of prevention and nursing knowledge mastery	32 (26.67%)	95 (79.17%)
Can consciously prevent the number of people effectively	28 (23.33%)	50 (41.67%)
Number of injuries per capita (times/6 months)	1.2	0.8
Can handle the number of people effectively after being injured	36 (30%)	80 (66.67%)

injuries are more common in clinical practice.⁹ As the disease progresses slowly, the onset time is difficult to determine. An ankle injury may cause pain, physical discomfort, etc. This has a greater impact on the patient's daily life. It cannot participate in social activities better.

Prevention of sports ankle injuries

Carry out adequate preparation activities before exercise

The purpose of warm-up activities is to improve the excitability of the central nervous system and enhance the functional activities of various organ systems. This makes the human body transition from a relatively static state to a tense activity state.¹⁰ This can overcome the physiological inertia of the body's functional activities. Many students ignore the importance of warm-up activities. They did not prepare adequately before the exercise or even did not prepare. In the case of impaired physical function and mental preparation, carry out intense and heavy exercise. The ankle muscles, joints, and ligaments are damaged due to insufficient preparation. Therefore, one of the important measures to prevent injuries is to train students on sports injuries.

Strengthen self-protection awareness

Sports are mostly competitive events. Some of these events also require physical confrontation, such as football, basketball, rugby, etc. Many students do not abide by the game's rules to win the game. They forcibly bumped into and pulled each other, causing the players on both sides to lose their center of gravity or jump and land unsteadily.¹¹ This caused an injury to the lateral anterior talofibular ligament of the ankle joint. Therefore, we educate students to strengthen their awareness of self-protection and avoid unnecessary confrontations. When jumping to the ground, pay attention to whether obstructions are around. Prevent the foot from stepping on uneven objects or stepping on other people's feet and causing ankle joint damage.

Instruct students to exercise skills

Relevant coaches and medical management personnel should deal with athletes' injuries according to their conditions. The diagnosis and treatment of athletes' injuries should be timely.¹² This can prevent acute development from becoming chronic due to an unreasonable diagnosis. Insufficient preparation activities may also lead to the extension of the injury. This will make the damage serious.

Nursing care of sports ankle joint injury

Treatment of ankle fractures

After an ankle injury, you should first judge whether it is a sprain, a fracture, or a ligament injury. If you feel the pain is limited after the

injury. Athletes who cannot walk or can barely walk and the ankle joint swells are an ankle fracture.¹³ At this time, it should be partially braked, fixed, and quickly go to the hospital for treatment.

Nursing of ankle sprain

Do local ice compress or cold compress immediately after injury until the pain is significantly reduced or disappeared. Cold compresses can constrict local blood vessels and reduce exudation, bleeding, edema, and pain. Local hot compress, external application of Chinese medicine, and fumigation were performed 24 to 48 hours after injury. This can reduce swelling, relieve pain, promote exudation and absorption, and accelerate recovery. In addition to topical medication, it can be combined with oral anti-inflammatory analgesics. We spray Yunnan Baiyao aerosol locally or mash the gardenia jasminoides aminoxides with borneol and vinegar and apply externally or externally to use Voltaren latex for the mildly injured. In addition to the method mentioned above, we use trauma fumigants to fumigate those with severe injuries. When blood accumulates in the joint cavity, we first puncture and aspirate the blood. Then inject a mixture of lidocaine and Queyanshusong or other glucocorticoids to reduce adhesion. In the late stage, it can be combined with acupuncture, massage, and massage therapy to promote the recovery of joint function.

CONCLUSION

The ankle joint is the lowest large joint in the human body. Its stability and flexibility are important in standing, walking, squatting, and other actions. Ankle injuries not only affect work and life but also cause psychological shadows. This will affect people's enthusiasm to participate in physical exercise. After ankle joint injury, it is easy to cause sequelae such as arthritis, joint pain, etc. This will bring pain to people's future lives. Through the publicity, explanation, and guidance of medical workers, people realize the causes and harms of sports ankle joint injuries. We enable people to master and use pre-exercise prevention and post-injury nursing knowledge to guide practice. This can reduce the incidence of sports ankle injuries.

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REFERENCES

- Xu S, Zeng L. Rehabilitation Path of Knee Ligament Proprioception Loss Caused by Sports Injury. *Investigación Clínica*. 2020;61(3):1258-67.
- Nielsen RO, Debes-Kristensen K, Hulme A, Bertelsen ML, Møller M, Parner et al. Are prevalence measures better than incidence measures in sports injury research?. *British journal of sports medicine*. 2019;53(7):396-7.
- Orchard JW, Meeuwisse W, Derman W, Hägglund M, Soligard T, Schwellnus M et al. Sport medicine diagnostic coding system (SMDCS) and the orchard sports injury and illness classification system (OSIICS): revised 2020 consensus versions. *British journal of sports medicine*. 2020;54(7):397-401.
- Mącznik AK, Mehta P, Kaur M. Online exercise-based sports injury risk reduction programs—a systematic review protocol. *Physical Therapy Reviews*. 2019;24(6):330-4.
- Nielsen RO, Bertelsen ML, Møller M, Hulme A, Mansournia MA, Casals M et al. Methods matter: exploring the 'too much, too soon' theory, part 1: causal questions in sports injury research. *British journal of sports medicine*. 2020;54(18):1119-22.
- Chandran A, Morris SN, Wasserman EB, Boltz AJ, Collins CL. Methods of the National Collegiate Athletic Association Injury Surveillance Program, 2014–2015 Through 2018–2019. *Journal of athletic training*. 2021;56(7):616-21.
- Tee JC, McLaren SJ, Jones B. Sports injury prevention is complex: we need to invest in better processes, not singular solutions. *Sports medicine*. 2020;50(4):689-702.
- Kaplan E, Imami H. Investigation of the Relationship Between Mental Training and Sports Injury Anxiety. *Turkish Journal of Sport and Exercise*. 2021;23(1):1-8.
- Donaldson A, Callaghan A, Bizzini M, Jowett A, Keyzer P, Nicholson M. A concept mapping approach to identifying the barriers to implementing an evidence-based sports injury prevention programme. *Injury prevention*. 2019;25(4):244-51.
- Hulme A, Thompson J, Nielsen RO, Read GJ, Salmon PM. Towards a complex systems approach in sports injury research: simulating running-related injury development with agent-based modelling. *British journal of sports medicine*. 2019;53(9):560-9.
- Pol R, Hristovski R, Medina D, Balague N. From microscopic to macroscopic sports injuries. Applying the complex dynamic systems approach to sports medicine: a narrative review. *British journal of sports medicine*. 2019;53(19):1214-20.
- Guo L, Tao T. Application of Cruciate Ligament of Knee Joint in Track and Field Sports Injury and Rehabilitation. *Investigación Clínica*. 2020;61(1):488-96.
- Bolling C, Barboza SD, Van Mechelen W, Pasman HR. Letting the cat out of the bag: athletes, coaches and physiotherapists share their perspectives on injury prevention in elite sports. *British journal of sports medicine*. 2020;54(14):871-7.