

CORRELATION BETWEEN LOCATION AND CAUSE OF INJURIES IN TENNIS PLAYERS



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CORRELAÇÃO ENTRE LOCAL E CAUSA DE LESÕES EM JOGADORES DE TÊNIS

CORRELACIÓN ENTRE LA LOCALIZACIÓN Y LA CAUSA DE LAS LESIONES EN TENISTAS

Lei Liu¹ 
(Physical Education Professional)

1. College of Physical Education,
Jimei University, Xiamen, Fujian,
China.

Correspondence:

Lei Liu
Xiamen, Fujian, 361021, China.
liulei78520@126.com

ABSTRACT

Introduction: Tennis is a network sport that requires strength, endurance, agility, speed, skill, and other physical demands from participants. Tennis athletes are subject to injuries in their daily training, affecting their competitive performance. **Objective:** Explore the correlation between the location of injuries and the cause of injuries in tennis players. **Methods:** Tennis players were selected as the research subjects. In this study, a questionnaire was used to record tennis injuries. The rehabilitation treatment of tennis players after injuries was summarized and analyzed through statistical methods. **Results:** The main forms of serious sports injuries caused by tennis players were acute and moderate injuries. The most common fractures are mainly ligament and tendon: joint ligament injury or tear, muscle ligament injury, bursitis, and soft tissue ligament contusion. The joints most commonly involved are knees, ankles, elbows, wrists, and shoulders. **Conclusion:** The common causes of sports injuries in tennis players are the inaccuracy of technical movements, insufficient muscular strength, and insufficient strength for preparatory technical activities. In practice, it is recommended that athletes correct and standardize their movements. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Tennis; Athletes; Athletic Injuries; Physical Conditioning, Human.

RESUMO

Introdução: O tênis é um esporte de rede que exige força, resistência, agilidade, velocidade, habilidade e outras demandas físicas dos participantes. Os atletas de tênis estão sujeitos a lesões em seus treinamentos diários, afetando o seu desempenho competitivo. **Objetivo:** Explorar a correlação entre o local das lesões e a causa das lesões nos jogadores de tênis. **Métodos:** Os jogadores de tênis foram selecionados como os objetos de pesquisa. Neste estudo, foi utilizado um questionário para registrar as lesões no tênis. Através de método estatístico, resumiu-se e analisou-se o tratamento de reabilitação dos jogadores de tênis após as lesões. **Resultados:** As principais formas de lesões esportivas graves causadas pelos tenistas foram lesões agudas e moderadas. As fraturas mais comuns que ocorrem são principalmente as ligamentares e tendinosas: lesão ou laceração do ligamento articular, lesão ligamentar muscular, bursite e contusão ligamentar de tecidos moles. As articulações mais envolvidas são joelhos, tornozelos, cotovelos, pulsos e ombros. **Conclusão:** As causas comuns das lesões esportivas nos tenistas são uma união de imprecisão dos movimentos técnicos, atividades de força muscular insuficientes e força insuficiente para atividades técnicas preparatórias. Na prática, recomenda-se aos atletas corrigir e padronizar seus movimentos. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Tênis; Atletas; Traumatismos em Atletas; Condicionamento Físico Humano.

RESUMEN

Introducción: El tenis es un deporte de red que exige fuerza, resistencia, agilidad, velocidad, habilidad y otras exigencias físicas a los participantes. Los atletas de tenis están sujetos a lesiones en su entrenamiento diario, lo que afecta a su rendimiento competitivo. **Objetivo:** Explorar la correlación entre la localización de las lesiones y la causa de las mismas en los tenistas. **Métodos:** Se seleccionaron jugadores de tenis como sujetos de la investigación. En este estudio, se utilizó un cuestionario para registrar las lesiones de tenis. Mediante un método estadístico, se resumió y analizó el tratamiento de rehabilitación de los tenistas tras las lesiones. **Resultados:** Las principales formas de lesiones deportivas graves causadas por los tenistas fueron las lesiones agudas y las moderadas. Las fracturas más comunes que se producen son principalmente las de ligamentos y tendones: lesión o desgarro de ligamentos articulares, lesión de ligamentos musculares, bursitis y contusión de ligamentos de tejidos blandos. Las articulaciones más comúnmente afectadas son las rodillas, los tobillos, los codos, las muñecas y los hombros. **Conclusión:** Las causas comunes de las lesiones deportivas en los tenistas son la unión de la inexactitud de los movimientos técnicos, las actividades de fuerza muscular insuficientes y la fuerza insuficiente para las actividades técnicas preparatorias. En la práctica, se recomienda que los deportistas corrijan y normalicen sus movimientos. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Tenis; Atletas; Traumatismos en Atletas; Acondicionamiento Físico Humano.



INTRODUCTION

Tennis is a split-net game. These competitive sports techniques can positively impact the overall comprehensive coordination ability of the participants' comprehensive strength, endurance, agility, speed skills, and balance skills^[1-2]. In recent years, Chinese tennis has developed rapidly^[3-4]. Tennis competitions have high requirements for male athletes' individual sports competencies, and technical movements are also fundamental, so the causes of tennis injuries are studied^[5-6]. This helps this article to take some proactive precautions. Using the results of this paper, try to reduce the number of injuries, the number of times, and the degree of injury. To provide a sure basis for ensuring the physical health of tennis players.

METHOD

Research objects

This paper takes 200 tennis players as the research object. This article analyzes the location, type, and cause of sports injuries.

Questionnaire survey method

Random sampling was conducted on 200 students from our school's 2020 and 2021 elective tennis courses. There are 100 men and 100 men each: a year or more of tennis career. The investigation covered the tennis player's injury's cause, location, and time. We sent out a total of 200 questionnaires this time. There were 200 valid questionnaires, and the recovery rate was 100%.

Dynamic control equations of tennis players

The dynamic governing equations for the mechanical properties of the hand bone can be described in the following format:

$$-\frac{\partial}{\partial x_i} \left[C_{ijkl}(x) \left(\frac{1}{2} \left(\frac{\partial u_k(x)}{\partial x_j} + \frac{\partial u_j(x)}{\partial x_k} \right) \right) \right] = f_i, x \in \Omega \quad (1)$$

Here C_{ijkl} is the elastic modulus, f_i is a physical or external force. In addition, the boundary conditions are defined as:

$$u_i(x) = \bar{u}_i(x), x \in \Gamma_u \quad (2)$$

$$v_j C_{ijkl}(x) \frac{1}{2} \left(\frac{\partial u_k(x)}{\partial x_j} + \frac{\partial u_j(x)}{\partial x_k} \right) = \bar{p}_i(x), x \in \Gamma_p \quad (3)$$

Γ_u and Γ_p denote the displacement boundary and the stress boundary, respectively. v_j represents the average vector to the Γ_p boundary. $\bar{u}_i(x)$ and $\bar{p}_i(x)$ as the stress on the boundary stress corresponding to the given displacement and the corresponding sum of the two feedstock displacements on the given stress boundary, respectively. The corresponding³form is:

$$-\int_{\Omega} C_{ijkl} \frac{\partial u_k}{\partial x_j} \frac{\partial v_i}{\partial x_l} + \int_{\Gamma_p} \bar{p}_i v_i = \int_{\Omega} f_i v_i, \forall v_i \in (H_0^1)^3 \quad (4)$$

Suppose $\{Fh\}$ is a family of finite element divisions of Ω . h is the segmentation parameter.⁴ Where e is the division element. Then the discrete variational problem corresponding to the definition problem (4) is:

$$-\int_{\Omega} C_{ijkl} \frac{\partial u_k^h}{\partial x_j} \frac{\partial v_i^h}{\partial x_l} + \int_{\Gamma_p} \bar{p}_i v_i^h = \int_{\Omega} f_i v_i^h, \forall v_i^h \in (V_h)^3 \quad (5)$$

Here $(V_h)^3$ is the finite element space.

Mathematical Statistics

This paper uses dynamic Excel software to analyze and process the valuable data collected from consultation, investigation, and interview.

There is no need for a code of ethics for this type of study.

RESULTS

Basic information about tennis injuries

Of the 200, 140 (70%) had a tennis injury. Of the 100 male athletes, 87 (87%) had sports injuries. Of the 100 female athletes, 53 (53%) had sports injuries. Long-term trauma is more common, while acute trauma is less common. The proficiency of tennis technical movements has a great relationship with the injured part.

Types and locations of injuries in tennis training

The most common sports injuries among tennis players are joint sprains, muscle strains, tennis elbow, tenosynovitis, blisters, etc. These five types of damage account for 77% of all damage. The other more severe injuries are only 23%. The significant injuries are the hands, legs, and elbows.

Analysis of the causes of injuries in tennis matches

Through the analysis of sports injuries of tennis players, the following five reasons can be drawn—sports technology, sports training, sports physiology, sports psychology, and sports external factors. Sports technical factors, sports training factors, and sports physiology factors are the crucial factors that affect the factors. Technical factors of sports injuries are the three leading dangerous causes of accidental sports injury death in male tennis players, such as improper technical movements, unstable technical movements, and demanding technical movements. The sports training factor is the main factor affecting tennis players' sports injuries. Its most extensive features are an unreasonable sequence of preparatory and finishing exercises, too much exercise, too much intensity, and too much local load. Exercise physiology injury is a major physiological cause of the symptoms of motor function impairment in tennis players. The main physiological characteristics of the time it occurs may be due to excessive physical fatigue, poor physical strength, poor physical flexibility, and old wounds that have not yet healed. External factors refer to factors other than oneself. This includes terrible site conditions, weather conditions, unsuitable equipment, etc.

DISCUSSION

Make reasonable preparations and activities

Prep activities aim to prepare your body before engaging in an intense workout fully. When exercising, you can increase muscle flexibility, elasticity, and mechanical endurance. Because modern tennis needs to respond quickly to tennis players' requirements, be proficient in action, move quickly, and swing the racket quickly, so scientific, reasonable, and comprehensive training before the game and complete, specialized, and comprehensive sports preparation are the only way to prevent players from getting injured and making mistakes successfully—basic prerequisites. Classes include jogging, stretching, and more. The second is professional preparation. Some technical moves commonly used by tennis players are getting stronger and stronger. This allows for adaptation to all body parts, fitness, and a sense of movement. Before special preparations, athletes should do general preparations. The wrist, elbow, ankle, knee, waist, and other joints should be strengthened when performing multiple sports. This can significantly reduce the chance of injury.

Tidying up is just as important as preparation. The goal is to move the body from moving to stillness. It helps clear blood lactate that is produced during exercise. After research, they were found to relieve muscle pain after exercise.

Master the correct tennis technique

The quality of technical movements in sports is an essential factor in sports injuries. After several hundred years of sports science, research, and development of tennis in New China, the technical action system of tennis has become relatively basic and tends to be more complete, scientific, normative, and reasonable. Some physical and technical movements of the athlete's body, such as improper handling, often lead to another negative movement of the average human body and some human functional organs used in the competition of other sports athletes. Or affordability. So strictly follow the principle of step by step. Players must learn standard tennis movements and basic tennis techniques. Through this method, the batting technique has been gradually improved and perfected. In the learning process, the athlete should first learn how to decompose. Step-by-step and systematic principles are essential to prevent sports injuries.

Strengthen strength, flexibility, and coordination training

Tennis participants required by tennis competitions need to have particular technical strength, endurance, agility, speed, etc., skills, and other abilities. Only when a certain level of physical training is achieved can athletes master complicated techniques proficiently. If the athlete's muscle strength is not enough and the ligament flexibility is not enough, it will likely lead to injury. At the same time, strengthen the physical strength and coordination of the exercise. Pay particular attention to exercising the flexibility of vulnerable muscle groups and joint ligaments.

Strengthen self-protection awareness, eliminate psychological fear and improve self-confidence

In tennis, strengthening self-protection awareness is an essential means of preventing injuries. Tennis players should correctly understand the real cause of sports injury and understand the result of injury. Tennis players should try to avoid physical and psychological adverse effects during intense competition. This is due to the weak muscles of the athletes, slow response, inability to concentrate, and poor physical coordination. If the mood is not good, the athlete's performance in training and competition will appear abnormal movements, resulting in injury.

Improve sports venues and choose suitable sports equipment

Most of the tennis courts studied in this paper are more than ten years old. Due to the lack of professional maintenance personnel, many ground damage has been caused. This will cause more damage to the tennis player. Improving the stress structure of indoor tennis courts is another immediate solution to reduce the chance of tennis players getting injured. Tennis players should also be able to choose some different materials, Rackets of all sizes, shapes, and weight-bearing structures. The weight of the empty racket is preferably less than 275 grams. This method can reduce the load on the arm and avoid injury. Stronger people can choose a heavier racket and appropriately increase the number of shots. The weight of the racket must not exceed its bearing range. Tennis players should choose shoes of different materials according to the different venues. This ensures that there is no pressure on the toes. Choose a smoother, less bumpy shoe when exercising indoors or on hard surfaces. When using artificial turf or sand, you should choose sneakers with many bumps and a significant coefficient of friction. In addition, you should choose protective support belts such as wrist guards and wrist guards according to the parts that are prone to injury in tennis games.

CONCLUSION

The most common injuries suffered by tennis players include chronic sprains of articular muscles, acute strains of muscle and ligaments, tennis elbow, tenosynovitis, vesicular swelling, etc. In all injuries, these five types of injuries account for 77%. The other more severe injuries are only 23%. There are five main reasons for sports injuries in athletes. Sports fitness technology, sports strength training, sports anatomy and physiology, sports applied psychology, sports rehabilitation psychology, external sports factors, etc.

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