

Sport Injuries of the Students Majoring in Tennis in Physical Education School of Jiangxi Normal University

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Abstract—Tennis is a type of net-confrontational sport, which requires high physical qualities and high-intensity combat. For tennis players, who are engaged in tennis for certain years, sport injuries are common. In this paper, we surveyed sport injuries of the students majoring in tennis in Physical Education School of Jiangxi Normal University. The aim is to find out the causes to induce sport injuries for these people, and reduce such injuries in the future sport career. The results showed: 76.47% of the students had injuries in shoulder joints, and 52.94%, 44.12%, 38.24%, 6.47% and 20.59% of them had injuries in waists, knee joints, elbow joints, wrist joints and ankle joints, respectively; 35.3% of the students were injured because of inadequate preparatory activities, and 26.5%, 14.7%, 11.8% and 8.8% of them were injured because of incorrect technical movements, poor physical qualities, inappropriate personal equipment, and bad venues, respectively. Therefore, to avoid sport injuries, the students majoring in tennis should do enough preparation movements and then improve their technical movements and physical qualities.

Keywords—Tennis; Shoulder joint; Damage; sports injuries; injury prevention

I. INTRODUCTION

Tennis is a racket sport that can be played individually against a single opponent (singles) or between two teams of two players each (doubles). Each player uses a tennis racket that is strung with cord to strike a hollow rubber ball covered with felt over or around a net and into the opponent's court. The object of the game is to play the ball in such a way that the opponent is not able to play a valid return. The player who is unable to return the ball will not gain a point, while the opposite player will. Tennis is also a type of net-confrontational sport, which requires high physical qualities and high-intensity combat. For tennis players, who are engaged in tennis for certain years, sport injuries are common. The characteristics of tennis can be fitness, education, entertainment, competitive and people of different ages and sexes together; it has a broad mass base. Tennis known as the gentleman movement, which can enhance physical fitness, improves disease resistance, but also enriches the amateur life, cultivate sentiments [1]. At present, tennis has been popularized all over the country, and more and more students are popular. Most of the universities have set up tennis courses, and students have joined in tennis. Tennis is a confrontation-

type sports, requires a higher physical quality requirements, but also a specific technical action requirements, large amount of exercise, as a tennis professional students, tennis training and training will inevitably put more time and energy, And for long-term tennis players, sports injury is a very common situation. The purpose of this paper is to analyze the causes of sports injuries of tennis students by analyzing the injury situation of tennis students, and to put forward some suggestions and measures to reduce the occurrence of sports injuries for the tennis students, so that the students can normal Healthy participation in tennis learning and training to provide reference.

II. SUBJECTS AND METHODS

A. Subjects

The 50 students majoring in tennis in Physical Education School of Jiangxi Normal University, including 36 boys and 14 girls, were recruited for the survey. Anonymous answer sheets were taken. Among them, the eldest was twenty three years old; the youngest was twenty years old; the average age was 22 years.

B. Methods

In this paper, through access to domestic and foreign universities tennis, tennis teaching, sports injuries, health care and other related aspects of prevention literature as the theoretical basis of the paper.

According to the needs of research, we designed the questionnaire of the sports injury situation of the students of tennis major in Jiangxi Normal University, and tested the reliability and validity of the questionnaires. The test-retest reliability coefficients were $R = 0.875$, which accorded with the requirements of this study. Questionnaires were distributed in the form of questionnaires, 50 questionnaires were distributed and 50 were recovered. The efficiency of the questionnaires was 100%.

Statistical analyses were performed using IBM SPSS Statistics software version 20.0 (SPSS Inc., Chicago, IL, USA). The data are expressed as the means \pm standard deviations (SDs) and compared using χ^2 tests. The significance level was set at 0.05.

III. RESULTS AND DISCUSSION

A. Number and Proportion of the Students with Sport Injuries.

As table I shows, the number of sports injuries among the 50 students in the three grades of tennis professional is 34, accounting for 68% of the total number of students in the gymnastic college of Jiangxi Normal University. %, indicating that tennis professional sports injury students is more common.

TABLE I. NUMBER AND PROPORTION OF THE STUDENTS WITH SPORT INJURIES

	Number	Percentage(%)
Normal	16	32
Injured	34	68

B. Injured Sites of the Students with Sports Injuries.

By reviewing the literature on tennis injuries, it was found that both professional tennis players and amateur tennis players usually have sports injuries during their tennis career. The probability of upper limb injury is the highest, especially the shoulder joint injuries. The existing reports showed that the most common sites of the tennis injuries could be divided into upper limbs, trunk and lower limbs. In this paper, the table II shows that the number of injured shoulder was the most, which accounted for the total injury rate of tennis injury. 76.47% of the total number of injuries; the number of lumbar injuries ranked second, accounting for 52.94% of the total number of injuries; the number of knee injuries ranked third, accounting for 44.12% of the total number of injuries, while the other injuries accounted for 38.24 of the total number of injuries %, 26.47% and 20.59% respectively. It can be found that the number of sports injuries of the shoulder joints is the most among the tennis professional students of Jiangxi Normal University. This is because the physiological structure of the human body is closely related to the technical characteristics of tennis sports.

TABLE II. INJURED SITES OF THE STUDENTS WITH SPORT INJURIES

Injury sites	Number	Percentage (%)
Shoulder joint	26	76.47
Waist	18	52.94
Knee joint	15	44.12
Elbow joint	13	38.24
Wrist joint	9	26.47
Ankle joint	7	20.59

Shoulder injury is a common type of injury in tennis. Shoulder injury caused by the repetitive use of shoulder [2] when serving and striking the ball. The injury also relevance to toscapular dyskinesia, rotator cuffs pathology or glenohumeral internal rotation deficit which leads to internal impingement and/or labral pathology [2, 3]. There is about 24% of the high-level tennis players aged from 12 to 19 years old suffered from shoulder pain and rise up to 50% for middle-aged players [4]. As shown in the table II, shoulder joint is the most likely occurrence of injury in all parts of tennis in this investigation. 76.47% of the 34 persons surveyed had more or less shoulder joint injury. Shoulder joint by the humeral head and scapula joint glenoid composition, around the ligament is weak, joint capsule relaxation, belonging to the ball and socket joints, for a

variety of flexion and extension, rotation movement. It can be said that the shoulder joint is the largest range of human movement, the most flexible joints, but its stability is poor, coupled with soft tissue around the shoulder joint space with the tendon in the course of exercise often squeeze and friction, it is easy Leading to joint damage [5]. The shoulder joint is basically used in every tennis technical movement, and the repeatability is very high, so the shoulder joint is under a heavy load. Therefore, the shoulder joint injury often occurs in the tennis movement.

C. Causes of the Sports Injuries Occuring in the Student Majoring in Tennis.

As shown in Table III, 35.3% of the students were injured because of inadequate preparatory activities, and 26.5%, 14.7%, 11.8% and 8.8% of them were injured because of incorrect technical movements, poor physical qualities, inappropriate personal equipment, and bad venues, respectively.

TABLE III. CAUSES OF THE SPORTS INJURIES OCCURRING IN THE STUDENT MAJORING IN TENNIS

Causes of injuries	Number	Percentage(%)
Inadequate preparatory activities	12	35.3
Incorrect technical movements	9	26.5
Poor physical qualities	5	14.7
Bad venues	3	8.8
Inappropriate personal equipment	4	11.8
Others	1	2.9
Total	34	100

Tennis is a network of confrontational sports, athletes in the non-stop running, moving, starting, sudden stop and a series of alternating movement, if not fully prepared activities, muscle in a stiff state, visceral system Function has not yet mobilized, likely to cause muscle strain, joint sprain or cardiovascular system strain [6]. The results showed that the number of sports injuries caused by insufficient preparation of tennis students was 12, accounting for 35.3% of the total injuries. It can be seen; due to inadequate preparatory activities leading to shoulder injury is a very prominent reason. Tennis is a network of confrontational sports, the physical quality of students demanding, each technical action requires coordination of the upper and lower body to complete. If there is not enough preparation before the training and competition activities, the human body's cardiovascular system, nervous system, internal organs and other body functions cannot be mobilized to such a state to carry out training and competition, it is likely to cause shoulder muscles Injury and ligament injury.

The technical movements of tennis are relatively complex, and the physical quality of the learners is demanding, and the technical movements of the tennis need to use the shoulder joints. Therefore, the shoulder joints bear a great deal of exercise load. Through the investigation and study found that leading to shoulder injury is the biggest two tennis technical action is the ball and high pressure ball technology, because the two tennis technical movements in the range of shoulder movement, hit the ball in the need to overcome a lot of

resistance So that the shoulder joint often over the scope of the sharp rotation, leading to rotator cuff and the humeral size between the repeated friction, over time caused strain.

From the survey results can be seen, tennis students as a result of technical errors in the master action led to the number of shoulder injury was 9, accounting for 26.5% of the total number of shoulder injuries. It can be seen, the wrong technical action is also a major cause of injury. From a physiological point of view, learning any technical action is the process of establishing a conditioned reflex. In this process, the technical action of the errors and irregularities will not be fully formed conditioned reflex, which is prone to sports injuries. Complex tennis technology moves difficult to enable students to grasp the correct technical action in a short time, in the course of practice without paying attention to the understanding and mastery of technical action essentials, it is prone to wrong batting action, such as serving, not relying on regression Pedal to leveraging and the power of the waist, relying on the arm force, it will be very easy to make the arm burden and shoulder injury.

Muscle strength, ligament flexibility is poor, muscle coordination force imbalance, easily lead to injury [7]. Tennis exercises on the practitioners have a higher physical quality requirements, and some students in the process of practice due to muscle strength, poor coordination of upper and lower limbs and leg movement speed cannot keep up and other causes of technical action deformation, causing sports injuries.

Tennis personal equipment mainly refers to the racket, shoes and sportswear and so on. Field survey found that most of the students the quality of the racket is not very good, hit the damping effect is poor, easy to cause wrists, elbows and shoulder joints and other parts of the injury. Most of the students do not have professional tennis shoes, just wear other sports shoes or running shoes, leading to the emergence of this situation are because the professional tennis shoes, the small number and price. And because the tennis court site friction coefficient and hard texture, tennis start, braking and fast moving action is easy to damage the shoes. Therefore, the majority of students choose low prices and non-professional tennis shoes. Sports shoes are not good, site and hard, it is likely to cause lower limb joints of the load increases, leading to ankle, knee and other joint damage.

With the development of tennis, students can watch through various channels to the world's best tennis player's game, many students have to imitate their competitive technology. However, the athletes of competitive sports technology are not easy, but need to go through long-term, specialized training and in the game constantly honed out. According to the survey, Jiangxi Normal University tennis professional students most of the plans to use a short time to master a variety of difficult tennis technology. Therefore, every practice on the pitch is a few hours. And the relative lack of tennis courts, it is often early to occupy the venue, good night before leaving. In this way to practice tennis, sports fatigue will inevitably arise. Excessive training load leads to body fatigue, not only can not improve athletic performance, but will make the body's ability to exercise decreased, resulting in sports injury.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Jiangxi Normal University tennis professional sports injury students are more common.

Jiangxi Normal University tennis students have sports injuries common parts of the shoulder, elbow, wrist, waist, knee and so on, of which the most common site of injury is the shoulder joint.

The main causes of sports injury in the students of the Jiangxi Normal University are the inadequate preparation activities, the incorrect technical movements, the physical quality, the site and the equipment.

B. Recommendation

Reasonable arrangements for preparatory activities. Full and reasonable preparatory activities can prevent and reduce the occurrence of sports injuries. The aim of the preparation is to prepare the body for vigorous exercise, mainly to improve muscle flexibility, mechanical endurance and reduce the viscosity of the muscles to meet the needs of strenuous exercise. Preparation for the whole body gymnastics, muscle stretching, joint activities, mainly jogging, feel the body heat, slightly sweating principle. In addition, to do a good job with the learning content, combined with the characteristics of tennis designed to prepare special activities, used to improve the excitability of the body and the function of various organ systems [8].

Correctly master the technical action. Technical action to master the correct or not, is one of the main causes of sports injuries. Students in the tennis technical movement exercises, under the guidance of the coach to learn the norms of tennis action, and the action essentials to fully understand and master, step by step, and gradually improve and perfect their batting techniques, effective prevention and reduction of exercise Injury occurred.

Wang Ping survey of Guangzhou University City, 10 college students proposed tennis on the strength, speed, explosive force, flexibility, sensitivity, endurance and other physical quality have higher requirements, especially around the joint strength training, can avoid excessive exercise due to excessive force Caused by sports injuries [9]. Of course, the higher the quality of flexibility can also reduce the occurrence of sports injuries. Wang Zhongyong proposed to improve the technical action to coordinate the power of the body hit, but to use the forearm at the same time to develop physical fitness, improve the body's ability to withstand, improve the stability of the joints to avoid injury [10]. Improve the overall quality. Therefore, the students should improve the strength, speed, endurance, sensitivity, coordination and other physical fitness, but also on the tennis of the various aspects of tennis, but also to improve the physical quality of the tennis, physical fitness is a prerequisite, Of the special quality of practice development, especially on the shoulder muscles around the strength and ligament stretch to strengthen the practice.

The school provides students with better training venues and increases the number of tennis courts. Students should pay

attention to personal sports equipment, sport equipment; upper and lower extremity joint injury is an important reason, therefore, to buy sports equipment to give full consideration to their professionalism, to reduce the occurrence of sports injuries.

Working and rest, reasonable arrangements for training load, may be the effective way to prevent fatigue and to avoid sport injuries for the students majoring in tennis.

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REFERENCES

- [1] TAO Zhi-xiang Tennis Tutorial. Higher Education Press, 2007.
- [2] Hoeven, H. van der; Kibler, W. B. (2006-05-01). "Shoulder injuries in tennis players". *British Journal of Sports Medicine*. 40 (5): 435-440. doi:10.1136/bjism.2005.023218. ISSN 1473-0480. PMC 2577490free to read. PMID 16632575.
- [3] Neuman, B.J., Boisvert C.B., Reiter B., Lawson K., Ciccotti M.G.; Cohen S.B. Results of Arthroscopic Repair of Type II Superior Labral Anterior Posterior Lesions in Overhead Athletes Assessment of Return to Preinjury Playing Level and Satisfaction. *Am J Sports Med*. 2011 Sep; 39(9):1883-1888.
- [4] Lehman, R.C. Shoulder pain in the competitive tennis player. *Clin Sports Med*. 1988, 7(2): 309-327.
- [5] Institute of Physical Education General Teaching Materials. *Sports anatomy*. Beijing: People's Sports Publishing House, 1984.
- [6] Qu Mian-yu, Yu Chang-long. *Practical Sports Medicine*. Beijing: Peking University Medical Publishing House, 2003.663-665.
- [7] Jiao Wei. *Study on Bilingual Course of Sports Injury*. Beijing: Beijing Sport University Press, 2003.35-42.
- [8] Wei Dong. Discussion on treatment of "tennis elbow". *Sports Science and Technology*, 2001, 22 (4): 43-45.
- [9] Wang Ping, Chen Huafu, Zhou Jian. Guangzhou University City 10 college students' tennis injury investigation and recommendations. *Synthesis Report*, 2012; 20 (9): 120-122.
- [10] Wang Zhongyong, Wang Jinfan. Prevention and treatment of tennis sports injury. *Social Sciences Research*, 2011; (10): 193-195.