

Study on the Current Situation and Prevention Countermeasures of Sports Injuries in College Basketball: A Case Study of Colleges and Universities in Zhaoqing, Guangdong

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ABSTRACT

This study aims to investigate the current situation of sports injuries among college basketball players in Zhaoqing, Guangdong, analyze the types, location distribution and main causes of injuries, and propose targeted rehabilitation and prevention strategies accordingly, so as to provide empirical evidence and scientific guidance for reducing injury risks and optimizing physical education teaching in colleges and universities. Methods such as questionnaire survey, literature review, mathematical statistics and logical analysis were used to process and conduct theoretical analysis of the data. The results showed that the incidence of sports injuries among college basketball players was relatively high (68.4%), with muscle strains (32.5%) and joint sprains (25.7%) being the most common types of injuries; the injury locations were highly concentrated in the knees (35.2%) and ankles (22.7%). The main causes were improper warm-up exercises (55.3%), excessive exercise load (62.7%) and weak physical fitness (48.3%). The problem of basketball injuries among college students is prominent, and it is closely related to the technical characteristics of the sport and the scientific nature of training. A comprehensive system covering scientific warm-up, personalized rehabilitation training and systematic prevention measures should be established to effectively protect the health and sports career of athletes.

KEYWORDS

Basketball sports injuries; Rehabilitation training; Prevention measures

1 Introduction

As a highly popular sports activity among college students, basketball plays an important role in enhancing physical fitness and cultivating team spirit. However, with the widespread development of basketball, the problem of sports injuries has become increasingly prominent, which seriously affects the physical and mental health of college students. As a region with developed economy and abundant educational resources, Zhaoqing, Guangdong has witnessed vigorous development of college basketball, but the problem of sports injuries has also become increasingly serious.

Investigations have found that the incidence of basketball-related sports injuries among college students is generally high, which not only directly affects the competitive level of athletes, but also may have a negative impact on their long-term physical development. Sports injuries are not only simple physical traumas, but also complex issues involving athletes' physical functions and psychological states. In-depth research on the occurrence mechanism, causes and prevention measures of basketball-related sports injuries among college students is of great theoretical and practical significance for improving college students' awareness of sports safety and optimizing the physical education teaching model.

Through systematic investigation and data analysis, this study comprehensively explores the current situation of basketball-related sports injuries among college students in Zhaoqing, Guangdong, reveals the main causes of injuries, and puts forward targeted prevention and rehabilitation strategies, so as to provide scientific guidance for physical education teaching and students' sports safety in colleges and universities.

2 Research Objects and Methods

2.1 Research Objects

The research objects were basketball players from 5 colleges and universities in Zhaoqing, Guangdong. A total of 320 student athletes were surveyed, including 240 males and 80 females, aged between 18 and 22. Random sampling method was adopted to ensure the representativeness and validity of the sample.

2.2 Research Methods

2.2.1 Literature Review Method

By systematically searching and analyzing relevant domestic and foreign academic literature, a solid theoretical

foundation and reference framework were established for this study. The purpose was to clarify existing research results, core concepts and potential research gaps, so as to guide the overall research design.

2.2.2 Questionnaire Survey Method

A structured questionnaire was designed independently according to the research objectives, and online and offline distribution channels were combined to collect first-hand empirical data from college basketball players. The core purpose of this method was to directly obtain key information about the occurrence of injuries, possible causes and individual perceptions.

2.2.3 Mathematical Statistics Method

Professional software such as Excel 2010 was used to input and conduct systematic statistical analysis of the quantitative data collected through the questionnaire. Descriptive statistical indicators such as frequency and percentage were calculated to convert raw data into interpretable statistical information.

2.2.4 Logical Analysis Method

Based on the statistical results, logical reasoning methods such as comparison, induction and deduction were used to conduct in-depth analysis of the internal connections and in-depth implications of the data. This process aimed to go beyond the surface of the data, explore the regular knowledge implied behind it, and form the final research conclusions.

3 Results and Analysis

3.1 Basic Situation of Basketball-Related Sports Injuries Among College Students

As can be seen from Table 1, among the 320 surveyed college basketball players, 68.4% had experienced sports injuries recently, including 45.6% with minor injuries, 20.3% with moderate injuries and 2.5% with severe injuries.

Table 1 Incidence of Injuries Among College Basketball Players

Item	With Injury Experience	Minor Injuries	Moderate Injuries	Severe Injuries
Number of People	219	100	44	5
Percentage (%)	68.4	45.6	20.3	2.5

As shown in Table 2, the types of injuries mainly include the following:

High-incidence injury types (proportion > 25%): Muscle strains (32.5%) were the most common type of injury, accounting for nearly one-third of the total. This directly reflects the technical characteristics of basketball, which requires frequent acceleration, deceleration, sudden stops and jumps. These movements exert huge eccentric loads on the hamstrings, quadriceps, triceps surae and other parts, which can easily lead to overload and strain of muscle fibers. Preventing muscle strains should be the top priority of injury prevention work.

Medium-incidence injury types (proportion between 10% and 25%): Joint sprains (25.7%) ranked second, mainly involving the ankles and knees. Ankle sprains mostly occur when jumping and landing, stepping on others' feet or changing directions quickly; knee sprains are related to unstable landing, lateral movement and physical confrontation. This highlights the severe challenge posed by basketball to joint stability. Ligament injuries (18.3%) often occur along with joint sprains but are more serious. In particular, the cruciate ligaments and collateral ligaments of the knees, as well as the anterior talofibular ligaments of the ankles, once injured, require a long recovery period and have a great impact on the athlete's sports career. Contusions (15.6%): As a confrontational sport with physical contact, collisions, being hit by knees or kicked during basketball games are common causes of muscle contusions.

Low-incidence injury types (proportion < 10%): Other types (7.9%) may include stress fractures, tendinitis, cartilage injuries, skin abrasions, etc. Although the proportion is the lowest, they should not be ignored, especially some chronic strain injuries, which require early identification and intervention.

As indicated in Table 3, the injury locations of college basketball players are relatively concentrated. The knees (35.2%) and ankles (22.7%) are the main injury locations, accounting for nearly 60% in total. This highlights the huge load borne by the lower limb joints during sudden stops, jumps and direction changes in basketball. Secondly, waist injuries (18.5%)

Table 2 Types of Injuries Among College Basketball Players

Item	Muscle Strains	Joint Sprains	Ligament Injuries	Contusions	Other Types	Total
Number of People	104	82	59	50	25	320
Percentage (%)	32.5	25.7	18.3	15.6	7.9	100

are also relatively prominent, which are related to physical confrontation and core strength exertion. This distribution rule clearly suggests that injury prevention measures should prioritize strengthening the stability of lower limb joints and core strength.

Table 3 Distribution of Injury Locations Among College Basketball Players

Item	Knees	Ankles	Waists	Wrists	Other Locations	Total
Number of People	113	73	59	40	35	320
Percentage (%)	35.2	22.7	18.5	12.6	11	100

3.2 Analysis of Causes of Sports Injuries

Table 4 Analysis of Causes of Injuries Among College Basketball Players

Influencing Factor	Improper Warm-Up Exercises	Excessive Exercise Load	Physical Fitness Factors	Technical Errors
Number of People	177	201	155	79
Percentage (%)	55.3	62.7	48.3	24.6

As can be seen from Table 4, 55.3% of the respondents admitted that they often ignored or perfunctorily did warm-up exercises, which directly led to a significant increase in the risk of sports injuries. Inadequate warm-up keeps muscles and ligaments in a tense state, making them prone to injury.

Injuries Caused by Technical Errors

Basketball is a highly confrontational sport, and unskilled techniques can easily lead to accidents. The data shows that injuries caused by non-standard technical movements account for 24.6%, mainly concentrated in technical links such as rapid direction change, jump shot and defense.

Excessive Exercise Load

Over-training is an important inducement of injuries. 62.7% of the respondents stated that their weekly training intensity exceeded 8 hours, among which 34.5% felt obvious fatigue, and the risk of sports injuries increased significantly.

Physical Fitness Factors

Weak physical fitness foundation is an important cause of sports injuries. The survey shows that 48.3% of the students lack systematic physical training, and their muscle strength and flexibility are insufficient, making them more likely to be injured.

3.3 Discussion on Rehabilitation Methods

3.3.1 Principles of Rehabilitation Training

Rehabilitation training after sports injuries is not a simple process of rest or random activities, but a scientific and systematic process based on the theories of sports medicine, biomechanics and training science. Firstly, strictly abiding by the basic principle of "repair first, then strengthen" is the cornerstone of successful rehabilitation. After the acute phase of injury, the initial focus of rehabilitation should be on creating the best healing environment for the tissues, including controlling inflammation, relieving pain and promoting the initial repair of damaged muscles, ligaments or cartilage. Any premature or improper intensity stimulation may disrupt the fragile repair process, leading to chronic injury or secondary injury. Secondly, rehabilitation programs must be highly individualized, and a "one-size-fits-all" model should never be adopted. Before formulating a program, a comprehensive assessment of the athlete should be conducted, including the specific type of injury (such as muscle strain, ligament tear), severity (Grade I to III), the rehabilitation stage, as well as the individual's pain tolerance, range of motion, muscle strength and psychological state. A program designed for an athlete with an ankle sprain is completely different from that for an athlete with waist strain in terms of training focus and taboos. Finally, the entire rehabilitation process must emphasize the progressiveness of step-by-step advancement. The increase in training load (including intensity, volume and complexity) should follow a monitorable and adjustable step-by-step model. For example, transitioning from isometric contractions to concentric/eccentric contractions, from no load to light load, then to partial body weight and finally to full body weight, and from single-plane movement to multi-plane compound movement. The advancement of each step should be based on the athlete's ability to complete the tasks of the current stage painlessly and in a standard manner, ensuring that the body has sufficient time to produce physiological adaptation, thereby restoring motor function safely and effectively.

3.3.2 Control of Rehabilitation Training Intensity

Accurately controlling the intensity of rehabilitation training is the key to balancing tissue healing and functional recovery, and it is directly related to the efficiency and safety of rehabilitation. In the early stage of rehabilitation, training should be dominated by low-intensity and low-impact activities. The goal of this stage is to maintain basic

cardiopulmonary function, prevent excessive muscle atrophy and joint stiffness without causing pain or re-injury. Specific methods may include: active joint movement within the pain-free range, isometric contractions for the muscles around the injured area (such as static contraction of the quadriceps), aquatic exercises (using the buoyancy of water to reduce load), and low-resistance cycling on a stationary bike. These activities help promote local blood circulation, reduce swelling and lay the foundation for subsequent training.

With the consolidation of tissue healing and the improvement of functional indicators, the rehabilitation program should gradually and controllably increase the intensity and complexity of training. For example, in strength training, it can transition from isometric contractions to resistance training using elastic bands or light dumbbells; in balance and proprioceptive training, it can transition from standing on both feet to standing on one foot, and then to training on an unstable surface (such as a balance pad). This process requires the rehabilitation therapist to closely observe the athlete's response and adjust the program in a timely manner.

It is particularly important that the rehabilitation program must scientifically arrange rest and recovery sessions. Tissues can only undergo supercompensation and functional reconstruction during rest. Therefore, high-intensity training days should be alternated with low-intensity training days or complete rest days, and physical therapy methods (such as ice application, massage and stretching) should be integrated as auxiliary measures to ensure that athletes do not fall into the dilemma of "taking two steps forward and one step back" due to over-training.

3.3.3 Phased Recovery Plan

A clear and goal-oriented phased recovery plan is a roadmap to guide athletes back to the field after injury. This plan is usually divided into three interconnected stages with different focuses.

The first stage is acute phase management (anti-inflammation, pain relief and local repair), usually within 1 to 7 days after injury. The core goal of this stage is to use the "RICE principle" (Rest, Ice, Compression, Elevation) or the updated "POLICE principle" (Protection, Optimal Loading, Ice, Compression, Elevation) to control inflammation, relieve pain and swelling. It may also start extremely slight joint activities and muscle isometric contractions within the pain-free range to stimulate repair and prevent functional degradation.

The second stage is mid-term functional recovery (restoration of range of motion and basic muscle strength). When the acute symptoms are effectively controlled, the focus of rehabilitation shifts to restoring the full range of joint motion (through active and passive stretching) and reconstructing the basic muscle strength and endurance of the injured area and surrounding muscle groups. At the same time, low-intensity balance, coordination and proprioceptive training should be gradually introduced to reconstruct neuromuscular control ability. This stage is the key link connecting the previous and subsequent stages, laying the necessary functional foundation for returning to special training.

The third stage is late-stage special ability reconstruction and integration. The goal of this stage is to enable athletes to return to their sports safely. The training content should simulate specific movements in basketball, such as progressive jump landing training, direction change running, acceleration and deceleration, as well as the decomposition and complete practice of special technical movements (such as jump shots and defensive slides). By gradually increasing the intensity and complexity of these special training sessions and ensuring the quality and painlessness of movement patterns, athletes are finally fully prepared physically and psychologically to return to the field with confidence.

3.4 Research on Prevention Measures

Based on the in-depth understanding of the causes of sports injuries, modern sports science emphasizes the adoption of systematic prevention measures to proactively reduce the risk of injuries.

The first measure is to promote scientific and comprehensive warm-up training. An effective warm-up should go beyond simple jogging and static stretching, and instead adopt a more advanced "dynamic warm-up" model. Its mechanism of action includes: significantly increasing the range of joint motion through multi-directional and multi-angle dynamic movements (such as lunging walks, high knees, butt kicks, etc.); improving the elasticity and extensibility of muscles through active contraction and stretching of muscles to reduce the risk of strains; more importantly, such warm-up can activate the connection between the central nervous system and motor units in advance, optimize the excitability and response speed of the neuromuscular system, and fully prepare for the upcoming high-intensity sports.

Secondly, regular training for joint ligament flexibility and stability should be normalized. This not only relies on the combination of traditional static and dynamic stretching to maintain good flexibility, but also, more importantly, introduces balance training and proprioceptive training. For example, standing on one foot and control training on an unstable surface can effectively stimulate the proprioceptors around the joints, enhance the body's ability to perceive and regulate joint positions in a dynamically unstable environment, which is crucial for preventing ankle and knee sprains.

Finally, attention must be paid to the correct use of sports protective equipment. This involves three aspects: first, selecting professional protective gear based on the sports event and personal injury history (such as functional ankle

braces versus simple bandages); second, enhancing athletes' awareness of the correct wearing method of protective gear through education and supervision, so that the protective gear can play its due protective and supporting role in the correct position; third, establishing a system for regular inspection, replacement and maintenance of protective gear, because the protective performance of aging and worn protective gear will be significantly reduced, making it useless.

4 Conclusions and Recommendations

4.1 Conclusions

The study found that the problem of basketball-related sports injuries among college students in Zhaoqing, Guangdong is common and severe, with a relatively high incidence of injuries. The injury locations show a highly concentrated characteristic, with lower limb injuries (knees and ankles) being the main ones. In-depth analysis of the causes shows that they can be mainly attributed to four key factors: inadequate warm-up exercises, deficiencies in technical movements, excessive training load and weak basic physical fitness. Therefore, the core key to reducing injury risks lies in establishing and implementing a scientific and systematic integrated system of rehabilitation and prevention.

4.2 Recommendations

Colleges and universities should first strengthen education on sports injury prevention in physical education teaching, and improve students' risk awareness and self-protection awareness through systematic courses. For student athletes themselves, they need to firmly establish the concept of scientific training, strictly follow the step-by-step load principle in training practice, and avoid over-training due to eagerness for quick results. From a long-term development perspective, it is recommended that subsequent studies focus on developing more targeted personalized injury prevention programs. By comprehensively considering the individual differences, technical characteristics and weak links of athletes, a more accurate and effective basketball injury prevention and control system can be established, providing continuous protection for improving the health level and sports career of college student athletes.

About the Author

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