

KNEE JOINT INJURIES INVESTIGATION AND PREVENTION IN COLLEGE BASKETBALL



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INVESTIGAÇÃO E PREVENÇÃO DAS LESÕES ARTICULARES DO JOELHO NO BASQUETEBOL UNIVERSITÁRIO

INVESTIGACIÓN Y PREVENCIÓN DE LAS LESIONES DE LA ARTICULACIÓN DE LA RODILLA EN EL BALONCESTO UNIVERSITARIO

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ABSTRACT

Introduction: Basketball has become a part of college students' after-school life mainly due to the widespread basketball culture on the college campus, especially due to the successful promotion of NBA, CBA, college basketball super league, and other elite sports events. **Objective:** This study aims to study the frequently occurring basketball sports injuries among college basketball graduate students, determine the causes and characteristics of these sports injuries, and propose preventive measures. **Methods:** Based on the anatomical structure and function of the knee joint and the sports characteristics of basketball, 92 college basketball athletes were statistically analyzed for their sports injuries during 12 weeks of training through questionnaires, expert interviews, and other research methods. **Results:** The types of injuries college basketball players mainly reported were concerning meniscus and medial collateral ligament injury, followed by knee bursitis and, finally, anterior cruciate ligament injury. **Conclusion:** With the continuous growth of the basketball training period, the proportion of sports injuries to the knee joints of sports training students gradually decreased. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Basketball; Knee Injuries; Accident Prevention.

RESUMO

Introdução: O basquetebol tornou-se parte da vida pós-escolar dos estudantes universitários principalmente devido a ampla difusão da cultura do basquetebol no campus universitário, especialmente devido a promoção bem sucedida da NBA, CBA, super liga de basquetebol universitário e outros eventos esportivos de elite. **Objetivo:** Este estudo visa estudar as lesões esportivas que frequentemente ocorrem no basquetebol entre os estudantes universitários graduados em basquetebol, descobrir as causas e as características dessas lesões esportivas, propondo medidas preventivas. **Métodos:** Com base na análise da estrutura anatômica e função da articulação do joelho e das características esportivas do basquetebol, 92 atletas universitários de basquetebol foram analisados estatisticamente para suas lesões esportivas durante as 12 semanas de treinamento por meio de questionários, entrevistas com especialistas e outros métodos de pesquisa. **Resultados:** Os tipos de lesão dos jogadores universitários de basquetebol principalmente relatados foram referentes ao menisco e a lesão ligamentar colateral medial, seguida de bursite no joelho e, finalmente, lesão ligamentar cruzada anterior. **Conclusão:** Com o crescimento contínuo do período de treinamento de basquetebol, a proporção de lesões esportivas nas articulações do joelho dos estudantes especializados em treinamento esportivo diminuiu gradualmente. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Basquetebol; Traumatismos do Joelho; Prevenção de Acidentes.

RESUMEN

Introducción: El baloncesto se ha convertido en una parte de la vida postescolar de los estudiantes universitarios debido principalmente a la amplia difusión de la cultura del baloncesto en los campus universitarios, especialmente por la exitosa promoción de la NBA, la CBA, la superliga universitaria de baloncesto y otros eventos deportivos de élite. **Objetivo:** Este estudio pretende estudiar las lesiones deportivas de baloncesto que se producen con frecuencia entre los estudiantes universitarios de baloncesto, averiguar las causas y características de estas lesiones deportivas y proponer medidas preventivas. **Métodos:** A partir del análisis de la estructura anatómica y la función de la articulación de la rodilla y de las características deportivas del baloncesto, se analizaron estadísticamente las lesiones deportivas de 92 deportistas universitarios de baloncesto durante 12 semanas de entrenamiento mediante cuestionarios, entrevistas a expertos y otros métodos de investigación. **Resultados:** Los principales tipos de lesión registrados en los jugadores universitarios de baloncesto fueron las lesiones de menisco y del ligamento colateral medial, seguidas de la bursitis de rodilla y, por último, la lesión del ligamento cruzado anterior. **Conclusión:** Con el crecimiento continuo del periodo de entrenamiento de baloncesto, la proporción de lesiones deportivas en las articulaciones de la rodilla en estudiantes especializados en entrenamiento deportivo disminuyó gradualmente. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Baloncesto; Traumatismos de la Rodilla; Prevención de Accidentes.



INTRODUCTION

Basketball is one of the most favorite sports of contemporary college students. With the development of online media, the increase of international exchanges and the outstanding performance of outstanding basketball stars in the NBA, basketball and basketball culture have been widely spread among the on campus.¹ In particular, the successful promotion of basketball games such as the NBA, CBA and college basketball Super League has become a part of college students' extracurricular life. Basketball is a powerful confrontation, combining running, jumping, shooting and other comprehensive sports.² With the continuous improvement of basketball level, the requirements of athletes in all aspects of the ability is increasingly higher. The knee joint is the most complex load-bearing joint in the human body. Because it is shallow and weight-bearing, it lacks the inherent stability of the hip joint and ankle joint. The characteristics of basketball events and the structure of the knee joint itself determine that the knee joint is prone to injury in basketball.³ It is difficult to recover to the original technical level even with the best treatment for severe knee injuries.⁴ In the process of exercise, human physiological function is in a non optimal state due to the influence of factors such as exercise biological rhythm and fatigue degree. At the same time, due to the lack of concentration of basketball students in training, the coordination of muscles in the whole body is reduced, and it is difficult to achieve good results. In this case, it is easy to get injured when conducting confrontation sports. The injured parts mainly focus on fingers, ankle joints, knee joints, waist and back, thighs, etc; In the process of training and competition, basketball students are prone to injury due to the influence of high antagonism, which is mainly caused by the lack of internal preparation activities, physical fatigue and other factors; The external venues are not standard and the training volume is unreasonable. Therefore, the key to reduce the occurrence of sports injury is to take effective measures to avoid it according to the injury factors.⁵ Therefore, the athletes must adapt to the needs of the current development of basketball sports. Knee injuries are one of the most common and deadliest injuries that seriously affect the athletic career, so reducing knee injuries in basketball and how to prevent injuries has become the target of research by national experts for many years.⁶ Under the mode of rapid development of modern competitive sports, the traditional sports theories, concepts and methods of sports training can no longer meet the needs of competition and training, which is a major breakthrough in sports training theory and methods under the background of professional sports.⁷ The United States has formed a complete set of functional training principles and methods as the leading physical training system, which has attracted the attention of the world. The physical function training system includes movement mode training, strength training, sensitive coordination and balance training, energy metabolism system training, recovery and regeneration training. Among the many elements of physical training, Physical quality training has always been an important part of physical training.⁸ China's long-term training time has confirmed that, Body muscle strength is the key to mastering and improving exercise techniques, Is a guarantee for the prevention and treatment of sports injuries, It is also the key to improve the level of exercise,⁹ therefore, Taking effective measures according to the factors of injury is the key to reduce the occurrence of sports injury, By studying the mechanism and symptoms of knee injury, Applying the findings to teaching and training, To propose the cause and prevention method of knee injury during basketball movement, To reduce knee injuries in athletes during training or competition, Reduce the knee joint injury rate of special basketball students in Capital Institute of Sports, Extended exercise life span, To explore the prevention method of knee injury in basketball players, As a reference for damage reduction and prevention, It provides a certain theoretical basis for further practical research.¹⁰

Research object and research method

Subjects of study

In this study, the investigation and prevention of knee injuries in basketball students specializing in sports training in a college were taken as the research object. In this study, 92 basketball students specializing in sports training were selected as the survey subjects to understand the causes and types of knee injuries in students' basketball. As well as the influence of different training years and different levels on the incidence of knee injury and the injury factors, the technical movements that are most serious for knee injury in the process of technical application and physical confrontation are found.

The study is Purely observational studies which no need to registry ID of ICMJE, and all the participants were reviewed and approved by Ethics Committee of Xinxiang Vocational and Technical College, China (NO. 2022022)

Research Methods

Using the CNKI literature retrieval system of the university library and the China Education Information Network, the relevant literature on basketball special physical fitness, physical training and physical motor function training in recent years was reviewed. The research and analysis of sports training majors, basketball players, knee injuries, functional training and other aspects were carried out to provide a reference for questionnaire design and body analysis.

According to the research tasks and research content of this topic, the experts of the basketball teaching and research department and the Baojiao Rehabilitation Teaching and Research Department of Capital Institute of Physical Education were interviewed through interviews, telephone interviews and other forms to understand the training status of special courses for basketball students of the sports training major of Capital Institute of Physical Education and the mechanism, cause, prevention and other relevant information, so as to provide reference for questionnaire design and body analysis.

EXCEL was used to statistically process the questionnaire data to provide a quantitative evaluation basis for body analysis.

Experimental result and analysis

Investigation of knee joint injury of basketball special students

According to Table 1, among the 92 basketball students of Capital Institute of Physical Education, 60.9% of the students had a history of knee joint injury, and 39.1% of the students did not have a knee joint injury. In order to truly and comprehensively grasp the knee injuries of basketball students majoring in sports training at Capital Institute of Physical Education, this study conducted a separate sample of 56 basketball students. The results showed that 42% of students had had an injury to the left knee. Secondly, 34% of bilateral knee injuries occurred, and 24% of basketball students had suffered right knee injuries.

Analysis of types of knee injuries in basketball special students

The survey results show that the types and proportions of knee injuries of male and female basketball students majoring in sports training are significantly different, as shown in Table 2.

Analyzing the reasons, first, there is a slight gap in sample size; Second, it is due to the differences in the physical fitness, physiological anatomy of knee joints, joint alignment and muscle strength of lower limbs between male and female athletes. Based on the comprehensive analysis of the

Table 1. Investigation of knee injuries of basketball students (N=92).

Damage	Knee joint injury	No damage to knee joint	Total
Number of people	56	36	92
percentage	60.90%	39.10%	100%

Table 2. Investigation of types of knee injuries in male athletes (N=48).

Damage type	Number of people	Percentage
Medial collateral ligament	10	20.80%
Lateral collateral ligament	4	8.30%
anterior cruciate ligament	6	12.50%
Distal patellar disease	2	4.20%
Meniscus damage	11	22.90%
Knee bursitis	9	18.80%
Chondrosis of patella	6	12.50%

survey results, the types of knee injuries of basketball students specializing in sports training can be divided into the following types: meniscal injury, patellar cartilage, apical disease, medial collateral ligament injury, lateral collateral ligament injury, anterior cruciate ligament injury, and knee bursitis. Among them, meniscal injuries and medial collateral ligament injuries were more common in knee injuries of male athletes specializing in sports training basketball, accounting for 22.9% and 20.8% respectively. Knee bursitis accounted for 18.8%, and patellar osteochondrosis and anterior cruciate ligament injuries accounted for 13%. Among them, terminal patellar disease occurs relatively rarely, accounting for only 4.2%.

Analysis of the degree of knee injury

Sports injuries are classified according to the severity of the injury, which can generally be divided into three types: mild injury, moderate injury and severe injury, and if the injury can be trained according to the original plan, it is "mild injury"; After the injury, the training cannot be carried out according to the original plan, and the affected part needs to be stopped or reduced and treated as a "moderate injury"; A "serious injury" occurs when one is completely unable to train or needs to be hospitalized after the injury.

It can be seen that most of the knee injuries of basketball students specializing in sports training are mild, accounting for 53.6% of the total number of injuries. Followed by moderate injuries, accounting for 39.3% of the total number of injuries; Severe injuries, accounting for 7.1%. According to statistics, there were 57 minor injuries; There were 43 moderate injuries; There were 6 severe injuries.

From the above findings, it can be clearly seen that mild injuries are mainly medial collateral ligament, terminal patellar disease and meniscal injury, moderate injury of anterior cruciate ligament, patellar osteochondrosis, and meniscal injury, and severe injury is mainly lateral collateral ligament injury of the knee. Taking effective measures according to the factors of injury is the key to reduce the occurrence of sports injury, By studying the mechanism and symptoms of knee injury, Applying the findings to teaching and training, it can be seen that the degree of knee joint injury of basketball students is mainly mild and moderate.

Ways for basketball students to prevent knee injuries

Injury prevention functional exercise refers to the special protective exercise of the body prone to injury in order to prevent sports injuries in the process of special training. Targeted knee injury prevention training can effectively prevent the occurrence of sports injuries and help improve athletes' athletic performance. Injury prevention training is the basis for ensuring the correct and efficient completion of sports movements

and preventing sports injuries, and is an important part of the training process of basketball special students.

Reasonably arrange the content of preparatory activities, reasonably connect general preparation activities and special preparatory activities, make preparatory activities similar to basketball special technical action requirements, fully move knees, wrists, ankles, elbows, head, neck, shoulders, waist and other parts to prevent the occurrence of sports injuries in basketball special training. This is shown in Figure 1.

Reasonable pre-game warm-up preparation activities help basketball players avoid knee joint injuries in intense games or high-strength training, reasonable pre-game preparation activities help the stretchability of muscles and joint soft tissues, reduce the viscosity between joints, enhance their flexibility, and avoid knee injuries caused by sudden movements such as internal rotation and external rotation of the knee joint during training or games. It can be seen that the main cause of knee injury of basketball players is insufficient preparation before intense competition or high-intensity training, followed by basketball players who still play and train when the body is overtired, and when the body is overtired, the physical function is reduced, and the knee joint is most prone to injury.

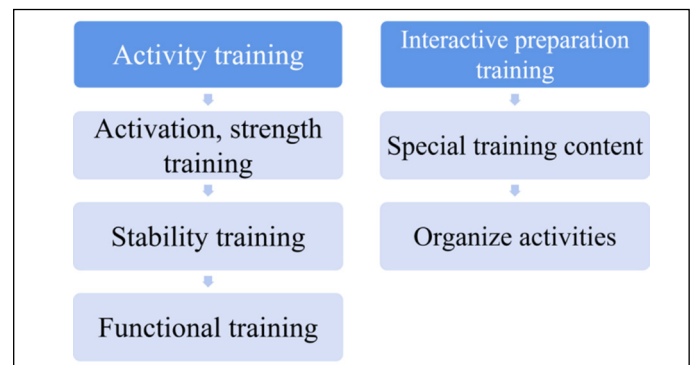


Figure 1. Architecture diagram of basketball special sports injury prevention method.

CONCLUSIONS

Knee injuries were more common among basketball students specializing in sports training, accounting for 60.9% of the total. The main types of injuries are meniscal and medial collateral ligament injuries, followed by knee bursitis, and finally anterior cruciate ligament injuries, which are mostly mild and moderate acute injuries. In basketball training or games, the rate of knee injury in men is much higher than that of women, which is closely related to the intensity of men's basketball games. Men's basketball is fiercely competitive and athletic, so female basketball players have a lower rate of knee injuries than male basketball players. As the athlete ages, the longer the training years, the more vulnerable the knee joint is, which requires basketball players to make a reasonable and scientific training plan for themselves at the beginning of training to avoid sports injuries caused by physical fatigue.

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