

Survey and analysis of sports injuries among physical education college students

Christopher Wilson^{1, a, *}, Mary Jackson^{1, b},

¹University of Strathclyde, 16 Richmond Street, Glasgow, G1 1XQ, United Kingdom
a.christopher2022wil@163.com, b.maryjacksonmove@gmail.com

***Corresponding Author**

Abstract: This study employs literature review, questionnaire surveys, interviews, and mathematical statistics to investigate and analyze the occurrence and causes of sports injuries among 346 college students at a physical education institution. The results indicate that there are differences in the probabilities of sports injuries among college students in different sports, and there are also variations in the probabilities of injuries to different body parts. The causes of sports injuries are multifaceted. It is recommended that in future sports training, coaches should further strengthen the protective measures taken for physical education students, and also that students' self-protection awareness and measures need to be improved.

Keywords: Physical Education Students, Sports Injuries, Self-Protection, Teaching Protection

1. Introduction

In sports activities, sports injuries caused by various reasons occur from time to time and have attracted the extensive attention of sports scientists. Sports injuries not only easily cause anatomical damage and physiological disorders to human tissues or organs but also have adverse effects on students' physical and mental health, life, and learning. To a large extent, they undermine students' enthusiasm and confidence in participating in sports activities, seriously interfere with and restrict the smooth completion of physical education plans, and to some extent affect the quality of training physical education students [1-2]. Therefore, studying the patterns, characteristics, and causes of sports injuries among physical education students is of great practical significance for improving the quality of physical education teaching, enhancing physical fitness, improving training methods, increasing sports performance and achievements, and preventing the occurrence of sports injuries.

2. Research subjects and methods

2.1. Research subjects

A total of 346 college students majoring in various sports from a physical education institution, with an average age of 22.60 ± 2.86 years, including 36 track and field athletes, 32 dancers, 36 swimmers, 28 basketball players, 31 badminton players, 25 table tennis players, 30 tennis players, 35 volleyball players, 30 soccer players, 35 taekwondo practitioners, and 28 judokas.

2.2. Research methods

Literature Review Method: A substantial amount of literature on sports injuries was consulted through the China Journal Network and libraries, establishing a solid theoretical foundation for the research.

Questionnaire Survey Method: Anonymous questionnaires were conducted among randomly selected students, with a total of 346 questionnaires distributed, asking students to fill in the sports injury survey form truthfully. The questionnaires were tested for reliability using the retest method, with a reliability coefficient of 0.94, which meets the requirements of statistical research.

Interview Method: Open interviews were conducted with sports coaches and college students majoring in physical education to understand the basic situation of sports injuries among college students.

Discussions and conversations were freely held on the causes, outcomes, phenomena, and impacts of sports injuries.

2.3. Classification of sports injuries

Based on the characteristics of common sports injuries among physical education college students, they are classified according to the tissues and body parts where the injuries occur. The classifications include abrasions, muscle strains, ligament or soft tissue injuries in various parts of the body (including the head and neck, chest, shoulders, elbows, hands, wrists, waist, hips, knees, feet, ankles, etc.), bone injuries, joint injuries (including dislocations), and other injuries (including lacerations, punctures, and cuts). [3-4]

3. Results and analysis

3.1. Sports injury distribution and analysis by sport among college students

As can be seen from Table 1, out of 346 valid returned questionnaires, 172 individuals reported sports injuries, accounting for 49.71% of the total surveyed population. The highest injury rate was in soccer, with a rate of 15.11%. This was followed by volleyball, taekwondo, judo, track and field, and basketball, with injury rates of 14.53%, 14.53%, 13.95%, 12.79%, and 9.3% respectively. The rates of sports injuries in dance, tennis, and swimming were relatively lower, at 6.97%, 6.97%, and 4.65% respectively. The lowest rates of sports injuries were in badminton and table tennis, both at 0.58%.

Table 1 Characteristics of Sports Injury Distribution by Sport among College Students

Sport	Number of Injuries	Injury Incidence Rate (%)
Football	26	15.11
Volleyball	25	14.53
Taekwondo	25	14.53
Judo	24	13.95
Track and Field	22	12.79
Basketball	16	9.3
Tennis	12	6.97
Dance	12	6.97
Swimming	8	4.65
Badminton	0	0.58
Table Tennis	1	0.58
Total	172	100

From the survey results, it is observed that the rates of sports injuries vary across different sports. Sports like football, taekwondo, judo, and basketball, which involve frequent physical contact and intense competition, are prone to injuries when athletes do not possess adequate physical qualities. For instance, in basketball and football, athletes are required to perform technical movements such as sudden stops, confrontations, jumps, and sprints during training and matches. These activities demand a high level of technical skill, coordination, flexibility, and strength from the students. taekwondo and judo are skill-based, direct confrontation sports, primarily focused on skill competition, conducted under direct opposing conditions. When the intensity of training and competition is high, athletes are required to have faster movement speeds, stronger muscles, and robust ligaments. If the muscle strength is low and ligaments are weak, sports injuries may occur due to factors such as sudden excessive force.

Volleyball and track and field require athletes to have high levels of exercise intensity and load, and some technical movements are more complex. For example, when a volleyball player spikes the ball, they need to rapidly swing their arm to hit the ball, which can easily lead to muscle strains in the shoulder or acute

sprains in the waist when diving to save the ball. Additionally, when blocking at the net, the ball's strong impact on the fingers and elbow joints can cause injuries to these joints. Track and field requires a high level of endurance, agility, strength, and speed from college student athletes; if the athlete's muscle power and elasticity are poor, joint stability and flexibility are insufficient, and the reaction is slow, the overall body adaptability is poor, injuries are more likely to occur.

Table tennis, tennis, badminton, swimming, and dance involve complex technical movements and have special requirements for muscle strength, body flexibility, and coordination qualities. If the technical movements are incorrect or the physical fitness is poor, injuries will occur.

3.2. Analysis of Injury characteristics in college student athletes

Table 2 indicates that the probabilities of sports injuries in different body parts of male college student athletes vary. The highest probabilities of sports injuries occur in the ankle joint, thigh, lower leg, and knee joint, with probabilities of 38.37%, 24.41%, 11.62% respectively. Following these are the finger joints, lumbar and back, and head, with probabilities of 8.13%, 6.97%, and 3.48% respectively. The lowest incidence rates of sports injuries are found in the shoulder joint, elbow joint, and wrist joint, with probabilities of 2.32%, 1.74%, and 1.16% respectively.

Table 2: Distribution Characteristics of Body Injury Sites in Male College Student Athletes

Injury Site	Number of Injuries	Percentage of Total Injuries (%)
Ankle Joint	66	38.37
Thigh, Lower Leg	42	24.41
Knee Joint	20	11.62
Finger Joints	14	8.13
Lumbar and back	12	6.97
Head	6	3.48
Shoulder Joint	4	2.32
Elbow Joint	3	1.74
Wrist Joint	2	1.16
Others		1.74
Total	172	100

Table 2 results indicate that college students have a distinct distribution of body parts susceptible to sports injuries, with the highest injury rate occurring in the ankle joint. This is closely related to the structural characteristics of the ankle joint, which is a type of gliding joint. When the joint is plantarflexed, its stability relatively decreases. The medial collateral ligaments are stronger than the lateral collateral ligaments. During training and competition, uneven terrain or unstable center of gravity can easily lead to inversion of the ankle joint and sprain of the lateral collateral ligaments. Since different sports often require students to flex, extend, and rotate their ankle joints within a certain range, this increases the likelihood of ankle joint injury.

The thigh, lower leg, and knee joint are also high-incidence areas for sports injuries. Generally, muscle strains are the main type of injury in the upper and lower limbs, caused by an imbalance in muscle coordination and strength development. During sports, when muscles are involved in movement, if the prime movers bear too much load and the antagonist muscles are relaxed without proper coordination, sports injuries can occur. In sports training, there is usually a focus on muscle training for the joints, neglecting the training of the muscles in the upper and lower limbs and other important areas. When performing a movement, if the muscle strength of the upper and lower limbs is insufficient, the ligaments are less flexible, and the muscle fibers are weak, these areas cannot withstand a certain intensity and range of motion when the exercise load is high, leading to muscle strains. The knee joint is the most anatomically complex and largest joint in the body, playing a role of bearing weight from above and below during movement.

Additionally, the knee joint is located between the longest lever arms, subject to greater mechanical stress. When the load exceeds the body structure's tolerable load, knee joint injuries can occur.

3.3. Analysis of the causes of sports injuries

From the perspective of sports injury epidemiology, the causes of sports injuries are multifaceted. The survey results from the questionnaire design indicate (Table 3), insufficient warm-up, incorrect technical movements, and lack of mental emphasis are the main reasons for sports injuries among college student athletes.

Table 3: Analysis of Causes of Sports Injuries

	Inadequate warm-up preparation	Incorrect technical movements	Lack of mental emphasis or attention	Poor physical condition	Environmental and equipment factors	Rough or foul actions	Excessive exercise load
Number of Injuries	54	42	36	16	11	7	6
Percentage	31.39	24.41	20.93	9.3	6.39	4.06	3.48

3.3.1. Inadequate warm-up preparation

Warm-up is a series of purposeful muscle activities before training and competition. It can moderately raise body temperature, enhance metabolic levels; increase the excitability of the central nervous system, and strengthen the activity of endocrine glands; overcome the physiological inertia of the internal organs, reducing the time to work in a state of activity; and regulate adverse pre-competition states. Research has found that most students lack sufficient understanding of the significance of warm-up activities before training and competition, and they are not well-informed about reasonable warm-up practices. The intensity or volume of the warm-up is improperly arranged, the specific content is not closely integrated with the warm-up activities, and the interval between the warm-up and the training or competition is too long. This results in the various muscle groups and joints not being adequately preheated, and the physiological functions and exercise intensity are not aligned, leading to frequent sports injuries.

3.3.2. Incorrect technical movements

The likelihood of students suffering sports injuries due to technical movement errors is also high. Many special disciplines have high requirements for students' physical fitness, functions, and technical skills. During teaching, training, or competition, because students have weaker physical qualities and have not correctly and proficiently mastered the technical movements, or the technical movements in training and competition are not standardized, they violate the characteristics of human body structure and function and the principles of mechanics during movement. Students are eager for quick success and blindly exert force, which often leads to sports injuries. In addition, some students misunderstand competition rules, taking rough actions as tenacious and brave, and considering foul actions as reasonable contact or deliberately committing fouls. As a result, actions such as colliding, rushing, pulling, and tripping often occur, increasing the chances of sports injuries.

3.3.3. Lack of mental emphasis

The occurrence of sports injuries among college student athletes is often related to a lack of recognition of the importance of preventing sports injuries. Both teachers and students believe that sports injuries are inevitable in the process of sports activities. Therefore, in the process of teaching, training, and competition, they are not actively preventing sports injuries. After sports injuries occur, they also do not actively analyze the causes, summarize experiences, and lessons learned. In addition, some college student athletes have a competitive mentality, disregarding the influence of subjective and objective conditions, and blindly training and competing, which often leads to the occurrence of sports injuries.

3.3.4. Sports injuries caused by other factors

Surveys have found that sports injuries among college student athletes caused by poor physical condition, environmental and equipment factors, rough or foul actions, and excessive exercise load also account for a certain proportion. Due to outdated and backward sports venues and facilities, poor floor quality, or poor lighting, it is easy for college student athletes to make incorrect judgments when performing or completing technical movements, leading to loss of body control and the occurrence of sports injuries. Sports injuries caused by poor physical condition or excessive exercise load are directly related to the athlete's physical fitness, and in many cases, are inseparable from the unscientific arrangement of exercise load and the increase in the intensity of sports training. Especially when the local load on the body is too heavy, it often leads to excessive fatigue of muscles, ligaments, and other soft tissues in the waist, ankle joints, knee joints, and legs, thus triggering the occurrence of sports injuries.

4. Suggestions

The occurrence of sports injuries among college student athletes is closely related to the sports they engage in. Sports such as football, taekwondo, judo, basketball, volleyball, and track and field have a relatively higher probability of sports injuries due to their inherent characteristics and intensity, while sports with relatively weaker competitiveness, or stronger artistic and expressive qualities like table tennis, tennis, badminton, swimming, and dance, have a relatively lower probability of sports injuries. The high-incidence areas for sports injuries in college student athletes are the ankle joints, thighs, lower legs, and knee joints. The main reasons for sports injuries in college student athletes are insufficient warm-up, incorrect technical movements, and a lack of mental emphasis. To minimize and reduce the occurrence of sports injuries in future sports training, the following points should be strengthened:

4.1. Importance of tailored training for athlete safety

Different sports require different levels of strength, speed, endurance, agility, and flexibility from college student athletes. Therefore, to comprehensively reduce the rate of sports injuries, targeted measures should be taken to improve the physical fitness of athletes in different sports and arrange sports training reasonably and scientifically. [5]

4.2. Targeted training for injury prevention in sports

In conjunction with the high-incidence areas of sports injuries in different sports, targeted exercises should be strengthened, especially for the training of small muscle groups involved in specific technical movements, to enhance the scientific level of sports training.

4.3. Athlete injury prevention: vigilance and recovery

College student athletes should always be vigilant during sports training and competitions to prevent sports injuries. Proper attention should be paid to the relationship between warming up, relaxing, and recovery. Sufficient warm-up activities should be done before exercise to fully stimulate muscle and nerve excitability, increase muscle elasticity and flexibility, and strengthen the strength training of vulnerable areas. After exercise, it is important to relax appropriately, using muscle and ligament stretching, breathing regulation, and other relaxation methods to restore the body to the normal level before exercise.

4.4. Boosting injury awareness and athlete support

Strengthen mental emphasis and understanding of sports injury knowledge. If feeling unwell, stop exercising immediately and take appropriate measures to alleviate discomfort symptoms, etc. Strengthen the medical supervision for college student athletes, establish medical records, and summarize the characteristics of sports injuries. Increase financial investment from schools to improve conditions such as school venues and equipment as much as possible, ensuring that college student athletes can train under good conditions, thereby better avoiding the occurrence of sports injuries.

5. Conclusion

In summary, this study comprehensively analyzed the sports injury situation among college students majoring in physical education, revealing the impact of different sports on specific body parts of students

and the multifaceted causes of injuries. The research indicates that contact-intensive and highly competitive sports such as football, taekwondo, judo, basketball, and volleyball are more likely to lead to sports injuries. Particularly, the ankle joints, thighs, lower legs, and knee joints, due to their high load and complex movements during sports activities, are prone to injury. In addition, insufficient warm-up activities, incorrect technical movements, and inadequate understanding of preventive measures are the main reasons for injuries.

To effectively prevent and reduce sports injuries, it is recommended that coaches and students enhance their awareness of the importance of warm-up activities, strengthen standardized training of technical movements, and give adequate mental emphasis. At the same time, they should strengthen self-protection awareness, reasonably distribute training loads, and focus on the comprehensive improvement of physical fitness. In physical education teaching and training, attention should be paid to individual differences, adopt targeted measures, and improve the scientific and safety of training. Through these comprehensive measures, a safer, healthier, and more effective training environment can be created for college students majoring in physical education, promoting their physical and mental health and the improvement of their sports skills.

6. References

- [1] Li Liwei. Investigation and Analysis of the Current Situation of Sports Injuries among College Students in Heilongjiang Province [J]. *Journal of Wuhan Sports University*, 2012, 46(12): 89-93.
- [2] Wang Haifeng, Gao Jun, Xiao Ningning. Research on Sports Injuries of Snowboarders at Different Levels in China's Halfpipe [J]. *Ice and Snow Sports*, 2011, 33(5): 38-42.
- [3] Gu Wei Nong, Wang Jianwei, Yang Yage, et al. Analysis of the Characteristics and Causes of Sports Injuries in Volleyball Players of Physical Education Institutes in China [J]. *Journal of Guangzhou Sport University*, 2007, 27(5): 80-83.
- [4] Guo Qiu Rong, Zhang Pei Rong, Zhao Heping. Investigation and Analysis of Sports Injuries in Basketball among Physical Education Students [J]. *Journal of Nanjing Sport Institute (Natural Science Edition)*, 2004, 3(2): 77-79.
- [5] Gao Feng. Research on the Prevention of Sports Injuries in Amateur Sports Training [J]. *Science and Technology Bulletin*, 2013, 29(1): 54-62.