

# The patterns and prevention of injuries in college table tennis training

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**Abstract:** This paper conducts a detailed investigation and analysis of injuries among table tennis athletes from college sports academies, and preliminarily explores some general patterns of sports-related injuries that have occurred, summarizing some preventive measures and solutions.

**Keywords:** Colleges, Table Tennis, Sports, Measures, Solutions

## 1. Introduction

With the ongoing development of sports worldwide, table tennis is evolving towards a more diversified direction. The "National Fitness Regulation" was promulgated and implemented in China on October 1, 2009, which is of great significance in promoting the development of college sports. At present, colleges and universities across the country have placed a high emphasis on table tennis, actively popularizing the sport and creating a surge in its popularity among college students. Many students have grown to love table tennis and have made it their top choice for daily fitness activities. However, due to a lack of attention to proper exercise methods and techniques in table tennis, injuries are bound to occur, which can impact study and daily life, as well as the effectiveness of table tennis competitions and training. Therefore, finding ways to prevent injuries in table tennis training is an important research topic.

## 2. Research objects and methods

### 2.1. Research subjects

A university's sports college currently has 1,192 students enrolled, including 31 full-time master's degree graduate students, 18 education master's students, 14 on-the-job graduate students pursuing a degree, and 62 students in the same-level graduate program. There are 866 undergraduate students and 201 correspondence students. In recent years, the sports college has actively promoted educational reform in physical education courses, leading to rapid development in the quality of education. An increasing number of college students are participating in sports activities, further enhancing their physical fitness. However, some students have suffered varying degrees of bodily injuries during table tennis training due to not paying attention to the principles of exercise, which has affected their daily life and studies. The author takes college students from a certain university as the research subjects, among which there are a total of 50 students majoring in sports training and 3 amateur coaches.

### 2.2. Research methods

#### 2.2.1. Literature review method

By reviewing the literature on table tennis injuries, one can understand the general situation of such injuries and grasp the patterns of them.

#### 2.2.2. Questionnaire method

The author conducted a survey on the injuries in college table tennis training, adopting the form of a questionnaire. A total of 50 questionnaires were distributed, and 50 valid questionnaires were collected.

#### *2.2.3. Interview method*

The author conducted face-to-face interviews with some coaches and college students, and visited relevant experts to understand the physical condition of table tennis athletes during their regular training and competitions, as well as the situation regarding injuries. Information and data were also collected.

#### *2.2.4. Mathematical statistics method*

The author analyzed and statistically evaluated the 50 valid questionnaires using relevant statistical methods and conducted a rigorous argumentation to explore the general patterns of injuries in college table tennis training.

### **3. Results and analysis**

#### **3.1. Characteristics of table tennis**

Table tennis is the smallest ball sport of all ball games. The diameter of a table tennis ball is 40mm, and it weighs 2.7g. The primary material is celluloid, which is highly elastic, or similar plastic. Among sports, it is known as the "magic ball" or the sport of wisdom. The volume of a table tennis ball is relatively small, and it is fast and versatile. Its fastest speed can reach about 50m/s, with a rotation speed as high as 150 to 180 revolutions per second. There are as many as 26 types of spins.

##### *3.1.1. Possessing independence*

Unlike sports like basketball and volleyball, table tennis is the smallest ball sport, typically not requiring many participants, with the primary mode of play being singles. Doubles are sometimes played, but it is less common. Therefore, in singles, players generally exhibit independence, especially those competing in table tennis who must possess a high level of independent combat effectiveness. During training, they must develop the ability to fight independently.

##### *3.1.2. Possessing decisiveness*

Table tennis players, when engaging in the sport, must proficiently master the skills of table tennis. At the same time, during the course of a match, they should make decisive arrangements in terms of tactics, based on correct judgments of their opponents and in response to the changing details, in order to meet the demands of the competition.

##### *3.1.3. Possessing tenacity*

Generally speaking, tenacity refers to the unwavering determination to overcome difficulties in order to achieve the set goals of a competition. Table tennis players need to cultivate good psychological quality and control their emotions to exclude distractions during matches or training. In the early stages of a match, when the scores of both sides are close, it is in the critical stages where the stronger tenacity makes the difference. Only with strong tenacity can one have the chance to succeed.

#### **3.2. The current state of college table tennis development**

Since table tennis was introduced to our country in 1904, it has been widely loved by the public and has a broad mass base. In recent years, with the continuous deepening of college physical education curriculum reform and the education of physical quality, college table tennis has also developed rapidly. Especially after the 1988 Seoul Olympics, when table tennis was officially included in the Olympic competition, colleges and universities across the country have attached great importance to table tennis teaching, established table tennis teams, and participated in competitions. Some colleges actively organize various class and departmental table tennis competitions to attract students' attention, increase their interest, and encourage college students to take the initiative to exercise. Many local colleges and universities have strengthened the construction of table tennis venues, expanded the area of table tennis courts, and purchased the necessary table tennis equipment and supplies. At the same time, they have reformed physical education courses, offering table tennis as a specialized elective course for students in the physical education

department for a semester, and also offering table tennis as an elective course for students who are not majoring in physical education, so that college students can master the basic skills of table tennis.

### **3.3. The significance and value of college table tennis for university students**

Table tennis is a racquet sport played over a net with no physical contact between players, making it less injurious compared to sports like football. It strengthens the body and cultivates the willpower, quality, self-control, and spatial awareness of the players, offering strong adaptability and high exercise value. Consequently, an increasing number of university students are taking to table tennis. At present, table tennis in colleges and universities holds significant importance for promoting the healthy growth of students.

#### *3.3.1. Promoting the healthy growth of college students*

Firstly, it promotes the growth and development of bones. The physical load of table tennis directly or indirectly affects the bones, inducing adaptive changes, delaying bone mass loss, or stimulating bone adaptation, thereby improving bone quality. Through repetitive table tennis movements, the total amount of bone tissue is increased, the bone density is thickened, and the bones are integrated, promoting bone growth and making the skeleton strong and healthy. Since the age range of college students is between 18 to 22 years old, a sensitive period for bone growth, college students can promote the growth and development of their bones and enhance their physical strength by participating in appropriately loaded table tennis activities.

Secondly, it can promote the cardiovascular system. Table tennis can improve the structure and function of the cardiovascular system, promote the development of the myocardium, lower blood pressure, and increase the work efficiency of the heart. Moreover, during table tennis practice, the exercise intensity is relatively stable, which can enhance the oxygen exchange function of the respiratory system, increase lung capacity and ventilation volume, enlarge vital capacity, and improve respiratory system function. Since many college students are only children who lack exercise and have poor physical fitness and insufficient athletic ability, participating in table tennis can improve their cardiovascular system and the adaptability of the cardiac center, increase excitement, enhance physical fitness, and provide protection for study and life.

Thirdly, it can improve the flexibility of the nervous system. Regular participation in table tennis can increase the reaction speed of the nervous system. Because the speed of the table tennis ball is relatively fast, participants are required to judge the direction and landing point of the ball in a timely manner and make decisions promptly. Through repeated and long-term table tennis exercise, the brain and the entire body's nervous system are stimulated, neural strength is improved, the supply of energy substances and oxygen to nerve cells is replenished, and the energy substances are ensured, greatly improving the flexibility of college students' nervous systems.

#### *3.3.2. Enhancing college students' intelligence*

Table tennis is a sport that demands a high level of psychological quality, tactics, technical skills, and individual physical fitness. Participants are required to have excellent agility and quick reaction capabilities. Long-term engagement in exercise is needed to enhance these qualities. Since some college students have undergone strenuous study during high school, and many college students do not place enough emphasis on their studies, their approach to academic tasks and knowledge retention can be rather hollow. By actively participating in table tennis, students can improve their awareness and interest in their academic pursuits, enhance their adaptability and the ability to analyze and solve problems, which in turn is beneficial for the enhancement of their intelligence.

#### *3.3.3. Enhancing the psychological quality of college students*

Psychological quality refers to the overall mental state of being able to properly self-assess and control emotions to adapt to the environment, based on a full understanding of oneself. This quality is primarily reflected in behavior and consciousness. Since table tennis is an integrated sport that requires a sound mind, such as good emotional control and strong will, participating in table tennis can help college students improve their adaptability, stress resistance, and emotional control abilities. Regularly engaging in table tennis allows students to experience success and failure, to appreciate the spirit of the Olympics, and through their training in the sport, to foster their initiative and self-confidence, to develop courage in the face

of defeat, and to enhance their resilience. This contributes to the development of a healthy mindset and shapes good psychological qualities among college students.

### 3.4. Table tennis injury survey and analysis

In this survey of 50 athletes from a university's sports college, including 40 male and 10 female college students, the current situation of injuries during table tennis training is as follows:

#### 3.4.1. About the general situation of table tennis injuries

The survey data reveals that currently, out of 50 athletes, 40 have suffered training injuries, with an incidence rate of 80%. Table tennis playing styles can be categorized into three major types: loop drive, counter-attack combined with chopping, and fast attack. Among the 50 individuals, there were a total of 80 injury cases. Specifically, there were 56 cases of loop drive injuries, accounting for 70%; 14 cases of counter-attack combined with chopping, accounting for 17.5%; and 10 cases of fast attack, accounting for 12.5%. Among the body parts affected by the injuries, the lower limbs had 20 cases, representing 25%, while the upper limbs had 60 cases, representing 75%.

#### 3.4.2. Regarding the distribution of injured areas in table tennis sports

Through surveys and interviews, the author has obtained relevant information and found that in table tennis, the areas of injury are concentrated in parts such as the shoulders, ankles, waist, knees, and elbows. The distribution of table tennis injury areas is shown in Table 1.

Table 1: Distribution of Injuries in Table Tennis by Body Part

Injury Area	Muscle Strain	Joint Sprain	Abrasion	Muscle Fatigue	Dislocation	Osteomyelitis	Total	Percentage %
Shoulder	4	5	0	2	1	0	12	15%
Back	3	0	0	0	0	0	3	3.75%
Waist	3	1	0	0	0	0	4	5%
Elbow	0	8			0		14	17.5%
Wrist	0	4	0		2	0	11	13.75%
Leg	14	0	4	0	0	0	18	22.5%
Knee	0	7	0	0	0	0	7	8.75%
Ankle	0	11	0	0	0	0	11	13.750
Total	24	36	8	8			80	
Percentage%	30%	45%	10%	10%	3.75%	1.25%	80	100%

From Table 1, it is observed that in table tennis training, the number of leg injuries is relatively high, accounting for 22.5% of the total, manifesting as muscle strains and abrasions; followed by the elbow, wrist, shoulder, ankle, knee, back, and waist. In terms of the manifestation of sports injuries, joint sprains are more common, accounting for 45% of the total, mainly due to the neglect of strength training for the small muscle groups around the joints.

#### 3.4.3. Regarding the analysis of causes of table tennis injuries

At present, there are various factors causing injuries in college students' table tennis training. Through surveys and the development of questionnaires, the main factors are as follows:

##### 3.4.3.1. Poor facilities and equipment

Some college students have reported that the existing table tennis facilities cannot meet the needs of teaching and training, and that hardware equipment such as tables and equipment still needs improvement. There is a need for more table tennis tables. Additionally, sometimes the floor is slippery, which can easily lead to falls and result in sprains and abrasions of the lower limbs; however, if the playing surface is too hard, it increases the burden on the ankles and knees, causing injuries to the lower limb joints; ill-fitting rackets

and shoes can also cause injuries. Among the 80 cases of sports injuries surveyed, there was 1 case of injury due to a slippery floor, accounting for 1.25%.

#### 3.4.3.2. Insufficient warm-up activities

The primary purpose of warm-up activities is to increase the excitability of the central nervous system, enhance the activity of the respiratory and cardiovascular systems, increase blood circulation, elevate the body's metabolic level, and prevent training injuries. Since table tennis is a racket sport played across a net that requires a certain level of agility, speed, and explosive power, failing to perform adequate warm-up activities can lead to poor physiological function, inflexible joints, and uncoordinated movements, resulting in training injuries. Among the 80 cases of sports injuries surveyed, there were 16 cases of insufficient warm-up activities, accounting for 20.0%.

#### 3.4.3.3. Incorrect technical movements

During table tennis training, some college students do not follow the technical guidance of the table tennis coach, do not act according to the essentials, violate the principles of biomechanics, and do not master the standardized technical movements of table tennis, making mistakes and failing to grasp the key points of table tennis techniques, and not forming a dynamic pattern, leading to training injuries. Because table tennis is a sport that requires high standards for technical movements, and techniques can only be mastered through repeated training. If beginners are eager for quick success and form incorrect striking movements, blindly exerting force when striking the ball, it is easy to cause training injuries. Among the 80 cases of sports injuries surveyed, there were 14 cases of incorrect technical movements, accounting for 17.5%.

#### 3.4.3.4. Excessive local load

During table tennis training, some college students train for extended periods. Due to the constant forward lean and semi-flexed position of the knee during training, this leads to local muscles being actively and strongly contracted or passively over-stretched, exceeding the load that the muscles or joints can bear, resulting in acute muscle strains or ruptures. This causes areas such as the waist, shoulders, knees, and elbows to bear excessive loads and high intensity for a long time, leading to fatigue injuries in local muscles, joints, and ligaments. Among the 80 cases of sports injuries surveyed, there were 22 cases of injuries caused by excessive local load, accounting for 27.5%.

#### 3.4.3.5. Athletic fatigue

Athletic fatigue refers to the state where, after a period of sustained exercise, the body is unable to maintain its functions at a specific level or cannot sustain a particular intensity. During table tennis training, some college students experience a buildup of aerobic oxidative metabolites in their muscles and a lack of oxygen, leading to physical fatigue. This fatigue results in a lack of concentration, reduced accuracy and coordination in movement, causing errors in table tennis training movements and resulting in injuries. Among the 80 cases of sports injuries surveyed, there were 8 cases of injuries caused by athletic fatigue, accounting for 10%.

#### 3.4.3.6. Muscle imbalance

During table tennis training, some college students exhibit muscle imbalances, characterized by insufficient strength in certain muscle groups, leading to joint instability and abnormal movement control, which in turn increases the incidence of new injuries. Among the 80 cases of sports injuries surveyed, there were 3 cases of injuries caused by muscle imbalances, accounting for 3.75%.

#### 3.4.3.7. Lack of cool-down or training with injuries

During table tennis training, some college students do not engage in sufficient cool-down exercises after intense training, leading to injuries. Moreover, there are cases of training with existing injuries. For instance, some students feel discomfort in their waist after a gymnastics class and then proceed to participate in table tennis training, which can result in waist pain and cause a waist sprain. Among the 80 cases of sports injuries surveyed, there were 8 cases of injuries caused by not cooling down properly, accounting for 10%; and there were also 8 cases of injuries caused by training with injuries, also accounting for 10%. The analysis of the survey indicates the following causes of table tennis sports injuries as shown in the table below:

Table 2: Table Tennis Injury Causes Table

Injury Cause	Number of Cases	Percentage
Poor facility and equipment	1	1.25%
Insufficient warm-up	16	20.0%
Incorrect technical movement	14	17.5%
Excessive local load	22	27.5%
Athletic fatigue	8	10%
Muscle imbalance	3	3.75%
Lack of cool-down or training with injuries	16	20%
Total	80	100%

## 4. Suggestions

College table tennis is not only beneficial for physical fitness and strength among university students, but it also helps cultivate strong self-confidence and willpower, and fosters positive interpersonal relationships. Consequently, proactive and effective measures should be taken to prevent injuries during college table tennis training to ensure the smooth conduct of the sport's practice sessions.

### 4.1. Improve the hardware facilities and venue construction for table tennis education

Further investment is necessary to improve the table tennis facilities and equipment. A dedicated table tennis venue for college students' classes should be established to enhance the table tennis teaching environment. In addition, a specialized multimedia classroom should be set up for students who love table tennis, allowing them to conduct video-based teaching or watch live broadcasts of table tennis matches. This will increase understanding of the injuries that can occur during table tennis training and reinforce prevention from a mental and educational perspective.

### 4.2. Warm-up properly

Whether the warm-up activities are adequate or not directly impacts the rate of sports injuries. A thorough warm-up can decrease muscle viscosity, enhance muscle elasticity, overcome the physiological inertia of organs, and maximize the body's physical capabilities. Hence, college students must fully understand the significance of warm-up activities, cultivate good exercise habits, and conduct warm-up exercises effectively. This will ensure that all body joints and muscle groups are properly prepared, reducing the likelihood of sports injuries.

### 4.3. Master the correct technical movements

Because table tennis is a sport that requires significant technical skill, with a multitude of serving, receiving, attacking, and defensive techniques, each with its own set of principles, college students must heed the proper guidance of their table tennis coach during training. They should earnestly study the standardized table tennis strokes and correct movement techniques, progressively mastering the rules of table tennis and its basic skills and tactics, which will help to prevent injuries in table tennis training.

### 4.4. Reasonably arrange the amount of exercise

An excessive load from table tennis training can cause injuries; overtraining can also lead to damage. The scientific and rational arrangement of the training load is crucial for effectively utilizing the body's potential and significantly enhancing the effectiveness of table tennis training. Therefore, it is important to adhere to the principle of gradual progression, starting with easier exercises and gradually moving to more challenging ones. The training load for college students should be a balanced combination of high, medium, and low intensities. When increasing the intensity of practice, the duration should be shortened; and when extending the practice time, the intensity should be reduced. By rhythmically increasing the training load

and integrating various techniques into the training sessions, one can scientifically and reasonably plan the volume of exercise, thus improving the training outcomes.

## **5. Conclusion**

The article summarizes the importance of college table tennis for the comprehensive development of college students and emphasizes the necessity of taking appropriate measures to prevent sports injuries. By improving hardware facilities, strengthening warm-up activities, mastering correct technical movements, and reasonably arranging training loads, the risk of injury can be effectively reduced, promoting the healthy development of table tennis.

Overall, this paper provides a scientific basis and practical guidance for the prevention and treatment of table tennis injuries in colleges, which is of great significance for improving the training effectiveness of athletes and ensuring their health.