

INVESTIGATION AND PREVENTION OF SPORTS RISK IN THE TEACHING OF TABLE TENNIS



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INVESTIGAÇÃO E PREVENÇÃO DE RISCO ESPORTIVO NO ENSINO DO TÊNIS DE MESA

INVESTIGACIÓN Y PREVENCIÓN DE RIESGO DEPORTIVO EN LA ENSEÑANZA DEL TENIS DE MESA

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ABSTRACT

Introduction: Among college students who are not majoring in sports, table tennis is well accepted, highly popular, and has low requirements regarding equipment investment. Therefore, many students choose this sport, although there are also certain sports risks in the course of the sport. **Objective:** Investigate the sporting risks of teaching table tennis and its preventive measures. **Methods:** Before each class exercise, the physical education teacher led the experimental class to rigorously complete the warm-up. In contrast, the control class maintained the basic program configuration without the warm-up phase. After 24 hours of practice, students in the experimental class and the control class were tested with the FMS. **Results:** The experimental class stability score increased from 1.58 points to 1.84 points, and the trunk rotation stability score increased from 1.68 points to 2.05 points. **Conclusion:** Warm-up activities before sports can further reduce sports risks in the table tennis teaching process by providing a better and safer higher education environment for students.

Level of evidence II; Therapeutic studies - investigation of treatment outcomes.

Keywords: Physical Education and Training; Racquet Sports; Accident Prevention; Athletic Injuries.

RESUMO

Introdução: Entre os estudantes universitários que não estão se especializando em esportes, o tênis de mesa é bem aceito, altamente popular e possui baixos requisitos no que diz respeito a investimento de equipamentos. Portanto, muitos estudantes optam por este esporte, embora também hajam certos riscos esportivos no decorrer do esporte. **Objetivo:** Investigar os riscos esportivos do ensino do tênis de mesa e suas medidas preventivas. **Métodos:** Antes do exercício de cada aula, o professor de educação física liderou a aula experimental para completar rigorosamente o aquecimento, enquanto a aula de controle manteve a configuração básica do programa, sem a fase de aquecimento. Após 24 horas de prática, os alunos da aula experimental e da aula de controle foram testados com o FMS. **Resultados:** A pontuação de estabilidade da classe experimental aumentou de 1,58 pontos para 1,84 pontos, e a pontuação de estabilidade da rotação do tronco aumentou de 1,68 pontos para 2,05 pontos. **Conclusão:** As atividades de aquecimento antes dos esportes podem reduzir ainda mais os riscos esportivos no processo de ensino do tênis de mesa proporcionando um ambiente de ensino superior melhor e mais seguro para os alunos. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Educação Física e Treinamento; Esportes com Raquete; Prevenção de Acidentes; Traumatismos em Atletas.

RESUMEN

Introducción: Entre los estudiantes universitarios que no se especializan en deportes, el tenis de mesa goza de buena aceptación, es muy popular y tiene pocos requisitos en cuanto a inversión en equipamiento. Por ello, muchos estudiantes optan por este deporte, aunque también existen ciertos riesgos deportivos en su práctica. **Objetivo:** Investigar los riesgos deportivos de la enseñanza del tenis de mesa y sus medidas preventivas. **Métodos:** Antes del ejercicio de cada clase, el profesor de educación física llevó a la clase experimental a completar rigurosamente el calentamiento, mientras que la clase de control mantuvo la configuración básica del programa, sin la fase de calentamiento. Tras 24 horas de práctica, los alumnos de la clase experimental y de la clase de control se sometieron a una prueba con el FMS. **Resultados:** La puntuación de estabilidad de la clase experimental aumentó de 1,58 puntos a 1,84 puntos, y la puntuación de estabilidad de rotación del tronco aumentó de 1,68 puntos a 2,05 puntos. **Conclusión:** Las actividades de calentamiento antes de practicar deporte pueden reducir aún más los riesgos deportivos en el proceso de enseñanza del tenis de mesa, proporcionando un entorno de educación superior mejor y más seguro para los estudiantes. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptores: Educación y Entrenamiento Físico; Deportes de Raqueta; Prevención de Accidentes; Traumatismos en Atletas.



INTRODUCTION

Table tennis has always enjoyed the title of national sport in China. At the same time, the table tennis project is very popular, and the participation of the masses is very high.¹ A large number of sports enthusiasts and students are willing to participate in the table tennis project.² The development of table tennis in China has been very mature, and at this stage, it has more advanced theoretical knowledge and training teaching mode. In terms of infrastructure, the construction of table tennis venues is also very perfect.³ Daily participation in table tennis can help improve physical condition, enhance physical quality, cultivate will, and help students develop physically and mentally in many ways. Due to the continuous development of society, people's investment in sports has begun to increase significantly.⁴ The student union actively pursues high-quality sports experience and improves its competitive level through daily training. The opening of table tennis courses in colleges and universities is often accompanied by many potential safety hazards.⁵ By analyzing the core causes of various potential safety hazards, we can effectively prevent various sports risks in the teaching process of table tennis. To create a safe sports environment for students is conducive to the development of physical education courses in colleges and universities.⁶ In addition, professional table tennis courses can help students have a deeper understanding of the project. Through participating in college courses, we can improve our table tennis skills.⁷

METHOD

Research on sports risk of table tennis teaching

Table tennis is an almost indispensable option for colleges and universities to carry out sports elective courses. For non sports majors, table tennis is famous, highly popular, and does not require high investment in equipment. Therefore, many students will choose this course, but there are also certain sports risks in the process of sports. In order to analyze the sports risk of table tennis teaching, this paper uses the interview method and questionnaire survey method to communicate with the physical education teachers and students of the elective course of table tennis, to investigate the current teaching situation and sports risk of the elective course of table tennis, and then uses the questionnaire survey method to distribute questionnaires to students who have sports injuries in the classroom.

This questionnaire survey adopts the method of anonymous distribution and recovery. A total of 50 questionnaires were distributed, and 47 valid questionnaires were obtained, with a recovery rate of 94%. The study and all the participants were reviewed and approved by Ethics Committee of Chengdu Technological University (NO.CDTU2019SZ024). Use Excel software to sort out the acquired data and draw relevant analysis charts.

Experimental design of sports risk prevention

In order to study the preventive effect of standardized warm-up preparation activities before class on the sports risks of table tennis teaching, this paper selected two table tennis elective classes in college freshmen as the research objects. After data collation, the basic information is shown in Table 1. The students in the experimental class are (164.22 ± 8.6538) (cm) tall, (54.21 ± 7.4152) (kg) heavy, (20.09 ± 0.4059)

Table 1. Analysis of the characteristics of the two groups of subjects.

	Experimental class	Control class	P value
Height (cm)	164.22±8.6538	166.51±9.6321	0.6951
Weight (kg)	54.21±7.4152	60.28±10.3448	0.1778
Age	20.09±0.4059	20.19±0.6130	0.1266
Training years	2.08±0.7173	1.99±0.5108	0.1957

(years) old, and (2.08 ± 0.7173) (years) trained. The students in the control class were (166.51 ± 9.6321) (cm) tall, (60.28 ± 10.3448 (kg) weight, (20.19 ± 0.6130) years old, and (1.99 ± 0.5108) years of training. The P value between several groups of data is greater than 0.05, so as to reduce the interference of personnel selection on the experimental results.

The experiment was conducted in a controlled way. Before each class began to exercise, the experimental class was led by the physical education teacher to carefully and strictly complete the warm-up preparation exercise, and the physical education teacher standardized the teaching of their actions, which was equivalent to taking the warm-up preparation exercise as a key teaching activity, so as to ensure the effectiveness of the warm-up preparation exercise. The control class is to maintain the original teaching situation, and the teacher will simply lead the students to complete the relevant actions. The teacher will demonstrate in the front, and the students will learn the teacher's actions and complete the relevant preparatory activities. In this process, the teacher will not regulate the students' actions. After completing the relevant actions, the experimental class and the control class will carry out a table tennis teaching course that is completely consistent. After 24 hours of teaching, the students in the experimental class and the control class will be tested with FMS.

The FMS test shows the fluency of athletes' movements and the flexibility of their bodies, which are generally regarded as the criteria to reduce the risk of sports injury. This paper also uses this indicator here. The sub indicators included 7 tests, including deep squat, hurdle stance, straight lunge, shoulder flexibility, active straight knee lift, trunk stability push up, and trunk rotation stability. Three professionals score the student's scores, take the average value as the final score of the student, and then calculate the average value of the class.

RESULTS

Research results of sports risks in table tennis teaching

As shown in Figure 1, the table tennis injury site analysis in the investigation and study. It can be seen from the figure that there are 3 students with shoulder and neck injuries, accounting for 6.383%; Four students had wrist injuries, accounting for 8.511%; Eight students had elbow injuries, accounting for 17.021%; There were 4 students with waist injuries, accounting for 8.511%; There were 8 students with knee joint injuries, accounting for 17.021%; There were 17 students with ankle injuries, accounting for 36.170%.

Figure 2 shows the analysis of sports injuries in table tennis teaching. As can be seen from the picture, 26 students were slightly unwell, accounting for 55.319%; 20 students with minor injuries needed medical treatment, accounting for 42.553%; One student was seriously injured, accounting for 2.128%. Through interviews with physical education teachers and students, we can also know that most of the students themselves do not have a good foundation in table tennis, so the intensity of

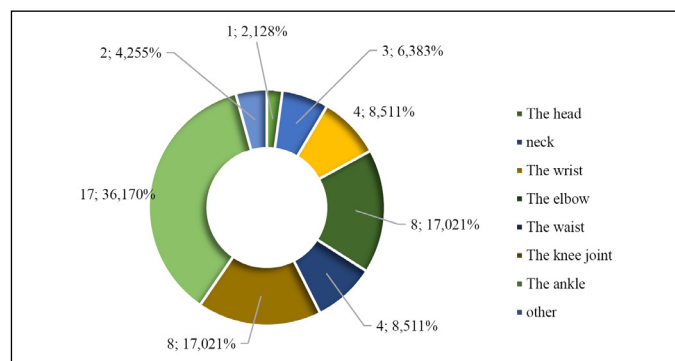


Figure 1. Analysis of the Sports Injuries in Table Tennis Teaching.

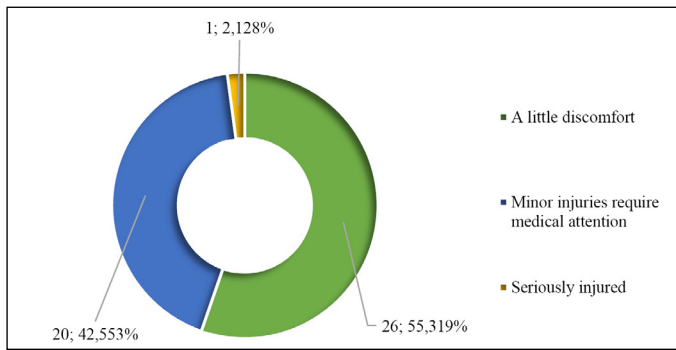


Figure 2. Analysis of sports injuries in table tennis teaching.

sports is far less than that of professional table tennis players, and their sports injuries are also limited. Most of the students only have joint and muscle strains, sprains, etc., which will not have a great impact on their health. Some students can improve their physical condition by simply stopping their movements when they feel uncomfortable due to sports injuries and walking around the field to recover under the guidance of physical education teachers. They can recover after a period of rest. There are also some students who have joint dislocation or strain injury. They need to go to the hospital for some bone setting massage and other methods. They can be cured with the help of medical treatment of bruises and injuries, almost without leaving sequelae. Only in a few cases will students suffer serious injuries, even fractures, which will affect their health and quality of life during this period.

Effect of prevention training program on reducing sports risk

In this section, we comprehensively analyzed the FMS test results of the two groups of students before and after the exercise, as shown in Table 2 and Table 3.

It can be seen from Table 2 that before the experiment, there was little difference between the one-way scores of students in the experimental class and those in the control class, thus reducing the impact of students' own performance on the experimental results. From the overall numerical results, it can be seen that before the experiment, the students in the two elective classes had poor foundations and relatively low scores, especially the stability of the trunk, which was easy to cause teaching risks in the teaching process.

It can be seen from Table 3 that the FMS test of the two groups of students has been greatly improved before and after the sports training. The squat score of the experimental class increased from (1.73 ± 0.4476) (points) to (2.11 ± 0.3382) (points), the hurdle step score increased from (1.99 ± 0.5141) (points) to (2.30 ± 0.4746) (points), the straight lunge score increased from (2.22 ± 0.5479) (points) to (2.54 ± 0.5276) (points), the shoulder flexibility score increased from (2.60 ± 0.6353) (points) to (2.85 ± 0.3484) (points), The score of active straight knee lift increased from (2.18 ± 0.6167) (points) to (2.62 ± 0.5073) (points), the score of trunk stability push up increased from (1.58 ± 0.7407) (points) to (1.84 ± 0.7610) (points), and the score of trunk rotation stability increased from (1.68 ± 0.4746) (points) to (2.05 ± 0.2472) (points). The squat score of the control class increased from (1.87 ± 0.6353) (points) to (1.93 ± 0.5841) (points), the hurdle step score increased from (1.79 ± 0.5769) (points) to (1.92 ± 0.4973) (points), the straight lunge score increased from (1.93 ± 0.7356) (points) to (2.05 ± 0.6437) (points), the shoulder flexibility score increased from (2.62 ± 0.7356) (points) to (2.68 ± 0.6130) (points), The score of active straight knee lift increased from (2.04 ± 0.5636) (points) to (2.11 ± 0.4943) (points), the score of trunk stability push up increased from (1.18 ± 0.4099) (points) to (1.30 ± 0.4919) (points), and the score of trunk rotation stability increased from (1.79 ± 0.4611) (points) to (2.05 ± 0.0031) (points).

Table 2. Analysis of FMS Test Results of Two Groups of Students before Sports Training.

Essential information	Before the experiment of the experimental class	Before the experiment of the control class	P value
Squat	1.73±0.4476	1.87±0.6353	0.5256
Hurdle step	1.99±0.5141	1.79±0.5769	0.2115
Straight Lunge	2.22±0.5479	1.93±0.7356	0.2571
Shoulder flexibility	2.60±0.6353	2.62±0.7356	1.0247
Active straight knee lifting	2.18±0.6167	2.04±0.5636	0.7649
Torso stability push ups	1.58±0.7407	1.18±0.4099	0.0801
Torso rotation stability	1.68±0.4746	1.79±0.4611	0.5734

Table 3. Analysis of FMS Test Results of Two Groups of Students after Sports Training.

Essential information	Before the experiment of the experimental class	Before the experiment of the control class	P value
Squat	2.11±0.3382	1.93±0.5841	0.0294
Hurdle step	2.30±0.4746	1.92±0.4973	0.0174
Straight Lunge	2.54±0.5276	2.05±0.6437	0.0198
Shoulder flexibility	2.85±0.3484	2.68±0.6130	0.2941
Active straight knee lifting	2.62±0.5073	2.11±0.4943	0.0209
Torso stability push ups	1.84±0.7610	1.30±0.4919	0.0316
Torso rotation stability	2.05±0.2472	2.05±0.0031	0.3292

DISCUSSION

Sports risks in table tennis teaching

The main sports risks in table tennis teaching can be divided into the following reasons. The first is the choice of teaching site. Teaching table tennis in a field with too much or too little friction is likely to cause students to slip and fall during sports. In addition, if the space of the sports ground is too narrow, it also greatly increases the probability of sports risk. Secondly, before the beginning of the sports process, students lack sufficient warm-up activities, which may cause various sports injuries. The main function of the warm-up activity is to open up the physical activity, so that their own state can reach the standard of participating in sports. Lack of warm up activities or insufficient warm up activities are likely to cause strain and sprain of soft tissues such as joints and ligaments of the body. Excessive exercise intensity is also part of the reason for sports risk. In the teaching process, once students continue to exercise in the environment with excessive exercise intensity, they may also cause various sports risks due to exhaustion. The students' technical movements are not standardized, which may cause various joint injuries. Irregular technical actions will lead to the wrong starting point. Once some soft tissues of the body exert too much force, it is likely to cause some serious tissue strain. Lack of necessary sports protective equipment is also part of the reason for sports risks. Sports protective equipment can give students some protection. Without the protection of protective equipment, the safety during sports will be greatly reduced. As the student group is in the growth stage, the sense of self-protection is not yet mature and lacks the sense of self-protection, which is the main reason why the student group has various sports injuries in sports. The physical quality of student groups varies from person to person. Under the same exercise intensity, the probability of sports risk will increase for students with poor physical quality.

Table tennis teaching risk prevention measures

By analyzing the causes of various sports risks in table tennis teaching, we can get some effective preventive measures. According to these reasons, teachers should attach great importance to and improve problems in teaching. It can effectively reduce the probability of various sports risks in the learning process of table tennis. First of all, colleges and universities should build professional table tennis teaching venues. All teaching venues

can create a safe sports environment for students. Effectively reduce various sports risks during sports. Secondly, teachers should guide professional warm-up activities when students play table tennis. Let the students turn on their physical activity by warming up. The flexibility and agility of the body meet the standard of participating in sports. During the warm-up activity, teachers should emphasize the importance of the warm-up activity. In the teaching process, teachers should guide students to choose the exercise intensity suitable for their physical conditions. It can effectively avoid the exercise of college students in the state of fatigue due to excessive exercise intensity. Teachers should standardize the use of students' technical actions. Avoid all kinds of soft tissue injuries and tissue strain caused by incorrect force generating points due to non-standard technical actions.

CONCLUSION

There have been many problems in the elective course of physical education for non physical education majors in colleges and universities.

First of all, students do not pay attention to psychology. Many non sports majors believe that sports is just a relaxation and entertainment activity, and the sports effect will only affect the course results. Therefore, they do not pay attention to physical education, and they are completely relaxed. Only when they are interested in physical education can they seriously study and train. This kind of mentality has affected the teaching effect of physical education curriculum, and has also brought high sports risks. Therefore, this paper takes the stage of sports preparation training as the key research object. The research results show that careful warm-up activities before sports can better reduce the sports risks in the teaching process of table tennis, prevent students from joint injuries and muscle strains caused by excessive excitement, and create a better and safer teaching environment for students.

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REFERENCES

1. Ren H, Wang D. Optimization algorithm of college table tennis teaching quality based on big data. *Advances in Educational Technology and Psychology*. 2021;5(4):170-7.
2. Luo S, Niu J, Zheng P, Jing Z. Application of minimum error entropy unscented Kalman filter in table tennis trajectory prediction. *PLoS One*. 2022;17(9):e0269257.
3. Naderi A, Zagatto AM, Akbari F, Sakinpoor A. Body composition and lipid profile of regular recreational table tennis participants: a cross-sectional study of older adult men. *Sport Sci Health*. 2018;14(2):265-74.
4. Mülling K, Kober J, Kroemer O, Peters J. Learning to select and generalize striking movements in robot table tennis. *Int J Robot Res*. 2013;32(3):263-79.
5. Ren H, Wang D. Optimization algorithm of college table tennis teaching quality based on big data. *Advances in Educational Technology and Psychology*. 2021;5(4):170-7.
6. Jayanthi NA, Dugas LR. The risks of sports specialization in the adolescent female athlete. *Strength Cond J*. 2017;39(2):20-6.
7. Michalski SC, Szpak A, Saredakis D, Ross T, Billingham M, Loetscher T. Getting your game on: Using virtual reality to improve real table tennis skills. *PLoS One*. 2019;14(9):e0222351.