

PREVENTION OF SPORTS INJURIES DURING PHYSICAL TRAINING OF VOLLEYBALL PLAYERS



ORIGINAL ARTICLE
ARTIGO ORIGINAL
ARTÍCULO ORIGINAL

PREVENÇÃO DE LESÕES ESPORTIVAS DURANTE O TREINAMENTO FÍSICO DOS JOGADORES DE VÔLEI

PREVENCIÓN DE LESIONES DEPORTIVAS DURANTE EL ENTRENAMIENTO FÍSICO DE JUGADORES DE VOLEIBOL

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ABSTRACT

Introduction: Volleyball is a popular sport among Chinese college students. Almost all professional sports colleges and universities have set up volleyball majors courses. To improve the basic physical fitness of volleyball players, it is necessary to strengthen their physical training. **Objective:** Analyze the causes and types of sports injuries of volleyball players in colleges, formulating countermeasures for preventive training of volleyball players. **Methods:** The sports injuries of 38 volleyball players at a university were investigated, the physical training factors that caused injuries were analyzed, and the need to build an injury-prevention physical training system was discussed. Injury prevention physical training was presented to effectively prevent sports injuries. **Results:** The common sports injuries of college volleyball athletes were mainly ligament injuries, knee joint injuries, patella cartilage injuries, and lumbar spine injuries. **Conclusion:** Preventive physical training can effectively prevent sports injuries among college volleyball athletes, reduce the incidence of injury to a controlled extent, and at the same time extend the athletes' sports trajectory as far as possible beyond their efforts to improve their ultimate sports performance. **Level of evidence II; Therapeutic studies - investigation of treatment outcomes.**

Keywords: Physical Education and Training; Volleyball; Sports Injuries.

RESUMO

Introdução: O vôlei é um esporte muito apreciado pelos estudantes universitários chineses. Quase todas as faculdades e universidades esportivas profissionais criaram cursos superiores de voleibol. Para melhorar a aptidão física de base dos jogadores de voleibol, é necessário fortalecer seu treinamento físico. **Objetivo:** Analisar as causas e os tipos de lesões esportivas dos jogadores de vôlei nas faculdades, formulando contramedidas para o treinamento preventivo dos jogadores de vôlei. **Métodos:** Foram investigadas as lesões esportivas de 38 jogadores de vôlei de uma universidade, analisados os fatores do treinamento físico que causaram lesões, e discutida a necessidade de construir um sistema de treinamento físico de prevenção às lesões. O treinamento físico de prevenção de lesões foi apresentado para prevenir efetivamente as lesões esportivas. **Resultados:** As lesões esportivas comuns dos atletas de vôlei universitários foram principalmente lesões ligamentares, lesões nas articulações dos joelhos, lesões na cartilagem da rótula e lesões na coluna lombar. **Conclusão:** O treinamento físico preventivo pode efetivamente prevenir lesões esportivas entre os atletas de voleibol universitário, reduzir a incidência de lesões a uma extensão controlada e, ao mesmo tempo, estender ao máximo a trajetória esportiva dos atletas além dos esforços para melhorar seu desempenho esportivo final. **Nível de evidência II; Estudos terapêuticos - investigação dos resultados do tratamento.**

Descritores: Educação Física e Treinamento; Voleibol; Lesões Esportivas.

RESUMEN

Introducción: El voleibol es un deporte popular entre los estudiantes universitarios chinos. Casi todas las facultades y universidades deportivas profesionales han creado cursos de especialización en voleibol. Para mejorar la forma física básica de los jugadores de voleibol, es necesario reforzar su entrenamiento físico. **Objetivo:** Analizar las causas y los tipos de lesiones deportivas de los jugadores de voleibol en las universidades, formulando contramedidas para el entrenamiento preventivo de los jugadores de voleibol. **Métodos:** Se investigaron las lesiones deportivas de 38 jugadores de voleibol de una universidad, se analizaron los factores del entrenamiento físico que causaban lesiones y se discutió la necesidad de crear un sistema de entrenamiento físico para la prevención de lesiones. Se presentó un entrenamiento físico de prevención de lesiones para prevenir eficazmente las lesiones deportivas. **Resultados:** Las lesiones deportivas comunes de los atletas universitarios de voleibol fueron principalmente lesiones de ligamentos, lesiones de la articulación de la rodilla, lesiones del cartílago rotuliano y lesiones de la columna lumbar. **Conclusión:** El entrenamiento físico preventivo puede evitar eficazmente las lesiones deportivas entre los atletas universitarios de voleibol, reducir de forma controlada la incidencia de lesiones y, al mismo tiempo, ampliar al máximo la trayectoria deportiva de los atletas más allá de los esfuerzos por mejorar su rendimiento deportivo final. **Nivel de evidencia II; Estudios terapéuticos - investigación de los resultados del tratamiento.**

Descriptor: Educación y Entrenamiento Físico; Voleibol; Lesiones en Deportes.



INTRODUCTION

Nowadays, with the development of volleyball all over the world, the requirements for the competitive level of volleyball players are becoming higher and higher.¹ If you want to have a foothold in the modern high-level volleyball, you must require athletes to be strict with their own quality, and have higher specific physical strength and technology than other athletes, so as to adapt to the high intensity and time limit of volleyball.² Volleyball is a competitive sport, which requires high physical quality of athletes.³ In order to achieve more excellent results, athletes need a lot of training to improve their competitive level.⁴ In addition, the volleyball field is large, which requires the athletes to run back and forth in the game, with a huge range of motion, especially some squatting, tumbling and other movements, which is a severe test for the athletes' knee joints. In the career of an athlete, health is more important than ability. The knee joint is the most important organization in an athlete's body and is very vulnerable to injury. This is the common problem in training and competition.⁵ The factors that occurred are related to the type of sports, technology and tactics, basic physical sports, training and competition facilities environment, and psychological factors. Volleyball is one of the programs where high-intensity confrontation and overuse of joints, muscles and ligaments cause high rates of injury, thus increasing the risk of injury during training and competition during.⁶ Injury is already a pressing problem in volleyball.⁷ Injury prevention physical training is a combination of rehabilitation physical training⁸ basic physical training, special physical training and special technical and tactical needs. It is suitable for athletes under the supervision of different special physical training programs, injuries and functional states, so as to reduce the risk of injury in the competitive state. It combines physical routine training of physical fitness in the.⁹ It is mainly used to provide the basis for the athletes to resume the training after the injury, and it is volleyball players rehabilitation, basic physical and special physical status, discusses the operation mechanism of volleyball training, analyzes or prolong the sports life of.¹⁰

Research object and method

Subjects of study

The study subjects were 38 undergraduate male volleyball athletes from a university of 2019, all of whom had national second-level volleyball players and no cardiovascular disease and family history.

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 Zhongyuan Institute of Science and Technology, China (NO. 2022009)

Research Method

Through consulting domestic and foreign literature and books, search and organize literature related to this research. This paper summarizes the common emergency measures injury rehabilitation training, searches and collects related volleyball events and physical characteristics, physical training, evaluation of athletes' physical fitness methods, training methods, training evaluation load monitoring, rehabilitation training, sports injury prevention, physical training, scientific training and scientific research scientific research scientific system. On the basis of a large number of reading and analysis, the collected theories and data collected by the collection practices are classified in order to understand the development and current situation of volleyball players' physical training and provide a basis for combining theory and reality for China's research.

For the relevant problems of athletes in sports injury rehabilitation training, list the interview outline, interview relevant experts, collect relevant content in line with the investigation theme, and obtain valuable opinions and suggestions.

The 2019 undergraduate men's volleyball athletes were selected as experimental subjects, and injury preventive physical training was added on the basis of traditional physical training, and 16 weeks of injury prevention physical training was carried out twice a week.

The data from this study were processed and analyzed using SPSS 20 for Windows software descriptively, statistically, and the values were expressed as averages or percentages. The matched T test was used for the comparison of before and after results, with $P < 0.05$ being evident and $P < 0.01$ being volleyball special athletes were analyzed, and the injury prevention physical training was planned.

Experimental result and analysis

Characteristic analysis of volleyball sports injuries

During the experiment, the injuries of the 2019 undergraduate male volleyball special athletes were counted, and the cumulative incidence rate was 99.3%. The injuries are shown in Table 1.

From the research data results, it is known that most of the injuries of the 2019 undergraduate male volleyball athletes are acute, for improving athletes' skills, tactical level and comprehensive strength. From the survey study, it was shown that 38 male volleyball athletes had sports injuries due to body position attributes, 35 cases of acute injuries, accounting for 73%, of which ankle injuries accounted for the vast majority, and 24 cases accounted for 68%; Knee injuries were followed by 5 cases accounting for 14%; 3 cases of spinal injuries accounted for 9%; 2 cases of shoulder injuries, accounting for 6%; Wrist injuries accounted for 1 case or 3%. Chronic injuries occurred in 75% of the spine in 9 cases; There are 3 cases of knee joints, accounting for 25%. From too many cases of chronic injuries, it is found that from an early age, the irregular training methods, not to mention the training to prevent injuries, and only pursue technical sports performance are the main reasons for the greatest damage to the body of current athletes.

Volleyball is one of the ball games. The court is rectangular, with a high net in the middle. Each side (six people from each side) occupies one side of the court, and players use their hands to hit the ball from the net. The ball used in volleyball is made of sheepskin or artificial leather and rubber, which is similar in size to a football. Volleyball originated in the United States. It was invented.

Physical training occupies an important position in volleyball training and requires attention from all parties. As far as the training concept is concerned, it is necessary to carefully study the theoretical knowledge covered by physical training, and regularly provide some physical training courses to strengthen physical training. Through practical activities and hands-on experience of effective physical training, for athletes, they can strengthen the ideological attention to physical training, and carry out volleyball-specific physical training courses, so that athletes can have a deeper understanding of the meaning of physical training, so that physical training can play a more active volleyball special role, so that they still maintain sufficient physical fitness in fierce volleyball games. This is shown in Figure 1.

In college volleyball, teachers should not only emphasize daily training skills, but also teach students relevant skills and knowledge to prevent sports injuries, and guide them to protect themselves. In the early stage of volleyball training or competition, warm up activities should be done to better participate in volleyball, activate joints, buffer the body, and increase the flexibility and strength of muscles to protect joints. Athletes should choose appropriate preparation activities according to the competition situation, and the exercise should be moderate. The instructor will arrange students to carry out muscle stretching and strength training, and wear wrist protection, knee protection and other protective equipment. Standardize volleyball movements

Table 1. Injuries of 2019 undergraduate men's volleyball athletes of Shenyang Institute of Physical Education.

	Foot and ankle	Knee	Wrist	Spine	Lower extremities
Acute	8.48	18.25	2	5.67	
Chronic		2.67		5.27	5

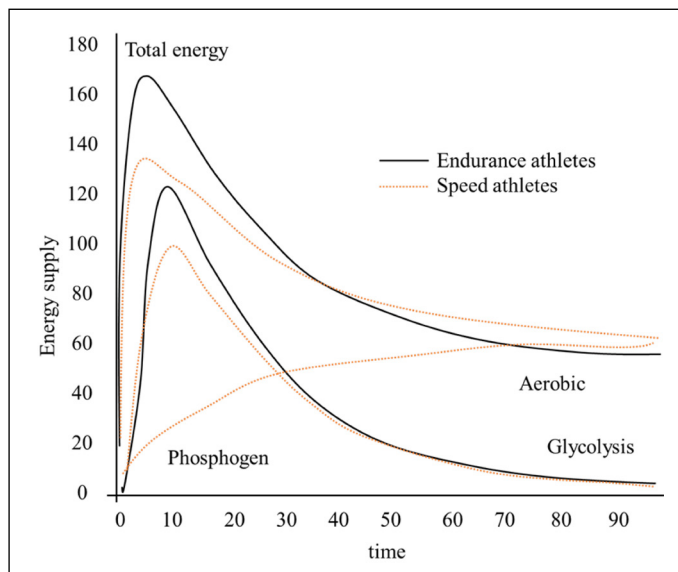


Figure 1. Characteristics of energy supply of athletes during competition.

If the actions in volleyball training or competition are standardized enough, sports injuries will be reduced. In daily training, the coach should correct students' wrong actions in time, and the training amount and intensity should be appropriate. No matter in daily training or competition, athletes should maintain standardized actions. They should not neglect the standardization of actions because of the pursuit of reaction speed. They should follow correct technical requirements and rules for serving, spiking, blocking and taking off, so as to avoid sports injuries due to non-standard actions. Like other sports, volleyball requires athletes to have excellent physical quality. Athletes should strengthen training and maintain good physical fitness at all times. Focus on training the ligaments around the ankle joint and knee joint or conduct tendon strength training to make key parts of the body more powerful and flexible. In the process of routine training, we should also learn to prevent and protect the vulnerable parts, and carry out more targeted training to reduce the sudden injuries caused by volleyball

The characteristics of physical training of volleyball sports injuries

Training needs to be designed according to the characteristics of the project and the orientation of the goal, how to meet the needs, need to refer to the academic theory, practice and teaching experience accumulation, to strictly control the implementation of training intensity and training policy. For high-intensity speed endurance performance is the characteristics of the sport, the overall strength training plan can help men's volleyball special athletes maintain their physical condition and good sports performance in training and events, but in the actual training process, it is found that the practice of squat and bench press seems to be an absolute item for athletes as training and more frequent, the physical training arrangement of men's volleyball special athletes is formulated, and explosive strength and speed strength should be fully implemented. The maximum strength and continuous high-intensity collision force of the muscles must be arranged more and more perfectly to adjust to the actual situation of the game, the core force is the body engine, and the training plan that combines with the strength of the limbs to form a power chain is important.

The establishment of basic evaluation indicators of physical fitness is meaningful, and there should be five indicators of basic athletic ability, plus the special needs of sports projects, and the purpose of setting evaluation indicators is to understand the current situation of athletes. The items for expert assessment and evaluation indicators are shown in Table 2.

Table 2. Evaluation indicator items.

	Percentage
Height	43.2%
Body weight	50.4%
Ketolai Index	20.0%
Body fat	28.8%
Body parts dimension	23.2%
Spirometry	24%
Spirometry Body Mass Index	9.6%
Oxygen operation system	6.4%
Endocrine System	3.2%
Strength quality	43.2%
Speed Quality	50.4%
Endurance qualities	49.6%
Sensitive qualities	30.4%
Flexibility qualities	22.4%
Other indicators	0.80%

Based on the results of the above table research, it is known that the general establishment of evaluation indicators and methods is still in the basic stage, and the relative is also related to the characteristics of the sport, but the relative problem also arises, from the highest statistics, the weight and speed quality is only 50.4%, which shows that there are still nearly half of the coaches before training without any physical and basic athletic ability assessment of athletes, in addition to height and weight, The five indicators of the basic athletic ability of the body in the flexibility value is only 22.40%, flexibility is the basic quality of the extension and coordination of body movements, the angle and dimension of the action is the key to affect sports performance, but also the athlete's joints and muscles to achieve balance and coordination needs, in such a lack of attention, the probability of injury is naturally high, which is worth our attention and consideration.

CONCLUSIONS

Volleyball is a high-intensity type of speed endurance hypoxic exercise. In the study, it was found that the 2019 undergraduate men's volleyball special athletes of Shenyang Sports Institute had strong ability to exercise anaerobic in short distance and short time, but the ability to aerobic for a long time also needed to be improved. From the observation of athletes' body shape and characteristics, it is known that obvious differences in knee flexor strength and extensor strength will be the main factors affecting the stability of the knee joint, and it is also a potential cause of the probability of sports injuries, which needs to be improved in training. In addition, athletes' aerobic, anaerobic and high-intensity hypoxic endurance needs to be further improved. Improving anaerobic capacity not only helps athletes improve their special athletic abilities, but also reduces the level of fatigue of athletes during high-intensity training and reduces the risk of sports injuries. Aerobic capacity is the basis of anaerobic capacity. Good aerobic capacity can accelerate the clearance of lactic acid, help athletes recover faster, and reduce the risk of injury. Volleyball players' high-intensity exercise, the heart burden is very large, long-term training may have a negative impact on heart function, aerobic training can help volleyball players improve cardiovascular function, how to maintain a high level of competitive state of athletes, to prolong sports career and reduce the risk of injury has a positive effect.

ACKNOWLEDGEMENT

This study is funded by Key Scientific Research Project of Colleges and Universities in Henan Province, NO. 22A630036

The author declare no potential conflict of interest related to this article

REFERENCES

1. Nunes ACCA, Cattuzzo MT, Faigenbaum AD, Mortatti AL. Effects of integrative neuromuscular training and detraining on countermovement jump performance in youth volleyball players. *J Strength Cond Res.* 2021;35(8):2242-7.
2. Zarei M, Soltani Z, Hosseinzadeh M. Effect of a proprioceptive balance board training program on functional and neuromotor performance in volleyball players predisposed to musculoskeletal injuries. *Sport Sci Health.* 2022;18:975-82.
3. Sun W, Meng K, Wang A. Research on the Effect of BBR Delay Detection Interval in TCP Transmission Competition on Heterogeneous Wireless Networks. In: *International Conference on Wireless Algorithms, Systems, and Applications*; 2022 nov 24-26; Dalian, China.
4. Colclough A, Munro AG, Herrington LC, McMahon JJ, Comfort P. The effects of a four week jump-training program on frontal plane projection angle in female gymnasts. *Phys Ther Sport.* 2018;30:29-33.
5. Kasińska Z, Urbański PK, Tasiemski T. Sports Injuries among Players of the Polish National Team in Amputee Football in the Annual Training Cycle. *J Hum Kinet.* 2022;81(1):211-9.
6. Hadzovic M, Ilic P, Lalic A, Stankovic M. The effects of a knee joint injury prevention program on young female basketball players: a systematic review. *J Anthr Sport Phys Educ.* 2020;4(1):51-6.
7. Timoteo TF, Debien PB, Miloski B, Werneck FZ, Gabbett T, Bara MG Filho, et al. Influence of workload and recovery on injuries in elite male volleyball players. *J Strength Cond Re.* 2021;35(3):791-6.
8. Zhou Y, Chen CT, Muggleton NG. The effects of visual training on sports skill in volleyball players. *Prog Brain Res.* 2020;253:201-27.
9. Fleckenstein J, Gerten S, Banzer W. Preventive Effects of a Single Bout of Exercise on Memory and Attention following One Night of Sleep Loss in Sports Students: Results of a Randomized Controlled Study. *Behav Sci (Basel).* 2022;12(10):350.
10. Shao X, Ye W. Preventive Effect of Egg Membrane Protein Supplementation on Dragon Boat Sports Injury under the Monitoring of Artificial Intelligence and Big Data. *Mobile Information Systems*, 2021, 2021: 1-12.