

Common Injuries and countermeasures in professional martial arts routine athletes

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Abstract: Martial arts routine athletes often suffer from sports injuries during daily training and competitions due to insufficient warm-up activities, incorrect technical movements, and other various reasons, which seriously affect the athletes' training effects and competitive performance. By using interview methods and literature survey methods to analyze common sports injuries in martial arts routine athletes and propose corresponding preventive measures, the aim is to reduce the occurrence of sports injuries, which can provide reference for coaches and athletes in daily training, and promote the continuous progress and development of the technical level of martial arts routine athletes.

Keywords: Martial Arts Routines, Professional Athletes, Sports Injuries, Prevention

1. Introduction

Martial arts routines are a type of whole-body sport that demands a particularly high level of speed, explosive power, and coordination [1]. They are one of the important forms of Chinese martial arts [2], a historical epitome of Chinese traditional martial arts culture, and a journey of martial arts aesthetics between performers and spectators [3]. As martial arts continue to evolve towards being "difficult, beautiful, high, and new," especially under the guidance of the new rules for martial arts routines implemented after 2003, the requirement to perform designated movements and to innovate high-difficulty movements has long been a practical issue that martial arts athletes must face. This has raised higher demands on the athletes' specialized qualities and technical skills and has also increased the possibility of sports injuries [4]. Sports injuries refer to various injuries that occur in the process of physical fitness and competitive sports, which fall within the scope of orthopedics in Chinese medicine and are also an important part of sports medicine [5]. Relevant data show that 70% of professional martial arts routine athletes are injured while practicing "designated movements." Frequent sports injuries not only prevent athletes from training and competing normally but also affect their physical health and sports ability, leading to a forced reduction in their sports life span [6].

This article provides a statistical survey of sports injuries among professional martial arts routine athletes, looking at the types of injuries, vulnerable parts, and their causes. It comprehensively analyzes and proposes effective preventive measures for sports injuries and strategies for dealing with them when they occur. This information serves as a reference for the daily training, self-improvement, and competitive performance of professional martial arts routine athletes, as well as for the arrangement and guidance of coaches, and the active cooperation of team doctors and related teams.

2. Subjects and research methods

2.1. Subjects of the survey

Thirty martial arts routine athletes from the Martial Arts Sports Management Center were surveyed, including 6 elite athletes, 10 first-level athletes, and 14 second-level athletes, aged between 12 and 28 years old, with a sports career span of 4 to 16 years. Auxiliary subjects of the survey included professional coaches and team doctors from the Martial Arts Sports Management Center, totaling 8 individuals.

2.2. Research methods

2.2.1. Literature review method

By searching, collecting, and organizing a large number of relevant journals, literature, and reports on martial arts routine sports injuries through CNKI (China National Knowledge Infrastructure), this study is provided with an important theoretical basis.

2.2.2. Interview method

The method fully utilizes the gaps in the daily training and competition schedules of professional martial arts routine athletes for face-to-face communication, inquiring about their physical conditions and the status of key body parts in a timely manner, in order to gain an in-depth understanding of the athletes' personal experiences.

Table 1: Survey of Athletic Level Statistics for Martial Arts Routine Athletes

	Elite Athletes	First-Class Athletes	Second-Class Athletes
Number	6	10	14
Percentage	20%	33%	47%

3. Survey results and analysis

3.1. Survey results

The survey results on sports injuries among outstanding martial arts routine athletes are shown in Table 2. All 30 athletes have experienced 1-3 injuries, among which joint injuries, lumbar muscle strain, ligament injuries, and external injuries are the top four with higher proportions of injuries.

Table 2: Survey Results of Martial Arts Routine Athletes from the Martial Arts Sports Management Center

Injury Type	Elite Athletes	First-Class Athletes	Second-Class Athletes	Total Number	Percentage
Ligament Injury	2	2	1	5	16.67%
Muscle Injury	1	1	2	4	13.33%
Joint Injury	3	4	2	9	30%
Lumbar Strain	2	3	2	7	23.33%
Soft Tissue Contusion	1	2	1	4	13.33%
Fracture	1	1	0	2	6.67%
External Injury	1	2	2	5	16.67%

3.2. Analysis

The impact of sports injuries on athletes, coaches, and their teams is multifaceted. Sports injuries can not only prevent athletes at a high level of training from participating in training or competitions (with severe cases even resulting in disability or loss of life), but they can also affect individuals psychologically, hindering the normal conduct of sports activities [7].

3.2.1. Muscle, Tendon, and ligament injuries

In daily training and competitions of martial arts routines, strains of muscles and tendons can occur, and even ligament ruptures. Since martial arts movements require vigorous muscle contractions (extensions), muscle strains can occur if the force exceeds the muscle's bearing capacity [9]. The survey results show that professional athletes with muscle injuries account for 13.33% of the total number of surveyed individuals. Tendon strains are injuries that occur when muscles or tendons are excessively active under conditions of fatigue or overload, and professional athletes with induced tendon strains due to prolonged lumbar muscle strain without rest and treatment account for 23.33%. Acute ligament injuries such as tears of the medial and

lateral collateral ligaments and anterior and posterior cruciate ligaments of the knee are common in martial arts routines, with 16.67% of professional athletes having experienced ligament injuries; the minor injuries occurring at the enthesis where the tendon attaches to the bone surface are also known as enthesopathies, such as shoulder axis injuries, patellar tendon injuries, Achilles tendon injuries, etc.

3.2.2. *Articular cartilage injuries*

Patellar chondromalacia, as well as chondral diseases of the knee and ankle joints, are all categorized as articular cartilage injuries. Most articular cartilage injuries occur following an acute injury, such as the twisting of the knee joint caused by landing jumps and rotations, leading to meniscal injuries in martial arts routine athletes. In martial arts routines, most cartilage injuries are the result of chronic strain. Joint injuries are the most common type of injury among professional martial arts routine athletes, accounting for 30% of the total number of individuals surveyed. For example, patellar chondromalacia, commonly seen in martial arts routines, is often caused by repeated running and jumping strains, especially in adolescents whose strength and endurance have not yet fully developed.

3.2.3. *Fatigue damage to bone tissue*

Fatigue periostitis and stress fractures are common types of fatigue damage to bone tissue, often occurring in the tibia, fibula, metatarsal bones, and vertebral endplates. Professional athletes with fractures caused by long-term bone tissue fatigue account for 6.67% of this survey. If these injuries are detected in time and training focus is adjusted to reduce local strain, most can heal on their own. Osteochondritis is another form of bone fatigue damage, which is more common in adolescent martial arts routine athletes, such as the commonly seen Osgood-Schlatter disease of the tibial tuberosity and humeral epicondyle apophysitis.

3.2.4. *Joint Instability*

Joint stability relies on the mechanical structure of the bones that make up the joint, the tightness of the ligaments, and the coordination of muscle strength. Professional athletes with joint instability caused by multiple soft tissue contusions account for 13.33% of this survey. Taking the knee joint as an example, injuries to the collateral and cruciate ligaments can lead to knee joint instability. Repeated sprains of the ankle joint can also result in laxity and instability of the ankle.

4. Discussion

4.1. Classification of sports injuries in martial arts routines

Based on the survey results, the sports injuries of professional martial arts routine athletes can be classified according to the degree of injury, disease course, and training characteristics:

4.1.1. *Classification by degree of injury*

Mild - After being injured, one can continue with the training plan as normal without exacerbating the condition; Moderate - After being injured, training is possible but it is necessary to cease or reduce activities in the affected area; Severe - Completely unable to train, rest and treatment are required. [8]

4.1.2. *Categorized by disease course*

They can be divided into two major categories: acute sports injuries and chronic sports injuries.

Acute sports injuries refer to injuries suffered suddenly due to direct or indirect violence during sports or competitions, such as fractures, tendon ruptures, and acute contusions caused by weapons like swords, spears, staffs, and sabers in martial arts routines;

Few sports injuries closely related to sports techniques are acute, while most are chronic. Chronic sports injuries can be divided into two types based on different causes: one type is overtraining or excessive physical load that leads to overuse chronic sports injuries, which occurs when training is arranged without considering the actual abilities and physical condition changes of each athlete.

4.1.3. *Classified by training characteristics*

They can be divided into two major categories: specific technical injuries and non-specific technical injuries.

Specific technical injuries occur because different sports competitive events in athletic training inevitably require athletes to bear different loads on various body parts, leading to different characteristics of injuries for specialized athletes. Since specific injuries are closely related to the technical aspects of the sports, most can heal on their own if training is stopped and athletes rest for a while. However, for professional athletes, these seemingly minor injuries, if not treated promptly, can often severely interfere with the execution of technical movements in daily training and the level of performance in competitions.

Non-specific technical injuries are considered accidental injuries. Such sports injuries require the establishment of strict rules and systems, enhanced medical supervision, and the use of safety gear. In terms of treatment and emergency response, they should be addressed quickly and promptly.

4.2. Causes and countermeasures for sports injuries in martial arts routines

Based on the survey and analysis of sports injuries among professional martial arts routine athletes, as well as the research on sports injuries by various scholars [10-12], the author believes that multiple factors should be considered, including training level, training methods, the physical and psychological conditions of athletes, and climate.

4.2.1. Insufficient training level

Firstly, the frequent occurrence of sports injuries is mostly due to an inadequate understanding and profound comprehension of physical training (including general physical training, specific technical training, strategic and tactical training, and psychological and moral character training). For instance, for any martial arts routine athlete, if the basic physical training in strength, speed, endurance, and agility is insufficient and they immediately engage in specific technical training, sports injuries will inevitably occur, and the degree of injury is closely related to time. Secondly, from a physiological perspective, the content of training in any sport is the process of establishing conditioned reflexes. If specific technical training is not emphasized to master the essentials of movements, and if the brain cortex fails to "record" the conditioned reflexes and continuity of various movements, the result will be hesitation and stiffness in movement, lack of coordination in muscles and joints, ultimately leading to sports injuries.

Countermeasures for injuries caused by insufficient training levels:

4.2.1.1. Injury prevention in martial arts: Focus on joint stability and training

The areas where martial arts routine athletes are prone to injury are the knee and ankle joints. The reason is that although these joints have better stability than the shoulder joints, they are less stable than the hip joints and rely on muscles, tendons, and ligaments for stability activities. By conducting reasonable and adequate general training, the strength of muscles and ligaments can be increased, their elasticity enhanced, and endurance and agility improved, so that the joints are less likely to be injured when they move in a stable and strong state.

4.2.1.2. Endurance and agility in martial arts safety

Training for endurance and agility is equally important and should not be overlooked. If martial arts routine athletes lack physical fitness and joint agility, they will not be able to complete specific technical movements, leading to the occurrence of sports injuries.

4.2.1.3. Cultivating athlete's mental and moral strength

The cultivation of athletes' psychological and moral qualities is also crucial. An excellent athlete must develop qualities of bravery, tenacity, hard struggle, determination, and the mindset of not being arrogant in victory or discouraged in defeat. At the same time, coaches and athletes need to gradually cultivate and improve these qualities in their daily training and life.

4.2.2. Errors in training methods

Errors in training methods include the following four aspects: not adhering to training principles, not valuing medical supervision (team doctors cannot make rational suggestions; coaches and athletes do not value the team doctor's advice), lack of protection, and defects in sports equipment and facilities.

Countermeasures for injuries caused by improper training methods:

Training principles are the experiences and lessons summarized during the training process and are very valuable "sports assets." Continuously deepen professional athletes' understanding and comprehension of training principles through warning slogans, video playback, practical summaries, educational guidance, and other means, to prevent sports injuries caused by such reasons.

Value medical supervision and strictly follow the team doctor's instructions; enhance the self-protection awareness of professional martial arts routine athletes, wear suitable training protective gear, and reasonably improve the training environment for professional athletes.

4.2.3. Fatigue

A decline in physiological function is also a sign of over-fatigue. After intense sports training without adequate rest and recovery, or due to continuous high-intensity and high-volume training, athletes may become excessively fatigued and unable to perform effectively, leading to fatigue-related injuries or accidental injuries. In theory, when the body is in a state of fatigue during overload training, the brain's inhibitory state is dominant, leading to a decrease in alertness and attention, and slower limb reactions, making accidental injuries more likely.

Countermeasures: To prevent such injuries, athletes should be prevented from continuing with various high-difficulty technical trainings immediately after intense exercise. It is important to avoid participating in high-load training while fatigued or already injured. Sufficient rest and sleep should be arranged in the sports training regimen.

4.2.4. Climatic factors

In cold and humid weather, the contractile ability, elasticity, and mechanical endurance of muscles and ligaments all decrease, making sports injuries more likely to occur.

Countermeasures: Before training, all preparatory activities should be carried out in advance to allow muscles, ligaments, and the entire body to gradually adapt after warming up.

4.3. Prevention and treatment of sports injuries in martial arts routines

The principle of giving equal importance to prevention and treatment should be adopted for sports injuries in martial arts routines. Good preventive measures are the basic guarantee to avoid sports injuries, and active treatment methods are effective ways to recover from sports injuries.

4.3.1. Prevention of sports injuries in martial arts routines

In addition to the relevant research by scholars [13-15] on methods for preventing sports injuries, the author believes that the prevention of sports injuries in martial arts routines should also focus on two main aspects: the reasonable arrangement of training plans and the correct use of physical therapy and protective gear.

A reasonable training plan means doing everything possible not to completely stop training. Stopping training not only leads to a decline in the function of the injured area, but also results in a rapid decline in overall body function over time. For instance, after a knee joint injury, if it involves the joint cavity, significant atrophy of the quadriceps can be observed within a week. Furthermore, it is necessary to decide which movements to reduce and how much to reduce them based on the mechanism of injury, location, severity, and urgency of the condition, as well as the specific anatomical characteristics of the area. Similarly, it is important to determine which exercises to add and how much to add. Increasing exercise rehabilitation training after tissue trauma is also an effective way to speed up the recovery of injured tissues, especially for chronic sports injuries.

The correct use of physical therapy and protective gear is mainly reflected in the following two aspects: The local application of various treatment methods to accelerate the recovery of damaged tissues, including ice packs, heat therapy, physiotherapy, massage, acupuncture, etc.; Athletes are not immediately stopped from training and competition after injury. Since most are minor traumas, fatigue injuries, or minor injuries, some minor injuries can continue with normal training and competition, but after injury, support straps or protective straps, protective gear, kinesiology tape should be used according to the specific situation to increase support force, reduce the load borne by movement, compress the injured area to reduce swelling, and alleviate the injury and pain.

4.3.2. Principles for the management of sports injuries in martial arts routines

4.3.2.1. Principles for the treatment of acute injuries

For severe sports injuries, immediate medical attention at a hospital is required, such as for fractures or ligament ruptures, without any casual pulling or moving to prevent further damage to blood vessels and nerves; for milder sports injuries, the PRICE protocol should be followed, which stands for Protection, Rest, Ice, Compression, and Elevation.

4.3.2.2. Principles for the treatment of chronic injuries

Reasonably adjust the training plan. After a sports injury, if conditions permit, the uninjured limbs should maintain the original training or appropriately reduce training according to the injury to prevent detraining syndrome.

Protect the injured limbs. Many sports injuries are caused by unreasonable training, resulting in chronic sports injuries. If an injury is ignored and training continues as usual, it is detrimental to the recovery of the limbs and prolongs the recovery time, seriously affecting normal training and high-level performance.

Strengthen the stability and adaptability of joints. If there is excessive protection and absolute rest after an injury, disuse atrophy of muscles, ligaments, tendons, and other soft tissues will occur, and lax soft tissues around the joint can lead to joint instability. The correct approach is to create opportunities and unleash potential for training after an injury, enabling corresponding tissues to play a compensatory and supplementary role. For example, strengthening the quadriceps and hamstring muscles through strength training can enhance the stability of the knee joint after injury to the collateral ligament; immobilization with a cast after an ankle sprain that causes ligament damage can lead to disuse atrophy of the calf muscles. Appropriate activity of the injured area can improve local blood circulation, reduce post-injury adhesion, speed up the swelling subsidence, and promote the repair of the injured tissues.

5. Suggestions

Among the 30 excellent martial arts routine athletes surveyed, sports injuries are mainly high in proportion for joint injuries, lumbar muscle strain, ligament injuries, and external injuries.

In martial arts routines, sports injuries of varying degrees in different parts of the body are caused by athletes' physical conditions and training levels, insufficient warm-up activities, not strictly following training principles, and not mastering special technical skills.

Professional martial arts routine athletes should strengthen general physical training, specific technical training, strategic and tactical training, as well as psychological and moral character training, master the essentials of movements skillfully, pay attention to relaxation and stretching after sports, enhance the understanding of sports injuries, which can to some extent prevent injuries in martial arts routines.

Start from both "prevention and treatment" perspectives to achieve "three timely actions": timely communication and discovery, timely adjustment and intervention, and timely measures and treatment. Reasonably arrange training plans according to athletes' actual physical conditions, psychological changes, environmental changes, competition schedules, and many other aspects, accurately grasp the basic knowledge of sports injuries, strengthen medical supervision, organize athletes to learn about injury protection, and minimize the risk of sports injuries.

6. Conclusion

This paper delves into the issue of sports injuries faced by martial arts routine athletes during training and competitions, providing detailed statistics and analysis through literature review and interviews with 30 martial artists of various levels. The study indicates that due to inadequate warm-up activities and incorrect technical movements, martial arts routine athletes frequently suffer from sports injuries, which significantly impact their training effectiveness and competitive performance.

The survey results show that joint injuries, lumbar muscle strain, ligament injuries, and external injuries are the most common types, accounting for 30%, 23.33%, 16.67%, and 16.67% of total injuries, respectively. The paper further analyzes the causes of injuries, including insufficient training levels, errors in training methods, over-fatigue, and climatic factors, and proposes corresponding prevention and treatment strategies.

Preventive measures emphasize the importance of arranging training plans reasonably and using physical therapy and protective gear correctly. Treatment principles are based on the characteristics of acute and chronic injuries, proposing the PRICE principle and specific methods such as adjusting training plans sensibly. The paper concludes with several recommendations, including strengthening general physical training, specialized technical training, and psychological and moral character training, as well as emphasizing relaxation and stretching after sports to enhance awareness and prevention capabilities for sports injuries.

In summary, this paper offers valuable reference information for martial arts routine athletes, coaches, and related teams to reduce the incidence of sports injuries, promote continuous improvement in athletes' technical levels, and extend their sports careers. By implementing effective prevention and treatment strategies, the risk of sports injuries can be minimized to the greatest extent, ensuring the health and performance of athletes.

7. References

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