Sports Injury Prevention and Rehabilitation in Physical Training

Guanbo Feng
Zhoukou Vocational and Technical College, Zhoukou, China

Abstract: Sports injury is an important problem in physical training, Prevention and rehabilitation of sports injuries is essential to guarantee the health of athletes and improve the training effect, This paper aims to explore the prevention and rehabilitation strategies of sports injuries in physical training, By analyzing the type of sports injuries, the mechanism of occurrence, and the risk factors, The principles and methods of rehabilitation after a sports injury are also discussed, Emphasizing the importance of scientific rehabilitation training in promoting casualty recovery and return to the field, Reasonable training plan, good physical fitness, correct sports skills, and proper rehabilitation training are the key to the prevention and treatment of sports injuries.

Keywords: Physical Training; Sports Injury; Prevention; Rehabilitation; Training Plan

1. Introduction

Physical training is an important means to improve the competitive ability of athletes, but the occurrence of sports injury often affect the training effect and threaten the career of athletes, so how to effectively prevent sports injury in physical training and scientific rehabilitation training become urgent problem, this paper will be from the two aspects of sports injury prevention and rehabilitation, hope to provide reference and guidance for physical training.

2. The type and Occurrence Mechanism of Motor Injury

2.1 Acute Sports Injury

Acute sports injury refers to the sudden injury in the process of sports, usually due to external force or muscle, ligaments, joints and other tissues bear too much stress, this kind of injury is characterized by a sudden, obvious symptoms, often accompanied by severe pain, swelling and dysfunction, common acute sports injury including muscle strain, ligament sprain, joint dislocation and fracture, etc. Muscle strain is the most common acute motor injury, Usually occurs when muscle contraction or passive stretching presents as local pain, swelling and tenderness, Heavy cases may develop muscle spasm and loss of function, Ligament sprain mostly occur in joint sites such as ankle, knee joint, Often cause torn or broken ligaments due to excessive eversion or varus of the joint, Presented by joint swelling, pain, and limited mobility, Joint dislocation is the complete detachment of the articular surface from the normal anatomic position, Often caused by indirect violence, Pressts with joint deformity, loss of function and severe pain, Fracture is the destruction of bone continuity, Can be caused by either direct or indirect violence, Pressts with localized pain, swelling, deformity and functional impairment, The mechanism of acute motor injury is complex, It is related to the characteristics and intensity of sports and also closely related to the physical quality and skill level of athletes, Therefore, attention should be paid to the prevention of acute sports injury in physical training, Take effective measures to reduce their occurrence risk.

2.2 Chronic Sports Injury

Chronic sports injury refers to the long-term, repeated movement process gradually accumulated tissue damage, usually occurs in tendons, bones and joints, this kind of injury is characterized by hidden, mild symptoms, but long duration, and easy to recurrent, common chronic sports injuries including tendonitis, periosteitis, stress fractures and arthritis, etc. Tendinitis is chronic inflammation caused by tendons chronenduring excessive pulling forces, Often occur in the Achilles tendon, knee joint and other parts, Pressts as local pain, tenderness and functional impairment, Tendonon thickening, calcification, and rupture can occur in severe cases, Periostoitis is a chronic inflammation of the periosteum, Often caused by the long-term repeated pulling or extrusion of the periosteum, Prespresented with local pain, tenderness and

swelling, Common in the front end of the tibia, Stress fractures are minor fractures of bone under long, repeated stress, Most occur in bone stress concentration sites such as foot, tibia, Pressts as local pain, tenderness and activity restriction, Arthritis is a chronic inflammation of the articular cartilage and synovium, Can be caused by chronic excessive joint weight bearing or repeated microtrauma, Pressts with joint pain, swelling, stiffness and functional impairment, Often involve the knee joint, hip joint, etc. The occurrence mechanism of chronic sports injury is closely related to the anatomical structure characteristics, training methods and equipment conditions of athletes. In physical training, the early identification and intervention of chronic sports injury should be strengthened, and scientific training methods and rehabilitation measures should be adopted to reduce their adverse effects on athletes' health and sports performance.

3. Risk Factors for Sports Injury

3.1 Internal Factors

Age and gender is an important intrinsic factors affecting sports injury, with the growth of age, the structure and function of human tissues and organs gradually degenerative changes, such as muscle strength, joint flexibility, osteoporosis, these will increase the risk of sports injury, studies show that older athletes of sports injury incidence is significantly higher than young athletes, in addition to female athletes sports injury incidence is usually higher than men, this is related to female hormone levels, bone density and muscle strength. The physical quality of athletes is also an important internal factor affecting sports injury. Good physical quality, such as muscle strength, flexibility and coordination, can effectively reduce the occurrence of sports injury. On the contrary, athletes with poor physical quality are often more prone to muscle strain, ligament sprain and other injuries in the process of sports. Athletes previous injury history, health and psychological factors will also affect the occurrence of sports injury, such as ever sports injury athletes if not fully rehabilitation, again in high intensity training or game easy to cause the recurrence of injury, and such as excessive tension, anxiety and other bad psychological state may lead to athletes inattention, movement error, thus increase the risk of sports injury.

3.2 External Factors

Training environment is an important external factors affecting sports injury, bad training environment, such as uneven field, insufficient lighting, temperature too high or low will increase the risk of injury, such as in high temperature environment for high intensity training, athletes prone to heat stroke, heat spasm, decreased performance and injury, and as in the case of insufficient light for some of the visual sports such as ball sports, athletes are more likely to accidental collision, sprain injury. Training equipment and equipment is also an important external factors affecting sports injury, the quality of unqualified or improper training equipment will lead to acute or chronic injury, such as hardness is not enough gymnastics mat will increase the risk of concussion, fracture, injury, shoes can lead to athletes plantar fasciitis, Achilles tendonitis and other chronic injury. Also the characteristics of sports, training intensity and frequency are also the important external factors affecting sports injury, some high-risk sports such as football, ice hockey, etc., the injury rate is usually higher than other sports, and excessive training load such as continuous high intensity training or frequent games will increase the risk of injury.

4. Prevention Strategies for Sports Injuries

4.1 Make a Reasonable Training Plan

Scientific training plan should follow the principle of gradual and individualization, progressive principle refers to the training intensity and training should gradually increase, avoid sudden increase training load and cause sports injury, in the training plan should be based to the physical condition, training level and recovery factors reasonable arrangement training intensity and training quantity, step by step to improve the training load, make the athletes' body is able to adapt to the increasing training stimulation, so as to reduce the risk of sports injury. For example, endurance training can start with low-intensity, short-time training, Then gradually extend the training time and improve the training intensity, Fully develop the athletes' cardiopulmonary function and muscular endurance, To reduce the occurrence of excessive fatigue and injury, The principle of individualization means that training programs should be formulated according to the individual

characteristics and needs of the athletes, Fully considering the age, gender, physical quality, technical level, psychological characteristics and other factors of the athletes to teach students in accordance with their aptitude, Scientific arrangement of training content and methods, For example, young athletes should focus on the development of basic physical fitness and athletic skills, Avoid intense, intense training too early, In order to affect their physical development and increase the risk of injury.

4.2 Improve Your Physical Fitness

Good physical quality can make athletes better adapt to the process of stress, reduce the occurrence of injury, strength training is an important means to improve muscle strength and explosive force, athletes can through weightlifting, push-ups, sit-ups and other strength practice enhance the muscle contraction ability and fatigue resistance ability, prevent the occurrence of the injury such as muscle strain, at the same time strength training can also enhance the strength of bones and joints, reduce the risk of fracture and joint injury. For example, football players can train the lower limb muscles of the gluteus thighs and the gluteus muscles, To improve their fighting ability and stability, To prevent the occurrence of knee and ankle joint injuries, Fleability training is an important means of improving joint mobility and muscle stretching, Athletes can increase the flexibility of muscles and ligaments by using static stretching, dynamic stretching, and PNF stretching to prevent problems such as muscle tension and ligament injury, For example, gymnasts can perform a lot of flexibility exercises such as splits, leg pressing, bridges to improve the flexibility of the lower limbs and torso, reduce the risk of soft tissue injury, Fleflexibility exercises also promote blood circulation, Accelerate the clearance of lactic acid, Relief discomfort symptoms such as muscle fatigue and soreness, In addition, balance training, coordination training, core strength training are also effective ways to improve physical fitness and prevent sports injury, Relevant training should be carried out according to the characteristics of sports and the actual situation of athletes, Comprehensively improve the athletes' physical quality and the ability to resist injury.

5. Principles of Rehabilitation for Sports Injuries

5.1 The Principle of Phased Rehabilitation

Sports injury rehabilitation process is usually divided into acute phase, recovery and remodeling three stages, different stages of rehabilitation goals and measures are different, so in the rehabilitation plan should follow the principle of stage rehabilitation, according to the type of injury, severity and recovery progress factors such as reasonable arrangement of each stages of rehabilitation content and method. In the acute phase of the main goal is to control the inflammatory reaction of injury, reduce pain and swelling, protect the damaged tissue, prevent injury, commonly used rehabilitation measures including rest, braking, cold compress, pressing, drugs, raising, if necessary, the main goal is to promote the damaged tissue repair, restore joint mobility and muscle strength, improve proprioception and motor control ability, commonly used rehabilitation measures include joint loosening, muscle strength training, proprioception training, functional training, etc., at the same time should pay attention to avoid excessive load and cause injury again. In remodeling period main goal is to further improve the athletic ability of athletes, restore sports skills, reach the level before sports injury, commonly used rehabilitation measures including special technical training, simulation game, psychological counseling, etc., and according to the recovery of the athletes gradually increase training intensity and the difficulty, in the whole rehabilitation process should regularly evaluate the rehabilitation effect, adjust the rehabilitation plan, to ensure that the rehabilitation progress smoothly, no sequela.

5.2 The Principle of Multidisciplinary Cooperation

Sports injury rehabilitation is a systematic engineering, involving medicine, sports, psychology, and other disciplines, need to multidisciplinary professional cooperation, so in the sports injury rehabilitation should follow the principle of multidisciplinary collaboration, establish including sports medicine doctor, physical therapists, sports rehabilitation division, psychological consultant, rehabilitation team, play their own professional advantages, develop and implement rehabilitation plan. The medical team is mainly responsible for medical work

such as diagnosis, treatment and functional assessment of injuries, Such as drug therapy, surgical therapy, physical therapy, Physical therapists and exercise rehabilitation therapists are primarily responsible for the development and implementation of specific rehabilitation training programs, Such as joint loosening, muscle strength training, proprioception training, gait training, and monitoring and evaluating the training process, Psychological counselors are mainly responsible for the assessment of the psychological state and psychological intervention, Such as relaxation training, goal setting, self-dialogue, Helping athletes to overcome psychological barriers, Building up confidence in recovery, All professionals should strengthen the communication and coordination, Adjust the rehabilitation plan and hold regular meetings according to the actual situation of the athletes, To evaluate the rehabilitation progression, To solve the existing problems, At the same time, the rehabilitation team should also cooperate closely with the athletes, coaches and others, Build a good trust relationship, Encourage athletes to actively participate in rehabilitation training, Improve rehabilitation compliance.

6. Rehabilitation Methods for Sports Injuries

6.1 Physitherapy

Physical therapy is a commonly used method in sports injury rehabilitation, its through the effect of physical factors such as heat, light, electricity, sound and promote damage tissue repair and function recovery, common physical therapy including cold therapy, ultrasonic therapy, electric stimulation therapy, cold therapy is a commonly used method in the acute injury, by reducing the local temperature constriction, reduce exudation and swelling, relieve pain and inflammation, cold compress can use ice bag, ice, 15-20 minutes each time, 3-4 times a day. Ultrasonic therapy uses the mechanical vibration and thermal effects of high-frequency sound waves to promote the repair and regeneration of soft tissues, Improve the local blood circulation, Relieve symptoms such as muscle spasm and joint stiffness, Ultrasonic therapy usually has a frequency of 1-3 MHz, The intensity of 0.5-2.0W/cm² , Each time for 5-10 minutes, And 1-2 times a day, Electrical stimulation therapy is the stimulation of the injury site by a low-frequency current, Promote the recovery of nerve-muscle function, Improve the local blood circulation, Reducing symptoms such as pain and swelling, The commonly used electrical stimulation methods are transcutaneous electrical nerve stimulation (TENS), neuromuscular electrical stimulation (NMES), Parameters depending on the individual circumstances and treatment goals, Physical therapy should select appropriate methods and parameters according to factors such as type of injury, severity and recovery stage and pay attention to the duration and course of treatment, Avoid excessive stimulation, At the same time, physical therapy should be combined with other rehabilitation methods to achieve the best rehabilitation effect.

6.2 Functional Rehabilitation Training

Functional rehabilitation training is to improve flexibility, strength, proprioception and motor control at the injury site through targeted physical exercise, Promote the recovery and improvement of motor function, Common functional rehabilitation training methods include joint range of motion training, muscle strength training, balance training, proprioception training, Joint mobility training improves joint flexibility and stability through passive or active joint activity, Prevention of joint adhesion and contractures, Training methods include passive joint loosening, active joint movement exercises, PNF stretching, The range of motion and difficulty should be gradually increased according to the degree of joint movement limitation and the recovery situation, Muscle strength training is used to enhance the strength and endurance of the injury site and surrounding muscles through resistance exercise, Improve the systolic function and motor control of the muscle, Training methods include isometric contraction, isotonic contraction, centrifugal contraction, Resistance and training volume should be gradually increased according to the recovery of muscle strength, Avoid excessive fatigue and muscle damage. Balance training improves the coordinated control of nerve-muscle by stimulating proprioceptors, Improve the balance and stability in athletes, Prevention of reinjury, Common training methods include single-leg standing, unstable support surface training, eye closure training, The difficulty should be gradual, Proprioception training is performed by stimulating the proprioceptors around the joint,

Improve joint location perception and motion perception, Improve the self-protection ability of the injury site, Common training methods include joint position reproduction training, proprioceptive neuromuscular facilitation technology (PNF), Functional rehabilitation training should follow the principles of individualization, scientific and systematic, Develop a reasonable training plan and regularly evaluate the type of injury, the stage of recovery and sports, Adjust the training program in time, Ensure that the athletes fully recover their athletic ability and level. As shown in Figure Figure 2.

Figure 1. Functional Rehabilitation Training

7. Conclusion

Sports injury is a problem that can not be ignored in physical training, the prevention and rehabilitation need from many aspects, through reasonable training plan to improve the physical quality, master the correct sports technology can effectively reduce the incidence of sports injury, in the event of sports injury, follow the principle of scientific rehabilitation, physical therapy and functional rehabilitation training method can promote the wounded recovery process, make it safely return to training and competition as soon as possible.

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