Proceedings of the 2nd International Conference on Modern Medicine and Global Health
DOI: 10.54254/2753-8818/17/20240632

The waist injuries and treatment methods of rowers

Meiqi You

Shanghai Experimental School Cambridge International Examination Centre Pudong Campus, Shanghai, 201210, China

b20160202409@stu.ccsu.edu.cn

Abstract. Rowing is one of the world's competitive sports, and it is an extremely energy intensive aerobic sport. This sport requires very strict physical fitness for athletes. Therefore, rowers need to withstand extreme load training and ultra-high intensity endurance training, whether in daily training or in actual competitions. Rowers must possess good physical fitness and functional abilities, as well as flexibility and agility. However, the prolonged physical wear and tear experienced by rowing athletes during training and competition can easily lead to sports injuries. Due to the influence of many factors, emphasis has been placed on rowing physical fitness training. In the specific operation process, it is necessary to closely combine the characteristics of rowing and the actual physical condition of athletes and develop a scientific and reasonable plan for rowing and injury treatment. Therefore, this article first starts from the investigation of physical injuries and types of injuries among different athletes and finds that the proportion of waist injuries is the highest. At the same time, it elaborates on the basic reasons for waist injuries, and finally provides rehabilitation treatment plans, allowing rowing athletes to make more progress and development.

Keywords: Rowing, Athletes, Types Of Injuries, Reasons For Waist Injuries, Rehabilitation Treatment.

1. Introduction

Rowing is a water sport that requires long-term and high-load training. Rowing athletes need to have good physical fitness and physical function, as well as a certain degree of flexibility and agility. Otherwise, in long-term high-intensity endurance training, rowing athletes are prone to varying degrees of sports injuries during various training sessions. However, due to the day after day training or uninterrupted competition, physical wear and tear gradually increase, causing the damage to the body to gradually magnify, and there is a high possibility of irreversible injuries. Having a reasonable exercise plan pays more attention to the effectiveness of training while reducing the impact of sports injuries. Rehabilitation is essential under long-term high-intensity training. And rowing is compared to popular sports such as basketball and football, so this article starts from the perspective of rowing methods, athletes' injury mechanisms, and treatment methods.

DOI: 10.54254/2753-8818/17/20240632

2. Body injury location and type

2.1. Investigate age and common types of injury

According to the registration form for sports injury census, there were a total of 233 athletes from certain provinces and cities in the rowing finals of the 7th National Games. The average age is between 17 and 21 years old. Among them, there are 130 male athletes, with an average age of 18 to 20 years old. The maximum age is 25 years old, and the minimum age is 17 years old; There are 103 female athletes, with an average age of 17 to 21 years old, with a maximum age of 27 and a minimum age of 16. The average duration of specialized training ranges from 2 to 6 years, with a maximum of 11 years and a minimum of 1 year.

Among the 233 athletes surveyed, 124 were injured, accounting for 53.22%, with a total of 14 types of injuries and 141 cases. According to clinical examination diagnosis, there were 59 cases of lumbar muscle strain, accounting for 41.84%, ranking first. Secondly, there were 24 cases of patellar chondropathy in the knee joint, accounting for 17.02%, 23 cases of patellar tendon disease and patellar tip disease in the knee joint, accounting for 16.31%, and 19 cases of shoulder back fasciitis, accounting for 13.71%. The above damages account for 8.88% of the total damage [1].

2.2. Proportion of lumbar muscle injury

Rowing belongs to the typical periodic training of a single action structure, so the types of injuries involved in sports are only 14, far lower than those in skill related sports. Among these 14 types of injuries, 90% are concentrated in the waist, shoulder, back, and knee. Except for some acute injuries, most of them are long-term cumulative strain injuries [1].

Among the 27 rowers surveyed at the 5th National Games, 23 had waist injuries, 7 had shoulder injuries, 2 had knee injuries, and 8 had wrist injuries. Among the 23 athletes with lumbar injuries, lumbar muscle strain and lumbosacral joint injury were the most common, with a total of 18 cases, each accounting for 33.33%. Secondly, there were 3 cases of sacroiliac joint injuries, accounting for 11.11%. There were 2 cases of sciatica, accounting for 7.4%. Among the 7 athletes with shoulder injuries, the head injury of the biceps brachii muscle was the most common, with a total of 6 cases accounting for 22.22%. Secondly, there was one case of injury to the short head of the biceps brachii muscle, accounting for 3.7%. Among the 2 athletes with knee injuries, only 2 had lateral collateral ligament injuries, accounting for 7.4%. Among the 8 athletes with wrist injuries, the transverse ligament injury of the wrist was the leading cause, with 7 cases accounting for 25.92%, and only 1 case of ulnar collateral ligament injury, accounting for 3.7% [2].

A prospective cohort conducted in a clinical setting. 37 first-class female university rowers (33 rowers and 4 police officers). Investigators conducted pre-season Functional Movement Screen (FMS) is a screening tool utilized to identify the risk of Musculoskeletal injury in field sports based on movement patterns and demographic data was collected. This season, out of 37 participants, 25 reported low back pain, indicating that 67.5% of participants did indeed experience pain. This indicates that the injury occurs more frequently in the waist [3].

3. The connection between technical movements and lumbar muscles

3.1. Techniques details during rowing

The basic movements of rowing are returning the oar and pulling the oar. When pulling the oar, the back should be straight, the arms should be extended, both hands should push the oar to the maximum extension position, the legs should be bent, and the body should be compressed to the maximum extent, approximately at the position where the chest and thighs are close. At this point, the shoulder and arm muscles should naturally relax, and the abdominal muscles should be moderately tightened. Then push the legs straight and push the sliding seat backwards. The back remains straight, and the posture of the trunk and arms remains motionless. At this point, the hands remain stable and pulled, the arms are extended, the back is straight, the legs are kept on the pedals, and the hip position remains unchanged.

DOI: 10.54254/2753-8818/17/20240632

Using the muscles in the abdomen, drive the trunk to lean back. The posture of the legs, arms, and buttocks remains unchanged, but the body swings straight back. Finally, keep your body straight back and hold onto the handle, pulling towards your chest. The bending speed of the arm gradually increases and the strength strengthens [4].

3.2. The negative impact on the waist

In order to complete this series of movements, the pressure on the waist is very high. Firstly, the force generated by the athlete's kicking needs to be transmitted through the waist to the upper half of the body and upper limbs, where the muscles in the waist can stabilize the spine. Secondly, in the late stage of pulling the oars, when the upper body falls back, it is not only necessary to strengthen the rowing force, so that the muscles behind the waist can bear more load, but also the support action after the fall also requires the waist to stabilize the upper body.

And from a bio-mechanical perspective, the load that the waist needs to bear during sitting is greater than when standing. As the pelvis tilts back during sitting, the protrusion of the lumbar spine disappears, and the body's center of gravity shifts to the front of the spine, the arm of force increases, causing tension in the muscles at the back of the waist. In order to reduce the load on the spine in a forward bending position, the body relies on the contraction of the muscles in the back of the waist, which is equivalent to increasing the load on the muscles in the waist, leading to lumbar muscle strain over time [1].

4. Causes of lumbar injury

Whether in regular practice or actual competitions, rowing athletes must be able to sustain tremendous load training and ultra-high intensity endurance training. However, the majority of rowing coaches disregard each athlete's physical condition during daily training, which can quickly result in physical weariness from too much training intensity. Currently, rowing athletes focus mostly on enhancing their performance and pay little attention to researching sports injuries. There are significant gaps in our understanding of the types, preventative strategies, and rehabilitation techniques for injuries sustained when rowing [5].

4.1. Excessive use of injured lumbar muscles

Excessive use and repetitive exercise gradually worsen the damage to the waist. Inappropriate rowing posture and techniques may exert additional pressure and stress on the waist during rowing [6]. For example, excessive bending or improper rotation of the waist can lead to lumbar muscle strain, lumbar disc problems, and more. Excessive use and repeated exercise can gradually worsen the damage to the waist. Improper rowing posture and techniques may exert additional pressure and pressure on the waist during the rowing process. For example, excessive bending or improper rotation of the waist can lead to lumbar muscle strain, lumbar disc problems, and so on. Firstly, repeated use can exacerbate existing damage. If a part is already injured or under excessive stress, continuing to apply pressure or use it may cause the original damage to worsen. This may include symptoms that continue to cause pain, inflammation, or swelling. Secondly, repeated use of the damaged area may lead to chronic pain and inflammation. This is because muscles, ligaments, joints, or other tissues do not have enough time to recover, and excessive fatigue or wear occurs. Thirdly, when using the damaged area, the surrounding tissues may also be damaged. This may include muscle sprains, ligament strain, nerve compression, etc. If these problems are not properly treated and restored, it may lead to further dysfunction. If the damaged area is not used correctly, the human body may naturally change its movement mode to avoid pain. This may lead to additional pressure or load on other body parts, increasing the risk of injury to other parts.

4.2. Core stability

The lack of core stability refers to the strength and control of the trunk muscles, which are crucial for protecting the waist and supporting the entire body in rowing. Firstly, because rowing is a sport that relies on boat balance and stability. Core strength can help athletes maintain a stable posture, enabling them to effectively control the boat. A powerful core can provide good balance while reducing

DOI: 10.54254/2753-8818/17/20240632

unnecessary twisting, ensuring that the hull remains level and stable. Secondly, core forces need to serve as intermediaries for the transmission of power. A robust core can effectively transmit the power of the upper body into rowing movements, improving the effectiveness and efficiency of rowing. Good core control can enable athletes. Thirdly, core strength can prevent injury, and a strong core can help reduce excessive load and stress on other parts of the body, reducing potential risk of injury. By providing stability and support, core strength can help reduce pressure on the back, shoulders, and waist, effectively preventing sports injuries. If the core muscle group of rowers is weakened or unstable, they may be more susceptible to lower back injuries.

4.3. Muscle imbalance and poor posture

Muscle imbalance and poor posture may cause discomfort and injury to the waist of rowers. For example, overly tense hip muscles and insufficient forward bending movements may lead to lumbar muscle imbalance and overuse. Firstly, muscle imbalance means that some muscle groups may be overdeveloped, while others may be relatively weak. For example, in rowing, the back and abdominal muscles are often stronger, while the buttocks and hips muscles may be relatively weaker. This muscle imbalance may lead to unstable trunk control and poor exercise patterns, increasing the load on the waist. Secondly, incorrect posture is common in rowing, especially among beginners. For example, a hunched or excessively tilted posture can cause unnecessary pressure and torsion on the lumbar spine. This posture may increase stress in the waist, leading to pain or discomfort in the waist [7].

5. Treatment and Rehabilitation of Lumbar Injury

5.1. Resting

Firstly, pay attention to rest and protection. In the event of waist injury, stop participating in rowing and give your waist sufficient rest. At the same time, it is necessary to protect the waist to avoid further injury, and a support strap or waist circumference can be used to provide support and stability. In the first few days after a waist injury, cold compress (ice packs, ice cubes, etc.) can be used to reduce pain, inflammation, and swelling. Afterwards, hot compresses (such as hot water bags, hot towels, etc.) can be used to promote blood circulation and soothe muscles.

5.2. Medication

If medication treatment is recommended for injuries after long-term exercise, over-the-counter non steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen and acetaminophen can alleviate pain and inflammation. But please note that before using medication, you should consult a doctor or pharmacist for advice on the correct dosage and duration of use. At both Olympic Games, nonsteroidal anti-inflammatory medicines (NSAIDS) were the most frequently used pharmaceuticals. The two sports with the greatest vitamin usage rates overall were boxing (91%) in Atlanta and swimming (76%) in Sydney. The two sports that used mineral supplements the most were rowing (56%) and cycling (73%) [8].

5.3. Physiotherapy

Alternatively, physical therapy can be used to help restore function and reduce pain after a lumbar injury. For example, physical therapists can perform treatments such as massage, traction, hyperthermia, ultrasound, and electrotherapy to accelerate recovery and promote tissue repair.

There's an example of the 375 injuries suffered by all 27 rowing competitors in the Six Games were successfully cured using massage. Acute injuries, such as those to the quadriceps femoris, ankle joints, pillows, etc., are 100% curable. With a 96% massage effectiveness rate, obsolete injuries are most common in the top three major injuries—waist, knee, and shoulder joint injuries. These injuries keep happening, prolonging sickness, and making therapy very challenging. Treatment simply serves to control the onset of abandonment and lessen the severity of the condition; it is still administered at the same time as repair and damage. After undergoing massage therapy, the vast majority of these athletes

DOI: 10.54254/2753-8818/17/20240632

displayed a noticeable improvement in their health. Additionally, massage regulates the process of excitation and inhibition by enhancing the physiological operation of the cerebral cortex. This regulates pre-competition stress and lethargy. Following a competition, massage can hasten the fading of exhaustion and hasten the body's recovery, both of which have extremely noticeable impacts [9].

Similarly, other methods have also been applied multiple times. For example, hyperthermia can use hot materials such as salt, bran, etc., or wrap bricks in red and wrap them in a cloth to apply heat to the area of low back pain or use medical saline bottles to pack hot water and apply heat locally. Heat therapy is a commonly used treatment method that utilizes the warming effect to promote the dilation of blood vessels in the injured area and accelerate blood circulation, playing a role in relaxing muscles, activating collaterals, dispersing blood stasis, and alleviating pain. Alternatively, ultrasound therapy is a method of treating diseases by applying low voltage, steady direct current to the human body. Direct current has positive and negative polarity and has electrolysis effect. When passing through the human body, it can produce a series of physical and chemical changes in human tissues, which have certain effects on tissue metabolism, peripheral circulation, and the nervous system. Especially in combination with drug ion introduction, drug components can enter tissue gaps, achieving the effects of relaxing muscles, activating collaterals, promoting blood circulation, and relieving pain.

5.4. Rehabilitation exercise

At the same time as treatment, rehabilitation exercises can be carried out. During rehabilitation, rowers may need to undergo specific exercises to restore waist strength and flexibility. These exercises may include stretching, strengthening core muscle groups, improving posture and techniques, etc. But it is necessary to ensure that it is carried out at the appropriate time and manner, and to avoid excessive exercise and re injury.

For instance, the impact data analysis of tennis players' technical movements was carried out using cameras, and the research findings revealed that the output of kinetic energy accounted for 52.1% of the total force, with the leg muscles, hips, and the athlete's body parts accounting for the remaining 55.7%. This conclusion shows that the lower limb and central muscle groups of the human body exert more than 50% of the total kinetic energy output and output, which is coordinated from the body's trunk to the upper limb muscle group, during the process of hitting a ball in tennis.The coordination ability of the limbs will be substantially enhanced for athletes with superior central muscle groups during the training process, and the excessive energy consumption brought on by a lack of body control ability will be successfully decreased.

The collaborative work mode between the lower limb and core muscles was found to be improved in a core strength exercise rehabilitation experiment on 60 college students with lower limb knee joint sports injuries. After 42 days of actual measurement, the results showed that the collaborative training method can promote the growth of absolute strength of knee joint related muscle groups, effectively improve joint activity range and stability, and not only shorten the knee joint rehabilitation cycle, At the same time, it greatly improves the physiological movement level of the knee joint and waist, playing an effective preventive role in fatigue and injury of the waist and knee joint [10].

In rowing, it is basically the same as tennis, which can reduce the pressure and intensity of the waist by enhancing the strength of other muscle groups in the body. When exerting overall force, use more other muscle groups to reduce lower back pain.

5.5. Operation

In some severe cases of lumbar injury, surgical treatment may need to be considered. Surgery can repair soft tissue injuries in the waist, correct structural problems, or reduce nerve compression. It is best to seek the guidance of a professional doctor for the treatment of waist injuries in rowing athletes. Doctors can develop personalized treatment plans based on the degree and type of injury and provide effective advice and rehabilitation guidance to help athletes recover as soon as possible and safely return to the competition.

DOI: 10.54254/2753-8818/17/20240632

After surgery, medical professionals will cover the patient's skin, offer psychological counseling to patients who are conscious, engage in conversation with the patient, and pay attention to any psychosomatic problems. With the surgeon's assistance, safely take patients back to the ward and conduct a thorough handover.

Through films and in-person demonstrations, doctors actively participate in the guiding of functional rehabilitation exercises to help patients better understand the fundamentals of exercising their core muscle groups. It is necessary to gradually increase the training intensity if the patient has significantly improved lumbar and abdominal muscle function. This will help to improve the stability of their spine, improve the function of their lower back muscles, and reduce lumbar weight bearing and lower back leg pain.

Lower back and leg pain persist in postoperative patients, who can benefit from pain assessment before receiving targeted preventive pain care like massage, local physical therapy, etc. If the patient has a high pain score, pain medication can be administered as directed by the doctor to increase the patient's postoperative comfort [11].

6. Equations and mathematics

To conclude, rowing, as a high-intensity aerobic exercise, requires extremely high physical fitness for athletes due to prolonged physical energy consumption. Due to the fact that rowing belongs to water sports, different uncontrollable factors can easily cause sports injuries to rowers. This article analyzes the types of injuries among rowers, selects the waist injuries that have the greatest impact, and analyzes the causes of injuries among rowers, including the repeated and extensive use of waist muscles; Insufficient core strength of athletes; Muscle imbalance and incorrect posture. And explore in depth the rehabilitation strategies for rowing athletes after sports injuries, such as providing them with sufficient rest and applying cold and hot compresses in the first time of pain; By further combining medication use to alleviate pain and training tasks, rehabilitation exercises are added to reduce the burden on the waist. Athletes with the most severe condition can only choose to retire and undergo surgical treatment to gradually recover and relieve pain. But currently, the prevention and treatment plans for rowing athletes are not enough to solve all the problems at present. So in order to reduce the injury situation of rowing athletes and reduce the sports injuries caused by various factors in the future, we must have a correct understanding of the training characteristics of rowing and the factors that may induce sports injuries, and be able to make effective judgments and provide treatment assistance in the first time after sports injuries occur, to avoid secondary injuries, and to promote the continuous progress and development of rowing in China.

References

[1] Wang Yu, Liang Min, Zhang Jiayu, et al. The characteristics and prevention of sports injuries among excellent rowers in China [J]. Journal of Chengdu Institute of Physical Education, 1994 (2): 92-96.

[2] Fan Binghua. Analysis of data on four major joint injuries among 46 rowing and kayaking athletes [J]. Zhejiang Sports Science, 1986 (1): 35-38.

[3] Clay H, Mansell J, Tierney R. ASSOCIATION BETWEEN ROWING INJURIES AND THE FUNCIAL MOVEMENT SCREEN™ IN FEMALE COLLEGIATE DIVISION I ROWERS. Int J Sports Phys Ther. 2016 Jun; 11(3): 345-9. PMID: 27274420; PMCID: PMC4886802

[4] Peng Yali, Wang Tianqi. Investigation and analysis of sports injuries among rowing team athletes [J]. Sports Science and Technology Literature Bulletin, 2022,30(5): 55-56.

[5] Liu Shufen. Types of sports injuries and rehabilitation strategies for rowing athletes [J]. Peers, 2022(7): 49-51.

[6] Wang Zhengxia, Shan Bao. A Study on Sports Injuries of Teenage Rowers [J]. Young people, 2020(43): 251.

[7] Tian Jing. The characteristics and prevention strategies of injuries in rowing athletes with different training years [J]. Netfeather World, 2021(11): 137-138.

DOI: 10.54254/2753-8818/17/20240632

[8] Huang SH, Johnson K, Pipe AL. The use of dietary supplements and interventions by Canadian athletes at the Atlanta and Sydney Olympic Games. Clin J Sport Med. 2006 Jan; 16(1): 27-33.
[9] Fan Binghua. Damage Analysis and Tuina Treatment Evaluation of Rowing Teams in the Sixth National Games [J]. Zhejiang Sports Science, 1989(3): 15-19.
[10] Feng Bin, Hua Sang, Li Xianglin, et al. A Review of Exercise Rehabilitation for Physiological Fatigue and Injury Pain in the Lumbar Region of Young Women [J]. Contemporary Sports Science and Technology, 2022, 12(11): 13-16.
[11] Huang Jiaoni. The application of full process nursing care in the operating room nursing of lumbar disc herniation treated with intervertebral foramen endoscopy [J]. Health advice, 2023, 17(8): 154-156.