

Gym-Related Injuries and its Prevention and Treatment Strategies

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Abstract. In contemporary society, health and fitness have received more and more attention and become an important venue for the public to pursue physical health and good posture. However, in the actual fitness exercise, because most exercisers lack the correct cognition of their own athletic ability, physical condition and movement norms, in the daily exercise process, there will often be unpredictable sports injuries. At the same time, the lack of professional knowledge in the self-treatment of injury leads to the aggravation of injury, which has a negative impact on all aspects of daily life such as my study and work. However, current research on fitness related sports injuries is relatively limited. Through the analysis of the characteristics of sports injuries, understanding the causes of sports injuries in current fitness exercises can provide an important reference basis for how to correctly deal with and prevent common sports injuries, and then improve the fitness consciousness of our people at the social level, and help the construction of a well-off society in an all-round way.

Keywords: Fitness exercise; sports injury; prevention; treatment.

1. Introduction

Based on the increasing popularity of gym activities such as strength training, cardio, and CrossFit, more individuals are turning to these methods to stay fit and maintain overall health. However, with this rise in gym participation, there has also been a notable surge in the frequency of gym-related injuries. Common injuries include damage to the shoulders, knees, and lower limbs, which, according to research, frequently occur in unsupervised training environments. According to a survey, 42% of young people in Israeli fitness centers reported getting injured during exercise. In CrossFit, the average injury rate is 35.3%, with an injury rate ranging from 0.2 to 18.9 per thousand hours of training. The most common areas of injury are the shoulders (26%), spine (24%), and knees (18%) [1]. In New Zealand, over the ten-year period, 16–64-year-olds made 345,254 injury claims (minor and moderate-to-serious injury claims for gym and fitness related injuries) [2]. These injuries often occur due to overtraining, incorrect posture, or excessive loads, and can affect a wide range of individuals, from beginners to experienced athletes. For example, improper deadlifting techniques can lead to lower back injuries, such as lumbar disc herniations, while incorrect form during overhead presses can cause rotator cuff injuries.

Investigating sports injuries among gym users provides valuable insight into the mechanisms of injury, which can help in the development of more effective preventive measures. These measures can minimize accidental injuries, ensure a safer exercise environment, and lead to better outcomes for both recreational and competitive athletes. Additionally, scientific research into these injury patterns can contribute to the creation of better training methods and techniques, allowing exercisers to work out more effectively while reducing the risk of injury. Despite the growing awareness of these risks, there remains a significant gap in the research surrounding effective prevention strategies and interventions [1]. The primary objective of this study is to analyze the underlying causes of injuries related to gym activities and propose practical preventive measures to decrease injury rates. Additionally, this research aims to provide new insights into the safety of gym exercises, particularly for casual gym-goers who may not have access to regular supervision or personalized training

programs. By comprehending these factors, the study aspires to improve the safety of fitness enthusiasts and promote injury prevention during physical exercise.

2. Cause Analysis

Injury sites varied across fitness activities. In strength training or CrossFit training, the shoulder was the most common site of injury, accounting for up to 20% [1,3]. The reason may be that the shoulder joint is composed of the humeral head of the humerus and the joint of the scapula. The joint capsule is relatively relaxed, the joint cavity is large, and it is a typical ball and socket joint that can move around three basic axes. The movements related to the shoulder joint include flexion and extension, adduction and abduction, internal rotation and external rotation, as well as horizontal flexion and extension and circular rotation movements, it is the joint with the largest and most flexible range of motion in the human body, and also the most active in social life. Therefore, it is highly susceptible to external injuries, leading to fractures or dislocations. The most common types of shoulder fractures and dislocations are clavicle fractures, acromioclavicular dislocation, and shoulder dislocation [4].

Injuries are highly correlated with the length of time spent practising CrossFits. Athletes who had been practicing for more than one year were 82.2% more likely to be injured than those who had been practicing for more than two years. Athletes with less experience. Therefore, athletes at the competitive level tend to be more prone to injury than recreational athletes and beginners. Some studies found that competitive level athletes were approximately five times more likely to be injured than beginners. One possible explanation for this is that competitive athletes need to achieve a higher level of technical proficiency and therefore need to practice for longer periods of time. As mentioned earlier, the longer the exposure to physical activity, the greater the likelihood of injury. Montalvo et al. in 191 practitioners, in which competitors were more likely to be injured and CrossFits practiced longer than other athletes. Training for long periods of time without proper rest can lead to two problems that increase the risk of sports injuries. On the one hand, overtraining can overload muscles, ligaments and joints, increasing the risk of injury. The body is under too much stress when it lacks rest, leading to fatigue and an increased risk of injury. On the other hand, long-term training causes muscle and nerve fatigue, affecting skills and posture. Fatigue can lead to poor posture, increasing the risk of injuries such as sprains and strains

One critical factor contributing to gym-related injuries is the lack of proper supervision and education. Many gym-goers, particularly those new to exercise or without access to personal trainers, may not be aware of the correct techniques or the importance of gradual progression. People first choose equipment that suits themselves based on their own needs and hobbies, which may lead to some exercisers blindly pursuing equipment that is not suitable for themselves and causing adverse effects. Providing education on proper form, exercise techniques, and the importance of rest can significantly reduce the risk of injuries. Gyms that offer introductory sessions, workshops, or access to qualified trainers can help mitigate these risks by ensuring that individuals are aware of the correct practices and can perform exercises safely [1].

3. Prevention strategy

Sports spirit is important in all sports, as high-intensity training can make the body tired and potentially cause muscle damage. Sports ability can also affect the training process, but it is equally important to recover physical condition after training to prepare for the next exercise. Articipants should ensure that they spend time learning the correct techniques for each sport—many injuries arise from improper form during complex exercises, so working with a coach to refine technique can prevent future injuries and take the time to fully recover from injuries and must focus on maintaining a good state when fatigued. So, it is important to enhance the professionalism of coaches themselves, avoid teaching members wrong movements to avoid injuries, enhance coaches' ability to guide members, and correcting members' wrong movements and unable movements in the process of movement teaching to avoid sports injuries. Enhance the experience of the coach, the coach should

be clear which action is not suitable for which class of members, timely reminder, to avoid the occurrence of sports injuries [5,6].

Additionally, Understanding the importance of gradual progress in the training process is crucial, focusing on mobility and strength training, especially in areas like the shoulders and core, helps reduce the stress on joints and muscles, avoid the overloading muscles [5, 6]. For instance, free training can train the chest, shoulders, back, legs, etc. from multiple angles. Common equipment used includes dumbbells and barbells, and there is no fixed training mode. People are more likely to train muscles. Excessive weight, blind pursuit, prolonged time, and improper posture during training can easily cause muscle strains. When using dumbbells for exercise, beginners may choose a heavy weight instead of a weight that suits them, as being too heavy can lead to injury.

During exercise, if the muscles feel pain, it is often a kind of early warning of the current operation of the body, therefore, it is necessary to suspend the exercise when such a situation occurs, adjust the physical condition in time, and avoid the risk of injury. If after a week of exercise, your own exercise level has not significantly improved, and the muscles still feel pain at the same time, you need to change the way of exercise according to the current situation. In addition, if you want to exercise different parts of the body, you can use the means of taking turns to avoid the appearance of sports injuries, if there are special circumstances you should immediately stop fitness exercise activities [7].

The design and maintenance of gym facilities also play a vital role in preventing injuries. Well-maintained equipment and thoughtful facility design can help minimize the risk of accidents. Ensuring that equipment is regularly inspected and that gym spaces are designed to accommodate different fitness levels and activities can reduce the likelihood of injury. For example, providing adequate spacing between machines and ensuring that equipment is in good working order can prevent accidents and injuries.

4. Intervention strategy

Resting the affected area and applying ice are essential in treating acute injuries such as sprains or strains, as this helps reduce inflammation and promotes healing. Common techniques used for recovery include: (a) post-exercise nutrition interventions, (b) water immersion therapy, (c) electrical stimulation, (d) compression, (e) massage therapy, and (f) active recovery. Active recovery is effective in reducing blood lactate levels after intense exercise, whether it is active plus passive recovery or active plus leg raising recovery, both of which are passive and effective [4]. For example, massage is a treatment method used by physical therapists to stimulate soft tissues (muscles, ligaments, tendons) in the body, thereby relieving muscle tension and pain, improving blood circulation, and achieving relaxation. It can unblock meridians, harmonize qi and blood, and enhance immunity. There are various massage techniques, including kneading, rolling, pushing, holding, pressing, etc. Touch, using gentle touch, can be used at the beginning or end of massage to soften tissues, increase blood flow to muscles, and provide an overall sense of calm. Kneading, using circular techniques between smaller areas, can help break down scar tissue and stretch tight muscles, thereby increasing their range of motion. Deep tissue massage can reach and relax deep muscles that may become stiff due to injury or poor posture. Deep massage can increase blood flow to these muscles and eliminate potential toxins that may accumulate. Friction, small depth movements of the thumb or fingers, can break down scar tissue and improve circulation in that area, helping to alleviate pain and promote healing.

Also, isometric strength training is a valuable tool in rehabilitation, particularly when dynamic exercises are not feasible due to the nature of the injury or condition. By generating force without changing the length of the muscle-tendon unit, isometric contractions allow for controlled muscle engagement while minimizing joint movement, making them effective in reducing pain (hypoalgesia) for chronic injuries. Their effectiveness can vary depending on the specific musculoskeletal issue, but these contractions enable targeted strengthening at precise angles, facilitating greater force output than concentric contractions and providing reliable measures of muscular strength. This is especially

beneficial for athletes recovering from injuries such as anterior cruciate ligament (ACL) ruptures, where strength deficits are often observed at certain angles; implementing positional isometrics can enhance recovery in these cases. Additionally, isometric quadriceps exercises, like those performed on a leg extension machine, can be invaluable for managing conditions such as patellar tendinopathy, allowing athletes to maintain strength without the risks of isotonic contractions. Long-length and high-volume isometric training also effectively promotes muscle hypertrophy, yielding significant improvements at the trained angles, even if it does not directly translate to enhanced sports performance across all activities. Overall, isometric strength training offers a versatile and effective approach in rehabilitation, helping manage pain, enhance strength, and support athletes in their recovery journeys. As research continues to evolve, integrating isometric training into rehabilitation protocols will likely maximize its benefits for various musculoskeletal conditions [8].

5. Conclusion

This research highlights the importance of promoting health awareness among the general public. The increase in gym-related injuries reflects the growing participation in fitness activities such as strength training, cardiovascular exercise, and CrossFit. Understanding the causes of these injuries and implementing effective preventive measures is crucial for ensuring the safety and well-being of gym-goers and also aids healthcare providers in optimizing the allocation of medical resources, ensuring targeted and efficient treatment. Recent research highlights that injuries often result from overuse, improper technique, and lack of supervision. By promoting education on proper exercise techniques, providing access to qualified trainers, and maintaining well-designed and safe facilities, gyms can play a significant role in reducing injury rates. Additionally, fostering a culture of safety and awareness can help individuals make informed decisions about their workouts and prioritize injury prevention. Future research should continue to explore the effectiveness of various injury prevention strategies and their impact on different gym populations. As the fitness industry evolves, it is essential that safety measures keep pace, ensuring that the benefits of exercise are realized without unnecessary risk. Ultimately, a balanced approach to fitness, supported by proper education and facility management, can help individuals achieve their health and fitness goals safely and effectively.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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