# Original Article: Sports Musculoskeletal Injury in the Professional Athlete with Clinical and Rehabilitation Point

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**ABSTRACT**

Pre-participation screening and evaluation is an effective strategy for predicting and preventing injuries in athletes before participating in organized sports. Sports injuries are very difficult and dangerous experiences that athletes face during their sports activities. Even after recovery, psychological factors such as fear of movement and anxiety can affect the return to sports. The aim of the study was to compare fear of movement or re-injury and anxiety caused by pain in athletes with and without a history of musculoskeletal injuries. Another problem that leads to injury in high-level athletes, especially national and professional athletes, is overuse of the spine, various organs and joints of the body, without considering sufficient recovery time. Depletion of energy reserves and body resources from nutrients and lack of proper replacement, impaired recovery, insufficient or poor quality sleep, abuse of stimulant drugs, anabolic steroids, peptides, along with technical errors, are the main factors in the occurrence of musculoskeletal injuries. Some of the equipment and techniques available in bodybuilding and functional training are used in rehabilitation and are used by sports medicine and rehabilitation specialists. Paying attention to strengthening the core muscles of the body with specific techniques and methods plays an important role in preventing spinal injuries, and specific and precise methods are used to improve the strength and fitness of these areas.

## Introduction

The National Institute for Occupational Safety and Health (NIOSH) defines musculoskeletal disorders as a group of conditions that involve the nerves, tendons, muscles, and supporting structures such as the intervertebral discs [1]. They represent a wide range of disorders that vary in severity and range from mild, intermittent symptoms to chronic, debilitating conditions. Examples include carpal tunnel syndrome, tension-type neck syndrome, and low back pain. Other authors consider musculoskeletal disorders to be a collective term for several conditions that are subdivided into (a) clinically recognized disorders such as tendinitis and vibration-induced white finger [2]; (b) Less well-known clinical conditions such as cervical tendon syndrome; And (c) nonspecific disorders such

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as cumulative trauma disorders or repetitive strain injuries. Safety and health issues in occupational settings are of great importance. Work-related musculoskeletal disorders are among the most important issues faced by ergonomists worldwide and are the leading cause of lost work time, increased costs and human injuries in the workforce, and cause burnout. According to estimates by the International Labor Organization (ILO), approximately 160 million work-related illnesses occur worldwide each year, with the highest number of recorded cases being work-related musculoskeletal disorders [3]. In addition, 2.3 million people die each year from occupational diseases and accidents. More than one million workers experience some type of injury each year, with repetitive motions, poor posture, and excessive strain being the main causes of these injuries [4].

Several factors contribute to the development of musculoskeletal injuries. These factors include a) physical, organizational, and social aspects of work and the workplace; b) physical and social aspects of life outside the workplace (sports and exercise, etc.); c) physical and physiological characteristics of the individual. Sports injury rehabilitation is a multidisciplinary approach to preventing, assessing, and treating sports injuries and helping to restore athletic abilities after an injury [5]. The first step to recovery is an accurate diagnosis from a sports injury specialist. Typically, the initial phase of treatment involves reducing pain and discomfort. Once pain and swelling have been reduced, rehabilitation measures will begin with the aim of accelerating recovery and reducing complications from the injury. Sports physiotherapy is the most important part of the sports injury treatment and rehabilitation program [6]. The physiotherapist will prescribe exercises to target specific goals such as mobility, flexibility training, balance coordination, and joint positioning for the injured person. Rehabilitation of sports injuries is essential to help ensure a return to pre-injury sports activities. Musculoskeletal injuries can have immediate and significant detrimental effects on performance. A range of rehabilitation interventions are needed when an individual experiences or is likely to experience limitations in daily functioning due to age or health conditions, including chronic diseases or disorders, injuries, or trauma. Rehabilitation enables individuals of all ages to maintain or return to activities of daily living, play meaningful life roles, and maximize their well-being [7].

Rehabilitation of sports injuries is a process that aims to minimize the complications of acute injury or chronic illness, promote recovery, and maximize functional capacity, fitness, and performance after injury. The rehabilitation process should begin as soon as possible after injury and continue with other therapeutic interventions. It can also begin before or immediately after surgery, when the injury requires surgical intervention [8].

Work-related musculoskeletal injuries impose significant costs on the health care system of countries. Direct costs include medical and hospital fees, rehabilitation, insurance, etc. Indirect costs include the disability of the injured person and his or her loss of wages, and the costs imposed on the employer in recruiting and training new workers to replace the injured person. Administrative costs include the costs associated with obtaining compensation and the cost associated with the quality of life associated with the pain and suffering of the injured person and his or her family. In Japan, the increase in musculoskeletal disorders in the 1960s to 1980s was most common among typists, telephone operators, and assembly line workers, with most of the complaints occurring in the hand, arm, and shoulder areas. In the

Scandinavian countries, these problems became apparent in the 1980s, and were most often associated with back pain among white-collar workers and neck, wrist, and shoulder injuries among blue-collar workers. Nordic studies have provided a more rigorous analysis of the factors that cause neck and arm pain (Figure 1). According to studies conducted in Europe, there are about 40 million workers with these disorders (more than 30% of workers), with medical costs of 0.5 to 2% of the EU's GDP [9].


**Figure 1.** Sports Musculoskeletal Injury in the Professional Athlete

## Many studies have been conducted in Iran in this regard, including the following

The results of a study of musculoskeletal disorders and factors related to the development of these disorders in 94 workers in the painting industry showed that the symptoms of musculoskeletal disorders were more common in some areas of the body, such as the back, wrist, knee, and shoulder, than in other parts of the body. Also, the results of a study of ergonomic risk assessment and the prevalence of musculoskeletal disorders among 99 people working in the car repair industry showed that the most symptoms of musculoskeletal disorders were in the back (62.6 percent) and the most complaints were in the wrist (64.6 percent), and 55.5 percent of the people evaluated in this study had a high risk factor for pain and discomfort [10].

## Muscle strain

A muscle strain is one of the most common types of sports injuries that occurs when muscle fibers are overstretched. This injury is usually caused by sudden movements, heavy lifting, or performing exercises with poor technique. A muscle strain can occur in any muscle in the body, but it is most common in the hamstrings (three muscles behind the thigh bone), groin muscles, and quadriceps muscles of the thigh and calf. Symptoms of a muscle strain include sudden pain, swelling, bruising, and limited movement in the injured area. The severity of a muscle strain can range from mild to severe. In severe cases, a complete tear of the muscle may occur [11].

### Foot Sprain

Ankle sprains, knee sprains, wrist sprains, and elbow sprains are some of the most common types of sprains. Ankle sprains are usually caused by a sudden outward rotation of the ankle. In this case, the ligaments around the ankle are overstretched or torn. Ligaments are strong tissues that connect bones together and help stabilize the joint. Ankle sprains are usually caused by a fall, a sudden change in direction while running or jumping, or a collision with an object. Symptoms of an ankle sprain include pain, swelling, bruising, limited movement, and a feeling of instability in the ankle [12].

### Broken Bones

A broken bone, or more accurately, a broken bone, is a common sports injury. This injury occurs when the force applied to the bone exceeds its tolerance, causing a crack or fracture in the bone structure. A variety of factors, such as direct impact, twisting, repeated pressure, or osteoporosis, can cause a fracture. The location of the fracture, its type, and the severity of the injury all affect the length of time it takes to heal and the treatment options. Symptoms of a bone fracture include severe pain, swelling, bruising, deformity of the affected limb, and inability to move it [13].

### Dislocation

A dislocation occurs when two bones that form a joint become completely separated, or the bone is pulled out of its normal place in the joint. This usually happens as a result of a sharp blow, sudden twisting, or excessive stretching of the joint. A dislocation is a painful injury, and the hand, elbow and shoulder, fingers, kneecap, and femur-tibia or knee are common joints that are dislocated. Symptoms of a dislocation include severe pain, swelling, joint deformity, and inability to move the joint. The joint is described as being dislocated [14].

### Sprain

A sprain or strain is one of the most common sports injuries, usually caused by a sudden twist of a joint or by an impact such as a fall or a blow that puts pressure on the joint. This injury occurs when ligaments (tough tissues that connect bones together) are overstretched or torn. The ankle, knee, and wrist are common joints that are sprained, and an ankle doctor, as well as a hand specialist, will diagnose them based on symptoms, which include pain, swelling, bruising, and limited movement in the affected joint. The severity of a sprain can range from grade I (a mild stretch of the ligament) to grade III (a complete tear) [15].

### Bone Fracture

A broken bone is one of the most serious sports injuries that can occur from a direct blow, excessive pressure, or sudden twisting. This injury occurs when a bone cracks or breaks completely due to force. Fractures can occur in any bone in the body, but are most common in long bones such as the shin, thigh, and arm. Symptoms of a broken bone include severe pain, swelling, bruising, deformity of the injured limb, and inability to move it [16].

### Shin Splint

A shin splint, or shin pain, is a common injury in athletes, especially runners and athletes who play high-impact activities such as football, basketball, and similar sports. This injury is caused by prolonged stress on the calf muscle, overuse of the calf muscles, tendons, and bones in this area, and is usually accompanied by pain on the inner or outer side of the calf, tenderness to touch in the painful area, and mild swelling. Causes of shin splints include sudden increases in exercise intensity, frequent and rapid stopping or restarting, wearing ill-fitting shoes, not warming up adequately before exercise, and weak calf muscles [17].

## Cruciate Ligament Injury

Anterior cruciate ligament (ACL) injuries are common in sports, especially in sports such as football, basketball, and volleyball. The anterior cruciate ligament (ACL) is a strong band of tissue in the knee that connects the thigh bone to the shin bone and helps stabilize the knee joint. Injury to this ligament usually occurs as a result of a sudden movement, such as turning, jumping, or landing awkwardly. Symptoms of an ACL injury include severe pain, swelling, a feeling of instability in the knee, and a popping sound when the injury occurs [18].

## Knee Injuries

Knee injuries are one of the most common sports injuries, occurring for a variety of reasons, such as a sprain, direct impact, overuse, or wear and tear. The anterior and posterior cruciate ligaments, medial and lateral collateral ligaments, menisci, and patella are among the most important structures in the knee that can be injured. Runner's knee (pain or tenderness near or under the kneecap (patella) at the front of the knee), fractures, dislocations (dislocation of the kneecap from the groove of the thigh bone (femur)), anterior cruciate ligament (ACL) injuries, and meniscus tears are all knee injuries that are accompanied by symptoms such as pain, swelling, locking of the knee, a feeling of instability, and limited movement [19].

## Tendonitis

Tendonitis is a painful inflammation of the tendons, often seen in athletes. Tendons are tough bands that connect muscles to bones. Inflammation of these tissues is usually caused by overuse, repetitive motion, or sudden pressure. The most common areas affected by tendonitis include the shoulder, elbow, wrist, knee, and Achilles. Symptoms of tendonitis include pain, swelling, tenderness, stiffness, and weakness in the affected area [20].

## What are trigger points?

Myofascial trigger points are a leading cause of acute and chronic pain that is often overlooked in today's medicine, yet they are among the most common musculoskeletal problems. There is strong evidence that muscle pain is a common, primary problem and not necessarily secondary to other diagnoses. Pain from muscle trigger points in acute and chronic pain is considered a separate and independent cause that may be combined with symptoms of other problems and even persist long after the initial problem has been resolved. Although there are various definitions of muscle trigger points in different schools, the most common definition that is accepted by the majority is: "A trigger point is a very sensitive point within a tight band of skeletal muscle that becomes painful due to pressure, stretching, contraction, and overloading, and often causes recurrent pain at a point further away from itself." From a clinical point of view, we can distinguish between active and inactive trigger points. Active trigger points have local and referred pain when touched by a physiotherapist, so that the patient reports the same familiar and constant pain, but in the case of inactive trigger points, the local and referred pain created is not familiar to the patient [21].

Clinical symptoms and types of trigger points: Dr. Simon proposed the main conditions of muscle trigger points as follows:

- The presence of a tight band in the skeletal muscle
- The presence of a point with high sensitivity along the tight band in the skeletal muscle
- The creation of a local contraction response (LTR) when touching and pressing the trigger point
- The production of radiating pain in response to pressure
- The continuous presence of radiating pain based on a specific pattern Dr.

Simon accordingly divided muscle trigger points into two types: Active trigger points: People who have all 5 of the above conditions. Inactive trigger points: People who have only the first four conditions. Factors contributing to the development of trigger points: 1. Overuse 2. Lack of use or improper use (e.g., not exercising or exercising incorrectly) 3. Chronic mental disorders 4. Imbalances in body chemicals 5. Congenital disorders such as short stature, joint instability (e.g., hypermobility) Active trigger points are cited as the main cause of pain in 85% of patients with musculoskeletal pain. Epidemiological studies in the United States have shown that between 30 and 80% of visits to pain clinics and primary care centers are due to muscle trigger points. Myofascial pain syndrome is a common, non-articular, musculoskeletal disorder characterized by the presence of trigger points. Other symptoms of this diffuse pain syndrome include the development of a local contractile response (LTR) during pressure, decreased range of motion, and autonomic system symptoms (Figure 2) [22].


**Figure 2.** Sports Musculoskeletal Injury in the Professional Athlete with Clinical and Rehabilitation Point

Myofascial pain syndrome is a major challenge both in diagnosis and treatment. Many treatment approaches address the muscle or fascia alone or locally. Myofascial pain syndrome appears to be present in all types of musculoskeletal pain as well as mechanical muscle pain. On the other hand, myofascial pain syndrome may be acute, chronic, localized, or generalized due to the presence of trigger points. Recent studies indicate the role of active trigger points in the generation and maintenance of localized pain such as headache, back pain, temporomandibular joint disorders, chronic pelvic pain syndrome, and generalized pain such as fibromyalgia or whiplash syndrome. These results indicate that active trigger points may be a precursor to the transformation of localized pain into generalized pain. Several non-invasive methods such as traction, massage, ischemic pressure, laser therapy, heat, acupuncture, ultrasound, TENS, biofeedback, and drug

treatments are used to improve myofascial pain syndrome and trigger points. One of the best treatments for myofascial pain is "Dry needling" (or dry needling DN or manual intramuscular therapy, also known as Medical Acupuncture or Western Acupuncture). In this method, an acupuncture needle is used that is directed towards the trigger point. Although acupuncture needles are used, the treatment is based on Western medical reasons [23].

In modern acupuncture, unlike classical Eastern and traditional acupuncture, medical and physiotherapy assessments and diagnoses are included, and often a neuroanatomical reason is proposed for the choice of needle insertion site and a neurophysiological reason to justify the effects of the treatment. The most valid diagnostic criteria for a trigger point are local tenderness and pain. In fact, needling sensitive areas of hypertonic muscles is a common recommendation in conditions of pain in both modern and classical acupuncture systems, which must be performed by physiotherapists who have received a certificate in manual therapy and dry needling after completing long-term training courses [24].

## Types of Sports Injuries

In general, sports injuries are divided into three general categories: "Cause of injury", "Area of the body affected", and "Type of pain of injury" [25].

### Classification by Cause of Injury

- ✓ **Direct Injury:** This type of injury is caused by an external force or impact. Therefore, the greatest risk of direct injury occurs when a person collides with another person or a foreign object such as a ball hits an athlete. Direct injury can cause bruises, dislocations, or broken bones, depending on the severity and size of the force applied [26].
- ✓ **Indirect Injury:** This type of injury usually occurs at a certain distance from the point of impact. Such as falling on one's hand, which leads to a dislocated shoulder. In addition, it is possible to cause it through an internal force. Such as stretching the muscles and tendons beyond their tolerance or performing incorrect sports techniques. Unfortunately, this type of injury is usually more common in novice athletes.

### Classification by body area affected

- ✓ **Soft tissue injury:** This is the most common type of injury in sports activities, involving damage to the skin, muscles, and tendons. These injuries can cause internal bleeding, bruising, and swelling in the injured area [27].
- ✓ **Hard tissue injury:** This injury involves a risk to the bones and skeletal structure of the body, which can range from a bone dislocation to a complete fracture. Of course, this type of injury requires a strong force and in almost all cases, the soft tissues will also be affected.

### Classification by type of injury pain

- ✓ **Acute sports injuries:** Such as sprains, dislocations, bruises, abrasions, muscle strains, ligament damage, fractures, brain injuries, acute back pain, acute knee pain and headaches, which usually occur following an impact. The most common acute sports injuries and injuries are bruises and abrasions. Ankle injuries and pain are also always considered the most common musculoskeletal sports injuries [28].

- ✓ **Chronic sports injuries:** Which are usually caused by excessive activity and applying force to a specific part of the body that occurs or is aggravated during training. All athletes should keep in mind that in order to prevent injury and the risks associated with it, performing correct and principled exercises under the supervision of a professional trainer, observing the principles of warming up and cooling down and taking the necessary precautions when performing sports activities are very important and can have a significant impact on determining their path and success.

## Review of other scientists' results

The results of scientists' studies have shown that the overall prevalence of musculoskeletal disorders in the lower extremities was estimated at 49% in the back (95% confidence interval: 43-55), 5.20% in the thigh and buttocks (95% confidence interval: 17.3-23.7), 39.2% in the knee (95% confidence interval: 1.44-2.34), and 26.9% in the ankle (95% confidence interval: 20.5-33.3). Based on different occupations, the prevalence of disorders was as follows: the highest prevalence of occupational back pain was observed among office personnel with a prevalence of 53% (95% confidence interval: 39-66) and hospital occupations (medicine, dentistry, nursing, etc.) with a prevalence of 50% (95% confidence interval: 37-62). The highest prevalence of hip and buttock disorders was observed among office workers with a prevalence of 27.9% (95% confidence interval). The highest prevalence of knee pain was observed among computer users with a prevalence of 47.8% (95% confidence interval), and the highest prevalence of ankle disorders was observed among office workers with a prevalence of 55.8% (95% confidence interval) [29].

The highest prevalence of shoulder pain was observed in computer users with a prevalence of 40.9% (95% confidence interval), the highest prevalence of neck pain in medical professions with a prevalence of 49.4% (95% confidence interval), the highest prevalence of hand disorders in medical professions with a prevalence of 37.7% (95% confidence interval), the highest prevalence of elbow pain in office workers with a prevalence of 22.8% (95% confidence interval), and the highest prevalence of back pain in computer users with a prevalence of 47.1% (95% confidence interval). The results of this study indicated that the prevalence of these disorders was high in the lower limbs, especially in the back. Other results of this study also indicated that the highest overall prevalence of work-related musculoskeletal disorders in the upper limbs was related to the neck with 39.3% and shoulder pain with 36.9%. Also, when comparing the results of this study with other studies, it should be noted that although our studies showed that no systematic review studies and comprehensive meta-analysis have been conducted to date to investigate the prevalence of these problems in the lower and upper limbs in Iran, and most of the studies conducted have been cross-sectional, some related studies can be mentioned, including the review and meta-analysis conducted by Azizpour et al. entitled "Investigating the prevalence of low back pain throughout life in Iran. [30]"

The results of this study, which was conducted using a meta-analysis method, also showed that the studies examined in their study were highly heterogeneous with a heterogeneity index of 8.98, and there was no significant difference between the prevalence of these disorders by year of study (P=0.744) and sample size (P=0.353). They reported a

prevalence of low back pain in Iran of 51.6%, which is very close to the results of the present study regarding the prevalence of musculoskeletal disorders in the lower back, indicating a high prevalence of problems in this area among Iranian workers. Liu et al. also examined the prevalence of low back pain among workers in various African countries in their systematic review using 27 articles [31].

In addition, the results of the study by Hu et al. also showed that back pain is a major problem in countries around the world; so that the global one-year prevalence of musculoskeletal problems in the articles reviewed in this study was between 22-65%. In our study, although the maximum rate was 57.5%, the results were almost similar to the results of other countries in the world in this review study. However, the minimum prevalence rate estimated in our study was almost twice that of this study; therefore, it can be admitted that this problem was more severe among Iranian employees and requires further investigation to investigate the causes of this prevalence.

The results of the study of the prevalence of musculoskeletal disorders by Mehrparvar et al. in Yazd, which was conducted on 92 workers of a food production factory, also showed that the prevalence of these disorders in the waist, shoulder, neck and wrist areas was 44.6, 17.4, 9.9, 22.2%, respectively, indicating a high prevalence of disorders in the waist (6.44%), which was also consistent with the results of our study. On the other hand, the study by Osborne et al. also showed that the prevalence of musculoskeletal disorders of any type during the life of farmers was 90.6%, and the prevalence of these disorders in a one-year period with a 95% confidence interval was 76.9%, and the prevalence of these disorders in the upper limbs was in the range of 4.71-6.3% and in the lower limbs in the range of 10.4-41%. [32]

This is while in our study, among musculoskeletal disorders of the lower extremities, back pain had the highest prevalence with a prevalence of 49%, and the rate of back pain in office personnel was the highest with a prevalence of 53%. Also, based on other findings of our research, in studies conducted in different regions of Iran, the prevalence of back pain was estimated as 51.6% in northern Iran, 50.2% in southern Iran, 57.8% in eastern Iran, 41.5% in western Iran, and 47.2% in central Iran, respectively; Therefore, according to the results of these studies, more attention should be paid to the health of the lower extremities and ergonomic intervention training programs should be considered by managers and officials of organizations to prevent musculoskeletal disorders related to these organs in workplaces [33].

Other results of our study showed that the prevalence of musculoskeletal disorders in the upper limbs in studies conducted in the cities of Tehran and Shiraz was higher than in other cities, and the prevalence of these disorders was lower in the city of Yazd. This part of our findings is consistent with the results of the study by Azizpour et al., who showed that the prevalence of low back pain throughout life in their studies conducted in the cities of Tehran and Shiraz was higher than the study conducted in the city of Yazd.

The prevalence of musculoskeletal disorders reported in the upper limbs in the study by Mirmohammadi et al. was 24% in the neck, 17% in the shoulder and arm, 9% in the upper back, and 50% in the lower back, which was consistent with the results of our study. On the other hand, according to other findings, there was no significant relationship between the prevalence of back pain and the average age of the subjects. In other words, according to the results of the study, it can be said that ergonomic design of workstations and

ergonomic training reduces the risk of work-related musculoskeletal disorders, especially the spread of these disorders in the upper limbs and lower back; Therefore, ergonomic training and occupational health-based training are recommended to prevent the occurrence of such disorders. It is suggested that in future research on the prevalence of musculoskeletal diseases, a sample of valid and reliable questionnaires in Persian and shortened versions should be used, and more detailed studies should be conducted to assess pain and discomfort [34].

## Sports massage reduces muscle pain

If you're wondering if massage can help you after a hard run or workout, the evidence is overwhelming. Clinical trials have found that there's some evidence that sports massage can reduce muscle soreness. A comprehensive review found evidence that massage is effective, while other commonly used tactics like ice, stretching, and low-intensity exercise were ineffective. A post-run foot massage can help reduce soreness in the days following a run [35].

## Does massage help with performance recovery?

Swedish massage improves muscle recovery time, and massaged muscles are less likely to hurt and have less swelling and inflammation. To better understand this, a four-day study was conducted on rabbits; they were sedated and their muscles were subjected to simulated exercise. The test group of rabbits then gave them a simulated massage and found that the massaged muscles had fewer damaged muscle fibers and no signs of white blood cells repairing muscle damage. The massaged muscles showed less signs of swelling and weighed 8 percent less than the unmassaged muscles. One study also suggests that massage reduces markers of inflammation after exercise, which could mean less exercise-induced muscle damage [36].

## Improve Brain Function with Massage and Relaxation

Since brain function depends on its blood supply, blood circulation can be increased with simple massage movements or acupuncture. Poor blood circulation caused by excessive pressure, fatigue or stress can lead to headaches, memory loss, slower reactions, and inability to concentrate or even mental confusion. The ear is directly connected to the brain, so massaging the external and visible part of the ear increases blood flow to the brain. Earlobe massage is very effective. For example, the center point of the earlobe is associated with vision. Vision can be improved by massaging it or pressing this point firmly. Scalp massage as well as neck massage can also improve blood supply to the brain [37].

## The Importance of Sports Massage

Sports massage, if applied by experts and professionals, can bring many benefits to the athlete. Preventing future injuries, regular and planned massage, treating and reducing pain, muscle cramps, creating balance in the skeletal system of the body, improving athlete performance, reducing levels of stress hormones such as cortisol, feeling calm and reducing anxiety, preventing the formation of scar tissue at the site of injury, and increasing the range of motion of joints are some of the benefits of sports massage [38].

## Athletes' need for massage

Many people wonder why athletes need massage with so much exercise. But you should know that regular massage, especially sports massage, is important and one of the benefits of massage for athletes is that it has a great impact on their mental fitness. An athlete needs to have a calm mind and body, to be alert and

efficient quickly or for some reason, many injuries that occur on the field need massage. Athletes, like any ordinary person, need to relax their bodies sometimes. The need for massages is a popular way to increase the efficiency and ability of an athlete.

## Foot massage

One of the benefits of massage for athletes is blood flow in the feet. Standing and walking for a long time can cause a lot of pressure on the plantar fascia, which causes a feeling of fatigue or foot pain. Foot massage can also help relieve this feeling of fatigue and pain. The organs that can be improved with foot massage include eye health and headache treatment, improvement in the small intestine, lung treatment, back pain treatment, neck pain relief, heart relaxation, knee pain, stomach improvement, thyroid problem and liver improvement [39].

## Conclusion

According to a study by Choubineh et al. in Isfahan on 1439 people, the prevalence of symptoms of these disorders was high in carpet weavers and was mainly in the waist (45.2%), hips and buttocks (6.1%), knees (34.6%), and ankles (23.7%) (34.6%). In another study conducted by Mostaghasi et al. in Yazd on 92 workers of a food production factory, they reported a prevalence of back pain of 44.6%. Today, given that the prevalence of musculoskeletal disorders of the body organs is of great importance in most industrialized and developing countries, information about the latest statistics at the national level can provide health planners with the opportunity to design and provide prevention-based occupational health training in the most desirable way. On the other hand, meta-analysis studies are often conducted to achieve accurate results with high statistical power and at the same time, validity, which is a result of increasing the sample size due to combining different studies and reducing the confidence interval of these measurements.

Overall, the results of the study indicate that work-related musculoskeletal disorders among Iranian employees, especially in the upper limbs (neck, shoulders, wrists) and lower limbs (waist, knee, thigh, hip, and upper back), have a relatively high prevalence compared to other countries. In this study, the highest injury in all work-related work groups was in the lower limbs, especially in the waist (49%) and in the knee (39.2%). Among the upper limbs, the highest incidence of musculoskeletal disorders was in the neck. Therefore, it can be said that considering the age, work experience, years of education, and physical ability of employees in using them in different departments and ergonomic training of employees in the field of the best correct way to do work and the best body posture while working or sitting are among the measures that can play an effective role in preventing musculoskeletal disorders. Accordingly, it is suggested that ergonomic and occupational health intervention programs be implemented to control or eliminate the risk factors for occupational diseases in different jobs. Also, the risk of work-related musculoskeletal disorders, especially the spread of these disorders in the upper and lower limbs, can be reduced by ergonomic design of workstations and ergonomic training intervention programs. On the other hand, due to the young age of the workers, there may not be a high number of musculoskeletal complaints at present, but it will create problems for the employees in the near future.

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