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Study on Aetiology of Ankle Supination Sprain Injury

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Abstract – When the rate of repetitive sprains and chronic symptoms is high (up to 75 % of initial lateral ankle sprains), it is important to better understand how LAS events can be managed and rehabilitated. The purpose of this article is to discuss the patho-physiology of LAS, its risk factors, and the available evidence on treatment modalities and exercises for LAS. Rehabilitation is the current gold standard of LAS treatment, which includes early mobilization with support. However, the high rate of relapse and development of chronic symptoms (up to 75%) after LAS suggests that the current standard of care may be ineffective Recent evidence suggests that more rigorous immobilization is needed to promote ligament healing and restoration of joint stability and function after LAS. Additionally, complementary therapies, including joint mobilization and balance training, have been shown to improve function and reduce the risk of relapse after LAS. Modifying current rehabilitation protocols to include ankle immobilization, joint mobilization, and balance training may be the first step in reducing the incidence of short- and long-term joint dysfunction.

Keywords – Etiology, Ankle, Supination, Sprain, Injury.

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INTRODUCTION

Lateral ankle sprains are one of the most common musculoskeletal injuries in daily activities. The ankle joint is the most common injured joint in athletes. Inversion sprains make up 70-85% of sprains in athletes. Up to 74% of people with acute lateral sprain develop chronic ankle instability. 10-30% of people with acute inversion sprains develop chronic mechanical instabilities and about 80% of ankle sprains recur. New injuries may be more common in high-risk sports like basketball, which have reported a 73% new injury rate. 3 The most common type of ankle sprain occurs due to excessive plantar flexion and supination. Ankle sprains caused by inversion accounted for 85 % of all ankle sprains[1].

An ankle sprain is defined as "an ankle injury caused by tripping and twisting the supporting foot that damages the ligaments."

New injuries may be more common in high-risk sports, such as athletes, for which a new injury rate of 73% has been reported. Ankle sprains are a common type of musculoskeletal injury. An "ankle sprain" is a type of ankle injury that occurs when a person trips and twists the supporting leg, damaging the ligaments. The most common mechanism of injury is a combination of inversion and adduction of the foot in plantar flexion, leading to an "inversion sprain" and subsequent injury to the ankle collateral ligament complex. Ankle sprains, especially the collateral ligament complex, are among the most common injuries to the musculoskeletal system.

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Repeated ankle sprains can cause pain during activity, weakness, swelling, and impaired function. A physical therapist can use manual therapy to treat musculoskeletal dysfunctions. A supinated ankle sprain occurs when the ankle is inverted and the foot is turned inward, as well as plantar flexion with adduction and inversion of the subtalar joint. 7 Occasionally there is also an external rotation of the lower leg with respect to the ankle. 8 According to Stormont et al. When the foot is plantar flexed, the anterior talofibular ligament is often damaged; Dorsiflexion of the foot often damages the calcaneofibular ligament. Although the majority of ankle sprains in soccer (59%) occur during contact with players, goalkeepers experience them in non-contact situations (79%).

Acute ankle sprain - definition

Often the terms "distortion" and "trunk" are used interchangeably. Technically, they refer to injuries to various types of tissue. "Sprains" is a slang term for ligament tears or damage. Ligaments are a type of fibrous connective tissue that connects bones. Strain is defined as damage to the tendons or muscles. Ankle sprains are among the most common injuries and are not limited to athletes. Ankle sprains are relatively common in sports. 11-13 sprains account for 4.7% to 24.4% of all musculoskeletal injuries and 25% of time lost in soccer, cross country, and basketball. About 23,000 ankle sprains occur every day in the United States. An inversion injury can cause a lateral ankle sprain, so the affected person must cope with the pain and effusion on the side of the ankle avoiding fractures. Sprain is also defined as an injury that causes a ligament fiber to stretch, and as the injury progresses, damage to the ligament fiber increases. The plantar flexion and inversion mechanisms of the ankle are most often damaged[2].

Pathophysiology

LAS damages the passive ligament structures of the ankle. This is because the most common injury mechanism is excessive plantar flexion and ankle inversion, which often leads to lateral ligament tear. The anterior talofibular ligament (ATL), the weakest ligament in the body, is the first to be injured. 8 After ATFL rupture, the calcaneofibular ligament (CFL) and finally the posterior talofibular ligament (PTFL) are damaged (PTFL). 8 ATFL injuries occur independently in 66 % of LAS, while ATFL and CFL tears occur simultaneously in 20 % of LAS. 8 Due to the great force required to cause damage and the dorsiflexion required to tension the ligament, the PTFL is rarely injured. The dorsiflexion required to stretch the PTFL brings the ankle to a closed and more stable position, minimizing the risk of ligament injury. In addition to the lateral ligament structures of the talocrural joint, the subtalar ligaments can also be damaged. Rubin and Witten were the first to study subtalar instability as a separate clinical entity; However, they hypothesized that subtalar joint injury is often associated with a lateral ankle injury. Furthermore, the prevalence of subtalar instability in people with ICA is estimated to be between 75% and 80%.[3]

Incidence, Prevalence, and Types of Ankle Sprains

Previous research found that the most common type of injury was a knee injury, followed by an ankle injury. In 24 of the 79 sports studied, the ankle was the most injured body part. 22 The most common type of injury experienced by college athletes in the United States was a sprained ankle. The ankle (16.8-24.7%) and the knee (27.3-50.5%) were found to be the area's most prone to injury in long-distance running, volleyball, basketball, and soccer, according to a survey of 2,293 sports injury patients. In another study of 580 marathon runners, knee injuries accounted for 33.9% of total injuries, while ankle injuries accounted for 20.9% of total injuries. 24 80% of ankle injuries are sprains, the most common type of sports injury in all body types and positions. 25-27. 77% of ankle sprains were lateral sprains. Between 28 and 73% of cases indicated a torn or isolated anterior talofibular ligament. 29.30 A local survey of 380 athletes found that the majority of injured athletes were jogging and running (25%), soccer (14%), ball games (19%), and rackets (19%). (19 percent). (twenty%). The remaining problems (30.2%) were swelling (13.9%), stiffness (14.6%), weakness (16.5%), crepitus (18.3%), instability (20.4%) and specified pain.

Ankle anatomy

The ankle, or talocrural region, is the point of contact between the leg and the foot. 32 The ankle is made up of three joints: the talocrural or true joint, the inferior tibiofibular joint, and the subtalar joint. 33-35 The terms dorsiflexion and plantar flexion refer to the movements produced in that joint. The term "ankle" is used in common parlance exclusively for the ankle region. The term "ankle" (no name) in medical terminology refers to the ankle region in general and the ankle joint in particular. The talus and tibia are the most prominent bones in the ankle area, while the fibula is the most common bone in the leg. The ankle bone is also called the ankle joint. The talocrural joint is a folding synovial joint that connects the tibia, fibula, and the proximal end of the talus in the lower extremity. The talus-tibia joint is stronger than the talus-fibula joint.

Ankle ligaments

Three collateral ligaments and a strong delta ligament surround the ankle. The three lateral ligaments are the calcaneofibular ligament, the posterior talofibular ligament, and the anterior talofibular ligament.

- The deltoid ligament stabilizes the medial side of the joint and is attached to the medial malleolus of the tibia.

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- The posterior and anterior talofibular ligaments provide adequate support for the lateral sides of the joints, which extend from the lateral malleolus of the fibula to the dorsal and ventral talus of the talus[4].

Etiology of supine ankle sprain

Most ankle sprains were caused by an increase in the moment of supination at the subtalar joint, often due to the location and size of the floor reaction force projected vertically when the foot made contact. When the plantar center of pressure was moved medially towards the axis of the subtalar joint, a larger lever arm was obtained along the axis of the subtalar joint, resulting in increased impulsive supination required to induce supination. Sudden explosive ankle. Wright et al. and his colleagues concluded from a dynamic computer simulation study that increased plantar flexion when sitting resulted in an increase in ankle sprains. When a plantar flexed foot hits the ground during landing, the forefoot makes contact, increasing the lever between the axis of the subtalar joint and the resulting joint torque, resulting in a brutal and explosive twisting motion and an ankle sprain. Consequently, foot placement at the time of contact was identified as the etiology of the ankle sprain. He also supported the idea that the ankle brace or brace would correct the ankle position during landing, rather than mechanically supporting the ankle.

Pathomechanics of lateral ankle sprain

The main cause of lateral ankle sprains is excessive supination of the back of the foot around an externally rotating leg immediately after the back foot first hits the ground during a jump or march. 71-72 The combination of internal rotation and inversion of the rear foot and external rotation of the lower leg places stress on the external ankle ligament. Belt damage occurs when the tension in one of the belts exceeds the tensile strength of the fabric. Increased plantar flexion on initial contact appears to be associated with an increased risk of lateral ankle sprain [5].

OBJECTIVES

1. Investigate the etiology of supine ankle sprain

2. Study the incidence, prevalence, and patterns of ankle sprains.

RESEARCH METHOD

Study design

The study used a pre-experimental and post-experimental design, with participants randomized to control or experimental groups. The control group receives standard care, while the experimental group receives functional therapy, mulligan mobilization, and standard care.

Selection of participants

Human subjects aged 35-50 years of both sexes with acute unilateral ankle sprain were recruited at Prince Sultan Military Medical City, Riyadh, KSA Saudi Arabia. In the opinion of the members of the institutional council of the doctoral commission, the study participants were clearly informed about the benefits of the exercise, their right to withdraw from the study at any time and the criticality of continuing with the study[6].

Integration criteria

The study recruited participants who reported ankle pain and functional difficulties, as well as those who had a grade I ankle sprain. Participants were both male and female and between the ages of 35 and 50.

Exclusion criteria

The study excluded participants with a history of recurrent sprains, ankle instability, recent ankle fractures, sensory impairment, or any history of treatment.

DATA ANALYSIS

Patient's data

In this section, the demographic profile of the interviewees was analyzed

Table 1: Gender Frequency

Gender	Total	Percentage
Male	24	48%
Female	26	52%
Total	**50**	**100%**

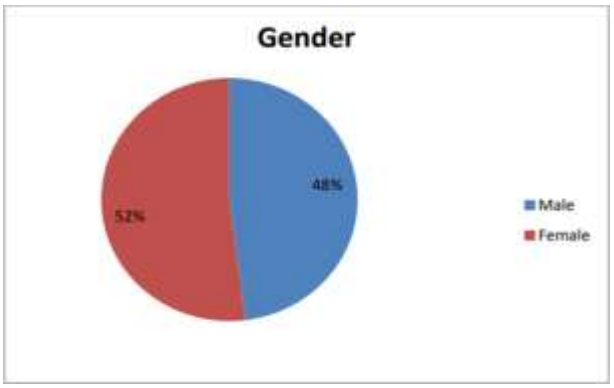

Figure 1: Gender Frequency

Interpretation: From Table 1 and Figure 1, 26 women and 24 men actively participated, the majority suffered an acute unilateral ankle sprain...

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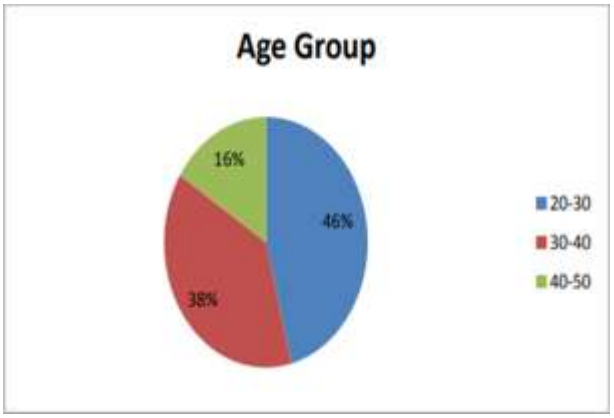
Table 2: age range

Age Group	Total	Percentage (%)
20-30	23	46
30-40	19	38
40-50	8	16
Total	**50**	**100**



Interpretation : Most of the study patients (46 %) were between the ages of 20 and 30 ; 38 % were between 30 and 40 years old ; and 16% were between 40 and 50 years old. It was shown both in the table above and in the illustration[7]...

Table 3: Ankle dorsiflexion interval

Ankle Dorsiflexion Range	Total	Percentage (%)
Right	25	50
Left	25	50
Total	**50**	**100**

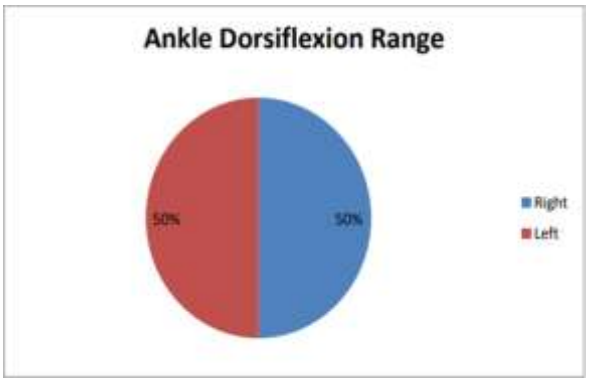


Figure 3: Frequency of the ankle dorsiflexion area

Interpretation: The majority of study patients (50%) are right dorsiflexed, while the remaining 50% are left dorsiflexed[8].

CONCLUSION

The present study concluded that when functional therapy and mulligan mobilization were combined with conventional physical therapy for six weeks, participants with acute unilateral ankle sprain showed significant improvements in functional and clinical outcomes compared to conventional physical therapy. In combination with conventional physical therapy, functional therapy and mobilization improved ankle function, reduced ankle pain, and increased ankle dorsiflexion. Based on the results, the study accepts the alternative hypothesis and rejects the null hypothesis. Therefore, functional therapy and mulligan mobilization is recommended as a necessary component of rehabilitation after an acute unilateral ankle sprain[9-10].

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