

## ORIGINAL SCIENTIFIC PAPER

# Deep Tissue Massage and Soft Tissue Release in the Management of Chronic Ankle Injury

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## Abstract

Deep Tissue Massage and Soft Tissue Release have been widely applied for injury rehabilitation. Both types of massage aim to eliminate the muscle tension that precedes or follows an injury. It is not known how effective each method is, and whether a difference between the two exists in achieving a desirable outcome of injuries, especially ankle injuries, which often occur. With this rationale, this study will examine the effectiveness and the differences of the massage approaches in managing ankle injuries. An experimental method was used in this study, involving 40 research subjects with chronic ankle injuries. Convenience sampling was used to recruit subjects, following which informed consent was signed following sufficient explanation about the experiment. Before and after the treatment approaches were carried out, the degree of pain perceived by the subjects was assessed with the Visual Analog Scale (VAS), and the level of ankle function was measured with Adapted Foot and Ankle Ability Measurement (FAAM). Ordinal collected data were analysed with non-parametric Wilcoxon sign rank test to determine the effectiveness of each method, and the U Mann Whitney to estimate the differences between the two methods. The results showed that Deep Tissue Massage and Soft Tissue Release massage decreased pain and increased ankle function significantly ( $p=0.001$ ), with the effectiveness of 67.5% and 61.1%, respectively, for decreasing pain and 21% and 24.7%, respectively, for increasing ankle function. There was no significant difference in effectiveness between Deep Tissue Massage and Soft Tissue Release in the management of chronic ankle injuries.

**Keywords:** *deep tissue massage, soft tissue release, ankle injury*

## Introduction

Ankle injury often occurs during physical activities and sports. It is more frequently found in athletes who more extensively use the lower extremities. Furthermore, ankle injury is the most common repeated injury because it is followed by mechanical or functional instability (Prentice, 2008; Kisner & Colby, 2007). Functional disorders in ankle injuries occur because of insufficiencies in motor-sensory function consisting of proprioceptive, postural control, neuromuscular control, reflexes disturbance in inversion reactions, and muscle strength. Motor sensory deficits occur because of a decrease in motor recruitment and non-ac-

tivation of the Golgi body (Weerapong, Hume, & Kolt, 2005). It is well known that the ankle joints are arranged by the distal tibia, fibula, and superior thallus, which are bound by elastic ligaments as passive stabilization of the ankle and foot joints. The frequently injured ligaments are lateral complex ligaments, consisting of anterior talofibular ligaments that function to resist plantar flexion; posterior talofibular ligaments, which function to withstand inversion movements; calcaneocuboid ligaments, which hold back plantar flexion movements; talocalcaneal ligaments, which function to resist flexed plantar ligaments; and posterior talofibular ligaments, which function to



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resist inversion. The three most important ligaments are the anterior talofibular ligament (ATFL), the calcaneofibular ligament (CFL), and the posterior talofibular ligament (PTFL), which are lateral ligaments (Small, 2009; Golano, Vega, Peter, & de Leeuw, 2010).

Not only ligaments, but tendons are also often injured, especially the peroneus longus and brevis tendons that function for leg eversion (Farquhar, 2013). The prevalence of ankle sprain is most common among soccer players. As indicated by Walls et al. (2016), ankle injuries constitute one third of cases of lower limb ceedra. During the 2004 Athens Olympics, ankle injuries were more common in soccer than other sports (Badekas et al., 2009). Furthermore, Junge and Dvorak (2014) noted that at the Futsal World Cup in 2000, 2004, and 2008 ankle sprain occurred in 10% of cases. In Indonesia, Abdurahman (2015) noted that in the Taekwondo Pre PON Competition, there were 37 cases of injuries, and 18% of them were ankle injuries. Kamal (2016) identified 41 cases of injury in football and found ankle injuries in 29.26% of cases. Thus, ankle injuries often occur mainly in soccer athletes; furthermore, Elliott, Ellis, Combs, and Hunt Long (2015) revealed that most soccer players undergo the process of rehabilitation and therapy poorly, resulting in chronic injury.

Massage in injury management has been done for a long time, including to deal with ankle injuries (Anderson, 2011). Deep Tissue Massage and Soft Tissue Release are two massage methods that are often used with the primary objective of myofascial release. Deep Tissue Massage will release soft tissue with a direct emphasis on the trigger point for 8-20 seconds followed by effleurage, petrissage, or friction using fingers, palms, knuckles, and elbows (Fernandez, 2016). Soft Tissue Release will release soft tissue by locking, followed by stretching. Locking will eliminate shortened muscle fibres and adhesion between muscle groups while stretching (both passive and active) will help stiff muscles become relaxed (Sanderson & Odell, 2013). Manipulation on Deep Tissue Massage requires oil and the therapist's hands must touch the skin directly, so it requires a dedicated room or space. This is manipulation will make the patient comfortable, even though it requires a lot of energy for the therapist (Johnson, 2011).

In Soft Tissue Release, there is no need for oil, and patients do not need to undress, so it can be done on the field without special equipment or space. The patient is involved in stretching while the therapist maintains pressure. This reduces patient comfort but is safer because it does not exceed the pain and ROM (Range of Motion) tolerance of the patient, and for the therapist, it will save energy (Pattanshetty & Raikar, 2015).

Myofascial release produced by the two methods will reduce pain and allow realignments of joints and tendons,

thereby increasing ankle function. Given the advantages and disadvantages of Deep Tissue Massage and Soft Tissue Release, this study will examine the effectiveness of both in the management of chronic ankle injuries with indicators of success in decreasing pain and increasing ankle function.

**Methods**

This study was experimental research with two-group pretest and posttest design. The research subjects were 40 people (based on a quota sampling scheme), consisting of 20 women and 20 men, with equal gender distribution in the Deep Tissue Massage and Soft Tissue Release groups. The average age, height, and weight of the study subjects were 33.4 years, 163.28 cm, and 61.8 kg, respectively. All recruited subjects, both athletes or non-athletes, were with engaged with physical activities at the Yogyakarta Public University Sport Center. The levels of subject activity were classified: 24 people in the mild category (60%), 12 people in the moderate category (30%), and 8 persons in the heavy category (10%). The average duration of injury was 7 weeks.

A total of 40 subjects fulfilled inclusion criteria: older than 20 years, with a chronic ankle injury (more than 6 weeks), and agreed to participate in the study (signing informed consent). Exclusion criteria were ankle injury accompanied by fracture, total ligament tore (post-operative), and those taking painkillers and anti-inflammatory medications. Men were separated from women; subjects with odd numbers of registration were assigned to Deep Tissue Massage, while those with even numbers were treated with Soft Tissue Release. Data were collected as pretest and posttest, consisting of pain measurement with Visual Analog Scale (VAS), and ankle functions rated with Foot and Ankle Ability Measurement (FAAM). Data collection and intervention procedures were done in the Exercise Therapy Laboratory, Sport Sciences Faculty, Universitas Negeri Yogyakarta (Yogyakarta Public University). Deep Tissue Massage and Soft Tissue Release were applied to the lower extremities with an average duration of 15 minutes. Data descriptions included gender, age, duration of injury, level of physical activity. Changes in pain level and ankle function for the two treatment groups were described as the percentage of change of the pretest level, compared using the Wilcoxon sign rank test. Differences in the effectiveness of the two treatments were statistically tested using the Mann Whitney U test.

**Results**

The result from this research was presented consecutively to show the influence of Deep Tissue Massage and Soft Tissue Release on the pain or ankle injuries through (1) pain scale, ( 2) ankle function, and (3) level of pain and ankle function before and after treatment.

**Table 1.** Pain scale (N=20)

Method	N	Pretest	Posttest	Mean	%
Deep Tissue Massage	20	4.40	1.43	2.97	67.5
Soft Tissue Release	20	4.75	1.85	2.90	61.1

Data in Table 1 indicated that those with Deep Tissue Massage group experienced higher average decreases in pain level compared to those with Soft Tissue Release

(67.5% vs 61.1%).

Ankle function before and after treatment is shown in Table 2.

**Table 2.** Ankle function

Method	N	Pretest	Posttest	Mean	%
Deep Tissue Massage	20	73.72	89.23	15.5	21
Soft Tissue Release	20	70.15	87.45	17.3	24.7

The table above shows that Soft Tissue Release was a better method to improve the ankle function with 24.7% against 21% for Deep Tissue Massage

Differences before and after treatment tested with the Wilcoxon Signed Rank Test are shown in Table 3.

**Table 3.** The level of pain and ankle function before and after treatment

Method	Variable	Pretest	Posttest	Z	p
Deep Tissue Massage	Pain	4.4	1.43	3.84	0.001
	Function	73.72	89.23	3.83	0.001
Soft Tissue Release	Pain	4.75	1.85	3.93	0.001
	Function	70.15	87.45	3.928	0.001

Both Deep Tissue Massage and Soft Tissue Release significantly decreased pain and increased ankle function (p=0.001).

Differences between Deep Tissue Massage and Soft Tissue Release methods were tested with the Mann Whitney U Test, as shown in Table 4.

**Table 4.** The difference in pain and ankle function between Deep Tissue Massage and Soft Tissue Release Method.

Method	Variable	Posttest	p
Deep Tissue Massage	Pain	2.97	0.195
Soft Tissue Release		2.90	
Deep Tissue Massage	Function	15.5	0.521
Soft Tissue Release		17.3	

The results from the table above showed that Deep Tissue Massage has a positive influence on decreasing pain and healing injuries, but Soft Tissue Release also has a benefit in improving patient health. However, there is no significant difference between Deep Tissue Massage and Soft Tissue Release in increasing the patient health status (0.195 & 0.521)>0.05. In general, both methods are effective in solving the pain and injuries of both athletes and non-athletes.

**Discussion**

Pain is a negative sensory and emotional experience associated with actual or potential tissue damage (Anderson & Parr, 2011). In an ankle sprain, the stretching and tearing of the complex lateral ligaments result from the inversion and plantar flexion force that bursts when the foot rests imperfectly on an uneven floor or ground (Kisner & Colby, 2012). Inflammatory processes that occur due to tearing will cause pain and decreased the function of the ankle. In subacute or chronic injury, there will be a crunch in the muscles making it difficult to stretch. Manipulative therapy, especially Deep Tissue Massage and Soft Tissue Release, will target specific regions of muscle tension, including muscles that are difficult to stretch actively (e.g., fibularis or peroneal muscle groups) and isolate muscle groups that usually stretch together, such as the vastus lateralis from quadriceps muscles (Johnson, 2009). At the time of suppression, gripping, and squeezing, blood flow to the area is blocked, but at the time of release, small blood vessels are no longer compressed, so fresh blood will flood the area. Thus, the massage will work as a pump (Johnson, 2011).

Massage is one method for relieving pain and related symptoms. Mechanical pressure in muscle tissue can improve local microcirculation of blood and lymph flow, which can fur-

ther reduce swelling, ischemia, or build-up of substances that directly or indirectly cause pain (Vegar, 2013). The benefits of therapeutic massage against muscles include relieving muscle tone and stiffness, accelerating healing of muscle strains and sprains by reducing muscle pain and restoring range of motion (ROM). Massage is known to stimulate cutaneous receptors so that it can potentially cause local lateral inhibition of pain feedback of the spinal cord. Lin, Hiller, and de Bie (2010) said that exercise therapy may reduce the occurrence of recurrent ankle sprains and may be effective in managing chronic ankle instability. After surgical fixation for ankle fracture, an early introduction of activity, administered via early weight-bearing or exercise during the immobilization period, may lead to better outcomes.

The pull and strength applied to muscle fibres from various massage techniques also activate the Golgi tendon and nerve organs. Their afferents have large diameters. Activation of large nerve fibres capable of sending nerve impulses quickly can partially block smaller and slower nerve fibres so as to reduce pain.

The Soft Tissue Release method involves stretching the fascia and releasing bonds between the fascia and skin, muscles, and bones with the aim of relieving pain, improving ROM and body balance (Namvar, Olyaei, Moghadam, & Hosseinifar, 2016). If the pain declines and the ROM rises, the function will increase. The results of the study of Pattanshetty and Raikar (2015), which examined the effects of three types of soft tissue manipulations, showed that the myofascial release technique could reduce pain and improve ROM in plantar fasciitis cases. Park et al. (2017) explained that massage is a systematic manual manipulation of the body by movements such as rubbing, kneading, pressing, rolling, slapping, and tapping for thera-

peutic purposes. These movements promote the circulation of the blood and lymph, relaxation of muscles, relief from pain, and restoration of metabolic balance

Field (2018) said that there are at least three mechanisms that underlie the effects of massage therapy on chronic pain: increasing vagal activity, reducing the inflammatory process, and reducing substances. Stimulation of pressure receptors will increase vagal activity and in patients with chronic pain lower vagal-mediated heart rate variability is indicated by increased vagal activity.

The principle of handling with the Soft Tissue Release method was emphasized on trigger points, then stretched. The aim of Soft Tissue Release is to free fascia and maintain network functions. This technique is used to relieve pressure in connective tissue. Careful myofascial stretching and maintaining a certain amount of time are believed to free the bond, softening and extending the fascia. Freeing the fascia where the nerves and blood vessels are located helps increase the transmission of the circulatory and nervous system. This technique is widely used in chronic conditions to help change the basic viscosity of the substance to a more fluid

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#### Conflict of Interest

The authors declare that there are no conflicts of interest.

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- The advantage of the Soft Tissue Release method is the involvement of patients; in other words, patients actively participate in therapy. Methods by involving patient activity are seen as safer, and therapists should attempt to use them. This method is felt to relieve the therapist because patients actively participate in treatment procedures. In addition, lotions or lubricants are not needed so the method can be more practically applied in the field setting. The effect of relaxation is longer, although the onset of therapy is slower, and patient comfort during the treatment is somehow lacking.
- Deep Tissue Massage and the Soft Tissue Release Method are effective in decreasing pain and increasing the function of the ankle. The effectiveness of Deep Tissue Massage and Soft Tissue Release were 67.5% and 61.1% for decreasing pain, and 21% and 24.7% for increasing ankle function, respectively. There was no significant difference between Deep Tissue Massage and Soft Tissue Release in decreasing pain and increasing ankle function.
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