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Research Article

COMPARISON BETWEEN THE IMMEDIATE EFFECTS OF MANUAL AND SELF MYOFASCIAL RELEASE TECHNIQUES IN AIR-HOSTESSES USING HIGH HEELED SHOES

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ABSTRACT

Background: Prolonged use of high heeled shoes tend to shorten the muscle tendon units causing tightening of the muscle fascicles of gastrocnemius muscle. Myofascial release works on fascia to release the soft tissue adhesions, thus causing lengthening of the muscle.

Methodology: This was an experimental pre/post study. 60 air-hostesses were taken for the study as subjects. They were then divided into two groups of 30 each – Group A and Group B. Both the groups were assessed and reassessed for ankle dorsiflexion Range of Motion (ROM) pre and post the intervention. Group A was implemented with manual myofascial release technique and Group B was implemented with self myofascial release technique using a foam roller. The mean of the difference of pre and post techniques was taken. Comparison between the immediate effects of both the techniques was done using student's unpaired t-test.

Results: Manual myofascial release technique promoted significant increase in the ankle dorsiflexion ROM as compared to the self myofascial release technique using foam roller. ($p < 0.001$).

Conclusions: Manual myofascial release is more effective as compared to self myofascial release technique in increasing ankle dorsiflexion ROM.

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INTRODUCTION

Myofascial release therapy (MFR) is defined as “the facilitation of mechanical, neural and psycho-physiological adaptive potential as interfaced via the musculo-fascial system.”⁹

Myofascial release is the gentle manual application of sustained pressure to release fascial restriction.⁹

Anatomy of Fascia

Fascia is divided into three layers

1. Superficial fascia (hypodermis) lies beneath dermis and consist of loose connective tissue and adipose tissue.
2. Potential space, which enlarges with extravasation of oedema.
3. Deep fascia is a dense sheet or band of fibrous connective tissue that separates the muscle into functioning groups and lines the body, covering all organs of the body.¹⁰

Role of Fascia

- Support and protection
- Proprioception
- Mobility / biomechanics

- Lubrication
- Shape
- Fat storage
- Repair / healing
- Defense
- Shock absorption
- Create interstitial spaces¹⁰

Dysfunctions of Myofascial Unit

- Restrictive scar tissue
- Localized trigger points
- Weakness and increased tone
- Adaptive muscle shortening
- Injury to the musculo-tendinous structures¹⁰

One common condition that places muscle-tendon units (MTUs) in a shortened position is wearing high heels. The length of calf MTUs is reduced by ankle plantarflexion caused by the heel lift imposed by the high heels. Being mechanosensitive tissues, tendons may adjust both their size and their material properties to maintain constant strain when the forces acting on them increase or decrease. Consequently,

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any change in the contractile behaviour of the plantarflexor muscles induced by long-term use of high heels might indirectly also affect tendon mechanical properties. Thus regular wearing of heels would lead to shortening of the fascicles of the gastrocnemius muscle together with changes in the mechanical properties of the Achilles's Tendon, resulting in functional alterations contributing to the reduction in the ankle active range of motion.⁵

Studies conducted showed the effectiveness of the various myofascial theories such as trigger point therapy, active release technique and self-myofascial release on joint range of motion, muscle force and muscle activation.²

Myofascial Release

The dermis is attached to the myofascia through a network of collagenous fibres (retinaculum cutis) that passes from basilaris to the underlying fascia. The gentle and sustained myofascial release supplies mechanical and thermal energy. This energy converts the ground substance into gel state which allows facilitation of sliding movement of collagen and elastin fibres. This frees up the adhesions and lengthen the fascia.^{9,10}

Self-Myofascial Release

Self-myofascial release is a popular intervention used by both rehabilitation and fitness professionals to enhance myofascial mobility.² Foam rollers are cylinders made of varying densities and textures of foam and pressure is applied by the individual externally or by using body weight.⁷ It works by breakdown of soft-tissue adhesions, thus lengthening the muscle.²

Although studies have shown that manual myofascial release and self-myofascial release techniques are effective for increasing range of motion, there have not been any studies performed for a direct comparison between manual and self-myofascial release techniques for range of motion.^{2,7}

Studies have shown that wearing high heel shoes can change musculoskeletal system of lower extremities and spine. Wearing high heel shoes for longer duration reduces the contractile properties of plantarflexors causing shortening of the plantarflexors.⁵

Tight plantar flexors eventually leads to restricted active ankle dorsiflexion ROM.⁵ By performing myofascial release techniques on these tight myofascia of ankle plantarflexors have effects on increasing the ankle joint dorsiflexion range of motion by releasing the tight myofascia.^{1,7}

Reduced dorsiflexion range of motion is checked by using a universal goniometer.⁸ Myofascial release techniques include manual and self-myofascial release techniques. Manual release technique is performed by the therapist on the subject to increase the joint range of motion. Self-myofascial release can be performed using foam rollers, roller massager, tennis ball etc.⁷ Foam rollers is one of the main tools used in the myofascial release. The subject uses foam roller and performs self-release technique to release the tight myofascia under the guidance of the therapist.² The technique of static stretching has been the principle technique for obtaining an acute increase in joint range of motion. However, literatures are available which show acute reductions in performance in association with static stretching. Foam rolling, a form of self-myofascial release

technique also increases joint range of motion acutely with no evidence of decrease in reduction in force production.⁴

MATERIALS AND METHODS

Materials Used

- Universal half goniometer
- Foam roller
- Plinth
- Yoga mat
- Pen
- Paper

Study Design

- TYPE OF STUDY : Comparative study
- POPULATION : Air hostesses wearing high heels since 1 year
- DURATION OF STUDY : 1 year

Sample Design

- SAMPLE SIZE : 60
LOCATION : Metropolitan City
- TYPE OF SAMPLING : Convenient sampling

Inclusion Criteria

- Air-hostesses who are willing to participate in the study.
- Active ankle dorsiflexion ROM : less than 20 degrees.
- Duration of wearing heels : minimum 1 year.
- Wearing heels for minimum 5 times a week and 5 hours a day.
- Heels height : 2"
- Type of heels : Pencil heels.

Exclusion criteria

Air- hostesses with

- no ankle pathology.
- no foot deformities.
- no medical or surgical co-morbidities.

Procedure

90 air-hostesses who are willing to participate were included in the study. All the subjects were screened as per the inclusion and exclusion criteria. Purpose of the study and procedure were explained to the subjects prior to the study. A written informed consent was taken from all the subjects prior to participation.

The subjects were then divided into two groups: group A (45 subjects) and group B (45 subjects). The subjects were assessed for active ankle dorsiflexion ROM using universal half goniometer. The manual myofascial release technique was performed on group A and later they were re-assessed for active ankle dorsiflexion ROM. The self-myofascial release technique using foam roller was performed by the subject under supervision on group B and later they were re-assessed for active ankle dorsiflexion ROM. The data was collected and statistically analysed to compare the immediate effect of manual myofascial release and self-myofascial release techniques on active ankle dorsiflexion ROM using student's unpaired t-test.

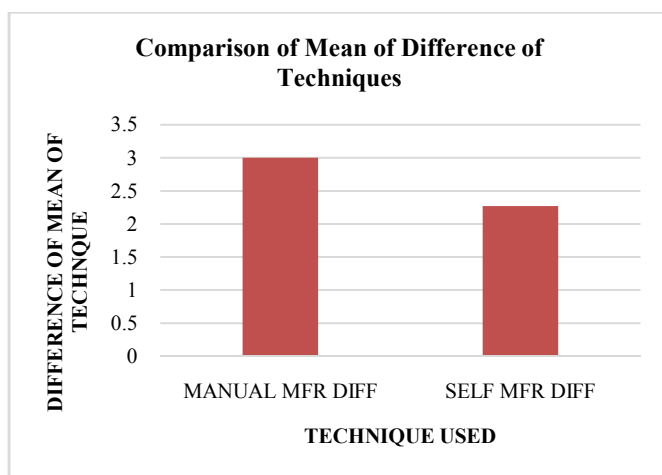
RESULTS

Table 1 Comparison between the mean of differences of manual and self myofascial release techniques on ankle dorsiflexion in air-hostesses.

Technique	Mean	Standard deviation	P value	Significance
Manual myofascial release	3	±0.98	0.001	Significant
Self myofascial release	2.27	±0.739		

*p<0.05
N=60

The data was checked for normality using the test. The readings showed a normal distribution. There was statistical significant difference between immediate effects of manual and self myofascial release techniques in air-hostesses using high heeled shoes ($p < 0.001$).



Graph 1

Inference: The above graph shows that the mean of the difference of manual myofascial release technique is more than that of self myofascial release technique.

DISCUSSION

In the current study, 60 air-hostesses were chosen as subjects and were screened on the basis of the inclusion and exclusion criteria. The subjects were then randomly divided into two groups of 30 subjects each. The subjects of the first group were assessed for active dorsiflexion ROM using universal half goniometer and were then administered with manual myofascial release technique and immediately re-assessed for active ankle dorsi flexion ROM. The subjects of the second group were also assessed for active ankle dorsiflexion ROM using universal half goniometer and were then administered with self myofascial release technique using a foam roller. They were immediately re-assessed for active ankle dorsiflexion ROM. It was then interpreted that the mean difference of pre and post readings of manual myofascial release technique was 3 degrees and that of self myofascial release technique was 2.27 degrees.

This clearly suggests that since the mean difference of the pre and post degrees of manual myofascial release technique is higher than that of self myofascial release technique, the p-value by unpaired t-test is 0.001 which shows it is highly

significant, manual myofascial release technique is a relatively better technique in increasing the ankle dorsiflexion ROM than self myofascial release technique. The research done by Couture G et. Al concluded in their study that range of motion increases after a session of foam roller for a short duration with a minimal increases in range of motion which is commonly attributed by decrease in muscle soreness, muscle stiffness and decrease in torque angle.¹ Also, a research done by Sullivan et. Al showed that self myofascial release using foam roller may produce therapeutic effect in fascia or muscle if enough force and pressure is applied which results in small increase in range of motion with temporary effects.¹³

MacDonald et. al found that two sets of self myofascial release using foam roller led to increased range of motion by 80% following two and 10 minutes. Similarly, in this study, subjects were asked to apply as much of their body weight on foam roller but RPE (Rate of Perceived Exertion) and applied tension were not controlled. In the similar pattern, the applied body weight on foam roller and the applied tension was not controlled in this particular intervention.¹⁴ Range of motion increases following foam roller is a change in the thixotropic property (fluid-like form) of the fascia encasing the muscle. Thus, this gel-like fascia allows greater range of motion when any manipulation technique is applied in it, or the fascia is stretched and put under tension.⁹

A study done by R. Csapo et. al, shows that long term use of high heeled shoes leads to shortening of the gastrocnemius muscle fascicles. Stiffer tendons the fascicles would be forced to alter their length more for a given change in the muscle tendon unit length. Thus, these changes in the muscle tendon unit and muscle fascicles shortens the gastrocnemius and limits the range of motion.⁵ Currently, there is no research directly comparing the effects of manual and self myofascial release techniques to increase the range of motion of ankle joint.

The high heeled shoes lift the heels by several centimetres and place the plantar flexion muscle tendon units at a considerably shorter length. Thus, myofascial release technique works on this myo-fascia and releases the stiffness and tension to increase the length of the shortened muscle tendon unit, eventually leading to increased range of motion of the ankle dorsiflexion.⁶

Based on the current study, a significant difference in the pre and post values is seen in the ankle dorsiflexion range of motion immediately after the administration of manual myofascial release technique as compared to that of self myofascial release technique using a foam roller on air-hostesses wearing high heeled shoes.

CONCLUSION

Thus, our study concludes that the manual myofascial release technique is more effective in increasing the ankle dorsiflexion range of motion as compared to self myofascial release technique using a foam roller.

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