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Effect of manual therapy & kinesiotaping on pain, ankle range of motion (ROM) & function in plantar fasciitis: a comparative study

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ABSTRACT

Background & Purpose

It has been estimated that plantar fasciitis affects as much as 10% of the general population over the course of a lifetime.

This study will help to explain the comparison between effect of kinesiotaping & effect of manual therapy. The aim is to find out which technique shows early effect.

Method

Total 48 patients were screened from which 30 patients were in inclusion criteria. The patients were randomly divided into two groups Group A & B. Group A was treated with kinesiotaping & Group B was treated with manual therapy (Maitland mobilization). The conventional treatment includes ice pack, intrinsic muscle strengthening, stretching of gastrocnemius, soleus, tendoachilles, plantar fascia was given to both the groups.

Results

Wilcoxon signed rank test was used to examine changes within same group which shows p value for pain group A ($p < 0.0001$) & group B ($p < 0.0001$) & for function group A ($p = 0.0001$) & group B ($p = 0.0010$) i.e. statistically significant. Mann-Whitney U test was used to examine changes between two groups which shows p value for pain & function ($p = 0.0865$), ($p = 0.7398$) respectively i.e. statistically not significant.

Paired t-test was used to examine the changes within same group which shows p value for ROM group A ($p < 0.0001$) & group B ($p < 0.0001$) i.e. statistically significant & unpaired t-test was used for the changes between two groups, p value for ROM ($p = 0.8990$) i.e. statistically not significant.

Which shows both the techniques were equally effective.

Conclusion

The study concluded that manual therapy & kinesiotaping are equally effective on pain, ROM & function in plantar fasciitis.

Keywords: Plantar fascia, Mobilization, Kinesiotape

INTRODUCTION

Plantar fasciitis is a non-inflammatory degenerative syndrome of plantar fascia resulting from repeated trauma at its origin on the calcaneus. [1]

Plantar fascia is an important static support for the longitudinal arch of foot. Strain on the longitudinal arch exerts its maximal pull on the plantar fascia. The plantar fascia elongates with increase in loads to act as shock absorber, but its ability to elongate is limited. [2]

Patient typically reported an insidious pain which is usually burning, stabbing, dull aching or sharp in nature & localized under plantar surface of heel. It is commonly experienced upon weight bearing after a period of rest. [3] This pain is most noticeable in morning with the first few step and is often described as 'first-step pain'. [4] Plantar fasciitis is considered as a self limiting condition.

Therapeutic treatment include systemic medications, local ultrasound, cryotherapy, deep friction massage, plantar fascia stretching, strengthening of intrinsic muscles of foot, heel cushion etc. [5]

Kinesiotape (KT) is thin, porous, latex free, 100% acrylic adhesive & heat activated, cotton fibers which allows for evaporation & quicker drying. This makes KT waterproof. [6]

Kinesiotape has roughly the same thickness as the epidermis & it can be stretched within 30% to 40% of its resting length. [6]

Kase et al have proposed several benefits of kinesiotaping which are [7]

- Provides positional stimulus through the skin
- Proper alignment of fascial tissue
- Provide sensory stimulation to assist or limit the motion
- Reduces oedema by directing exudates towards the lymph duct

Mobilization is passive, skilled manual technique applied to joints & related soft tissues at varying speeds & amplitudes using physiological or accessory motions for therapeutic purposes. [8]

Joint mobilization, also known as manipulation, refers to manual therapy techniques that are used to modulate pain & treat joint impairments that limits range of motion (ROM) by specifically addressing the altered mechanics of the joint.

The varying speeds and amplitudes could range from a small-amplitude force applied at high

velocity to a large-amplitude force applied at slow velocity. [8]

The indications of joint mobilization are pain, muscle guarding, spasm, joint hypomobility, positional faults, progressive limitations, functional immobility etc. Passive joint mobilization reduces pain by modulation of nervous tissue. [8]

As both the techniques are effective in plantar fasciitis, the aim is to find out which technique shows early effect. This study will help to explain the comparison between effect of kinesiotaping & effect of manual therapy.

MATERIALS & METHODOLOGY

Total 48 patients were screened & initial assessment was done from which 18 patients were in exclusion criteria & 30 were in inclusion criteria. The patients were randomly divided into two groups Group A & Group B by chit method. Group A was treated with kinesiotaping & Group B was treated with manual therapy (Maitland mobilization). The conventional treatment was given to both the groups.

Inclusion criteria

1. Age group 22– 55 yrs [9]
2. Both male & female
3. NPRS score of 5-8

Exclusion criteria

1. Ankle sprain
2. Red flags to manual therapy (i.e. tumor, fracture, osteoporosis)
3. Prior surgery to distal tibia, fibula, ankle joint or near foot region
4. Any tape allergy
5. Any skin infection
6. Impaired circulation to distal extremities

Outcome Measures

- ROM was assessed by goniometer
- Pain was assessed by Numerical Pain Rating Scale (NPRS)
- Functional ability was assessed by Plantar Fasciitis Pain/Disability Scale (PFPS)

Group A (Kinesiotaping)

Subjects were treated with kinesiotaping-I:T striped taping for one week. [10]

Group B (Manual therapy)

Subjects treated with Maitland mobilization:
Ankle-foot complex-Talocrural joint posterior glide

- Subtalar joint lateral glide

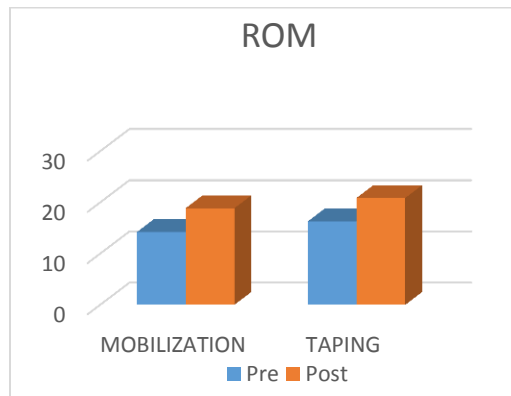
- Subtalar joint distraction

Conventional treatment was given to both the groups which includes ice pack, intrinsic muscle strengthening, stretching of gastrocnemius, soleus, tendoachilles, plantar fascia.

RESULTS

Table 1 – Comparing mean values of pain between both groups

PAIN	Group A (Kinesio taping)	Group B (Manual therapy)
Pre (mean ±SD)	6.47 ± 1.125	6.93 ± 1.22
Post(mean ± SD)	1.33 ± 0.82	2.60 ± 1.84

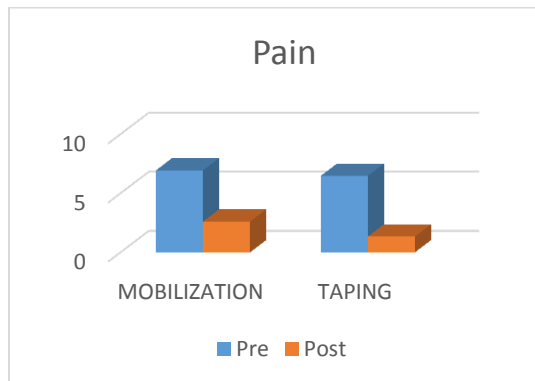


Graph 1: Showing pre & post R_x mean values

The above graph shows that there is an improvement in ROM in both the groups.

Table 2 – Comparing the mean value of ROM between both groups

ROM	Group A (Kinesio taping)	Group B (Manual therapy)
Pre (mean ± SD)	16.27 ± 3.92	14.20 ± 3.34
Post (mean ± SD)	20.87 ± 3.83	18.87 ± 3.02

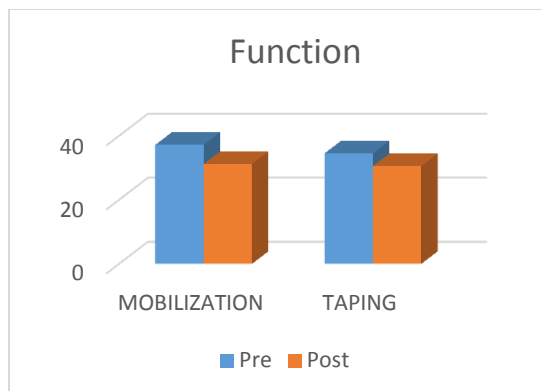


Graph 2 – Showing pre & post R_x mean values

The above graph shows that the pain get reduced in both the groups.

Table 3 – Comparing the mean value of function between both groups

FUNCTION	Group A (Kinesio taping)	Group B (Manual therapy)
Pre (mean ± SD)	34.793 ± 3.472	37.500 ± 3.579
Post (mean ± SD)	30.347 ± 2.493	31.193 ± 6.771

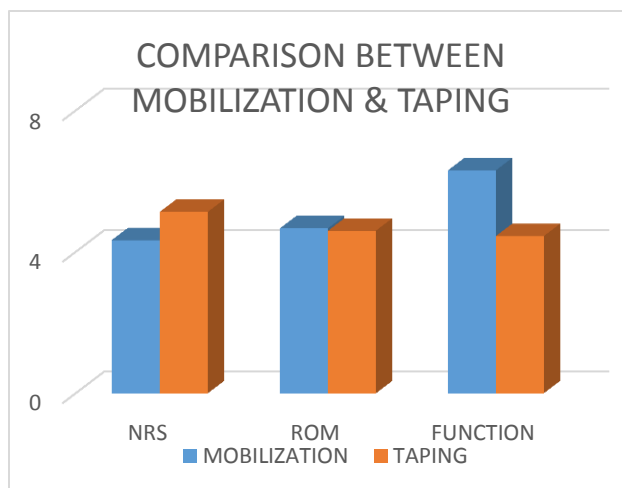


Graph 3 – Showing pre & post R_x mean values

The above graph shows that there is an improvement in function in both the groups.

Table 4 – Comparing the mean values of the measured outcomes for both groups

	Pain	ROM	Function
Group A(Kinesio taping)	-5.13 ± 0.92	4.60 ± 1.595	-4.447 ± 2.914
Group B (Manual therapy)	-4.33 ± 1.35	4.667 ± 1.234	-6.307 ± 6.241



Graph 4 – Comparison between both groups

The above graph shows that both groups are effective in pain, ROM & function in plantar fasciitis. The dependent variables were NPRS, PFPS & ankle ROM. Pre-treatment scores for pain, ROM, function were recorded on the first day. Then treatment was given to both the groups and their post-treatment scores were recorded on the last day.

Non-parametric tests were used for the analysis of the scores of pain & function. Wilcoxon signed rank test was used to examine changes within same group & Mann-Whitney U test was used to examine changes between two groups.

Parametric tests were used for the analysis of ROM. Paired t-test was used to examine the

changes within same group & unpaired t-test was used to examine the changes between two groups.

DISCUSSION

This study was conducted to check which technique shows early effect in plantar fasciitis. 30 patients with plantar fasciitis were randomly allocated into group A (kinesio taping) & group B (manual therapy). Conventional treatment was given to both the groups which includes ice pack, stretching of plantar fascia, stretching of tendoachilles, stretching of gastrocnemius, stretching of soleus, strengthening of intrinsic foot muscles. The outcome measures were goniometer, Numerical pain rating scale (NRS), Plantar fasciitis pain/disability scale (PFPS).

In this study, as shown in graph 2, the pre & post changes observed in ROM were significant in both the groups, group A ($p < 0.0001$) & group B ($p < 0.0001$).

Kinesiotaping can control the pulling force to a certain tendon or ligament in order to avoid further injury so that tissue repair can be facilitated. By applying kinesiotaping on the plantar fascia, the pulling force of the plantar flexors & plantar fascia, the tension get reduced which helps in improving ankle ROM. [10]

Kinesio tape will help in correcting muscle function by strengthening weakened muscles & relieving abnormal muscle tension, helping to return the function of fascia and muscle to normal which can improve ankle ROM. [11]

Due to the pain immobilization of particular joint may occur. With immobilization there is fibrofatty proliferation which causes intra-articular adhesions as well as biomechanical changes in tendon, ligament & joint capsule tissue. Mobilization will help in breaking down of adhesions & helps in maintaining biomechanics of joint. [8]

Due to joint motion, afferent nerve impulses from joint receptors transmit information to central nervous system which provides awareness of position & motion. [8]

As shown in graph 3, the pre – post changes observed in pain were significant in both the groups, group A ($p < 0.0001$) & group B ($p < 0.0001$)

As discussed above kinesiotaping can control pulling force of the plantar flexors & plantar fascia can be reduced which help in reducing pain.

Kinesio tape exerts its physiological effect on skin, circulatory and lymphatic system, fascia, muscles and joints which will help in reducing pain.

The skin towards with the tape forms wave like convolutions on returning to the resting state when the skin of affected area is stretched prior to the application of kinesio tape. Due to lifting of the skin, the space between skin & subcutaneous tissue increases which will drain the lymph & inflammatory substance, reduces pressure on pain receptors. As the tissue is constantly lifted & lowered, lymphatic drainage & blood circulation are stimulated in same way to a pump action. [12]

Kinesio tape decreases pain through neurological suppression.

The possible improvement in the local circulation due to application of kinesiotape may facilitate the resolution of pain.

Passive movements or mobilization eliminates movement related irritating cause & reduces pain.

Mobilization techniques appear to exert a predominant influence on mechanical nociception (via dorsal periaqueductal grey modulation) rather than thermal nociception. [13]

Small amplitude oscillatory & distraction movement stimulate the mechanoreceptors which may inhibit the transmission of nociceptive stimuli at the spinal cord or brain stem level. [8]

These movements are used to cause synovial fluid motion which brings nutrients to the articular cartilage. Gentle joint motion helps to maintain nutrient exchange thus prevent painful & degenerating effects of stasis when joint is painful, swollen & cannot move through the ROM. [8]

Graph 4 shows significant changes in pre – post scores of function in both the groups i.e. group A ($p = 0.0001$) & group B ($p = 0.0010$).

When patient cannot functionally move joint at its full ROM the mobilization will maintain available joint play which will help in performing daily activities. [8]

As the pain get reduced & ROM is improved the function will improve automatically.

As shown in graph 5, the analysis between group A & group B for ROM, pain & function was not significant ($p = 0.8990$), ($p = 0.0865$), ($p = 0.7398$) respectively.

Conventional treatment includes ice pack, stretching of tendoachilles, gastrocnemius, soleus & strengthening of intrinsic muscles

As per Lewis Hunting reaction, alternative vasoconstriction & vasodilation will take place when ice is applied. Vasodilation will lead to increased blood flow which will help in reducing pain.

Cold slows the conduction velocity of peripheral nerves which decreases nociceptive information transmission through primary afferents centrally to the spinal cord which results in a decrease in behavioural signs & a decrease in neural activity in dorsal horn neurons. [13]

Stretching exercises helps in restoring & increasing the extensibility of the muscle tendon unit thus regain or achieve the flexibility & ROM required for necessary or desired functional activities. [8]

Stretching of tight muscles around the foot is considered an effective treatment of plantar fasciitis. [14]

According to studies by Wolgin et al. (1994) and Davies, Severund and Baxter (1994) stretching

of the Achilles tendon was found to be the most effective form of treatment. [15]

Strengthening program correct functional risk factors such as weakness of the intrinsic foot muscles. [16]

CONCLUSION

The study concluded that manual therapy & kinesiotaping are equally effective on pain, ROM & function in plantar fasciitis.

ABBREVIATON

- ROM- Range Of Motion
- NRS- Numerical Pain Rating Scale
- PFPS- Plantar Fasciitis Pain/Disability Scale

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