

A Study to Analyze the Effectiveness of Kinesio Taping and Rigid Taping in Plantar Fasciitis: A Randomized Clinical Trial

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ABSTRACT

The present study was aimed to check the effectiveness of Kinesio taping and rigid taping in plantar fasciitis. A total sample of 36 subjects was enrolled during the study period of which 18 subjects were allocated in the Group A and 18 subjects were allocated in the Group B using envelope method. Group A received Kinesio taping + Conventional Therapy. Group B received rigid taping + Conventional Therapy. The outcome measures were obtained from the subject before and after the treatment duration on day 1 and 6 respectively. Both the groups will receive the treatment one session per day for 6 days. The two groups were compared based on three outcome measures namely Visual analogue scale, pain disability index and foot function index. All outcomes were measured at 1st day of intervention and at 6th day of intervention. Mean, standard deviation, paired t-test and Chi-square were used to analyze the data. There was a statistically significant change in the VAS, PDI and FFI Scores with p value <0.05 within all the groups. But Group A showed higher statistically significant difference as compared to Group B. The study concluded that the interventions given to each of the groups showed an improvement in terms of pain intensity, increased range of motion and reduced the disability level in subjects with plantar fasciitis. Kinesio taping showed significant improvement in terms of reduction of pain and disability level and increased range of motion

Keywords: Kinesio taping, Rigid taping, Plantar fasciitis, Visual analogue Scale, Pain Disability Index and Foot Function Index

INTRODUCTION

Plantar fasciitis (PF) is the most common foot condition treated by healthcare providers (McPoilet 2008; Hunt 2004) accounting for 15% of all foot disorders (Sorrentino 2008) with more than 10% of the population affected by it over their lifetime (Hossain 2011; Puttaswamaiah 2007). It accounts for 7-14% of sporting injuries (Fabrikant 2011; Batt 1995; Ambrosius 1992; Noakes, 1985) and is especially prevalent in sports requiring a „push off“ motion (Batt 1995). PF is also known as the painful heel syndrome and occurs in both males and females with a higher predominance in young male athletes and middle-aged obese females (Hossain 2011; Barrett 1999; Brown 1996).

PF is primarily an overuse injury (Hossain 2011; Batt 1995) and involves inflammation of the fascia on the plantar surface of the foot and micro-tears of the plantar fascia at its insertion on the calcaneus (Barrett, 1999; Lillegard 1993) following tensile overload (Batt 1995; Kibler 1991). The body's attempt to heal these micro-tears can lead to chronic inflammation and the formation of adhesions (Puttaswamaiah 2007; Ambrosius 1992).

There are many other possible factors that may predispose to the development of PF. Recent studies have shown an association between obesity and developing PF (McPoil 2008; Roxas, 2005). A study by Irving et al (2007) showed a higher BMI to be a risk factor to developing PF as obese individuals experienced higher vertical forces under the heel during gait leading to higher stresses within the heel damaging soft tissue structures like the plantar fascia. The most common presenting symptom of PF is a sharp pain of insidious onset with maximal tenderness at the anterior medial border of the calcaneus (Hossain 2011; Puttaswamaiah 2007; Hunt 2004; Batt 1995). The pain is typically worst on the first few steps in the morning (Hossain 2011; Puttaswamaiah 2007; Brantingham 1992) and with initial steps after prolonged sitting or inactivity (Puttaswamaiah 2007; Hunt 2004).

There are many different treatment techniques to treat PF (Hossain 2011; McPoil 2008; Hunt et al., 2004; Rajput 2004; Barry 2002). Treatment usually involves conservative management; if this fails a non-conservative approach like surgery can be used. Conservative management employs many different techniques including: rest (Batt 1995), cryotherapy (Nicholas 1995), therapeutic ultrasound (Pollard 1999), stretching and strengthening (Young 2001), manipulation (Brantingham 1992), orthotics (Young 2001), strapping (Hunt 2004) and night splints (Batt 1995) all of which have been shown to be beneficial. Surgical release of the plantar fascia should only be considered if there is no response following six to nine months of conservative treatment (Hormozi 2011; Young 2001; Nicholas 1995; Ambrosius 1992). Several researchers have done research on the effectiveness of different therapies for PF (Koteeswaran *et al*, 2020, Shane M. McClinton *et al*, 2019, Laxmi Yadav *et al* 2019, Bruna Reclusa Martinez *et al*, 2016, Petzer *et al*, 2015).

The objective of this study is to analyze the effectiveness of Kinesio taping and rigid taping in plantar fasciitis – A randomized clinical trial and specifically: To find out the effectiveness of Kinesio taping in plantar fasciitis, to find out the effectiveness of rigid taping in plantar fasciitis, to compare the effectiveness of Kinesio taping and rigid taping in plantar fasciitis. Therefore, there is an opportunity for research to be conducted into which taping technique is more effective in the treatment of PF. Hence this study was undertaken to analyze the effectiveness of Kinesio taping and rigid taping in plantar fasciitis.

METHODOLOGY

In this study, randomized clinical trial was established to evaluate the effectiveness of kinesio taping and rigid taping in plantar fasciitis. 36 subjects who fulfilled inclusion and exclusion criteria were selected by simple random sampling technique. 2 envelopes were handed to the subjects. Each envelope was enclosed with either group A or group B and then recruited subjects were asked to select either of the envelopes and then according to the selected envelope the subjects were enrolled in either of the groups (Group A & Group B) with 18 in each group (n=18).

SAMPLE SIZE

The sample size for the study was 36 subjects which included both male and female between the ages of 18-65 years, who were clinically diagnosed with plantar fasciitis. The study was conducted at

Physiotherapy outpatient department Sri Lakshmi Institute of Medical Sciences College of Physiotherapy, Kavali and Lakshmi Physio care & Obesity Hospital, Kavali. Study duration was 6 days. Sampling criteria are of two types. Inclusion criteria are Individuals with age between 18-65 years, Participants willing to participate in the study, clinically diagnosed with plantar fasciitis, Individuals with bilateral and unilateral foot with plantar fasciitis. Exclusion criteria are evidence of trauma to the foot, Congenital deformities of foot, rheumatoid arthritis, skin ulceration. Materials include consent form, data collection sheet, kinesio tape, rigid tape, therapeutic ultrasound, ice packs.

PROCEDURE

Ethical clearance was obtained from the ethical committee of Sri Lakshmi Institute of Medical Sciences College of Physiotherapy, Kavali. A brief history was taken about the musculoskeletal assessment for educational profile and as per the inclusion criteria. The study protocol was explained to the subjects in their vernacular language and a written informed consent was taken from all the participants. The 36 subjects were allocated into 2 groups: Group A included 18, Group B included 18 subjects.

Group A-Received kinesio taping+ Conventional Therapy.

Group B-Received rigid taping + Conventional Therapy.

The outcome measures were obtained from the subject before and after the treatment duration on day 1 and 6 respectively. Both the groups will receive the treatment one session per day for 6 days.

RESULTS

MASTER DATA CHART

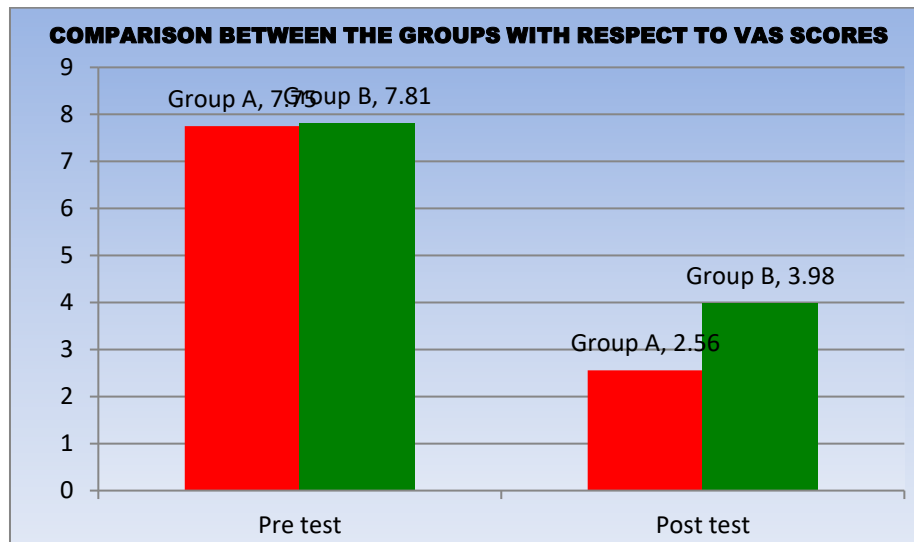
GROUP - A										
S.No	Age	Sex	Group	Affected Limb	VAS		FFI		PDI	
					Pre	Post	Pre	Post	Pre	Post
1	43	F	A	Rt	10	3	95.80%	26.47%	57	15
2	44	F	A	Rt	8	2	79.41%	20%	57	10
3	40	M	A	Rt	8	2	78.23%	22.94%	53	13
4	25	F	A	Lt	8	3	75.88%	24.70%	49	14
5	53	F	A	Rt	9	3	81.17%	19.41%	59	14
6	22	M	A	Rt	8	1	88.23%	13.52%	63	8
7	61	F	A	Lt	6	2	73.52%	13.52%	55	12
8	32	F	A	Rt	7	4	92.35%	19.41%	64	12
9	53	F	A	Lt	8	4	78.82%	18.23%	57	9
10	35	F	A	Rt	5	2	78.82%	11.17%	56	8
11	39	M	A	Rt	8	3	80%	22%	54	19
12	40	F	A	Rt	9	3	85.80%	27.64%	59	17
13	36	F	A	Lt	8	3	60.58%	18.82%	58	15
14	43	M	A	Lt	7	2	75%	21.76%	48	16
15	38	F	A	Lt	6	2	69.41%	20.58%	54	17
16	32	F	A	Lt	9	3	87.64%	21.17%	61	19
17	41	F	A	Rt	8	2	80%	47%	56	20
18	63	F	A	Lt	7.5	2	79.41%	46.47%	48	32

GROUP - B										
S.No	Age	Sex	Group	Affected Limb	VAS		FFI		PDI	
					Pre	Post	Pre	Post	Pre	Post
1	43	F	B	Lt	10	2	97.05%	28.82%	63	12
2	25	F	B	Rt	8	7	78.82%	65.88%	51	39
3	35	M	B	Rt	7	8	80.58%	68.52%	65	51
4	39	F	B	Rt	8	7	80.58%	64.70%	60	46
5	40	M	B	Lt	6	2	72.94%	59.41%	55	18
6	38	F	B	Rt	9	3	86%	70%	61	51
7	62	M	B	Lt	8	2	72.35%	44.11%	54	31
8	45	F	B	Lt	8	3	78.82%	47.64%	60	30
9	39	M	B	Lt	7	5	79.41%	52.35%	60	34
10	31	M	B	Lt	7	2	78.84%	63.23%	58	42
11	64	M	B	Rt	7.5	3.2	69.41%	31.20%	52	22
12	50	M	B	Lt	8.5	4	72.94%	25.30%	55	24
13	53	F	B	Lt	8	4.5	75.30%	16.50%	55	25
14	53	F	B	Rt	8	3	57.05%	24.11%	47	18
15	32	M	B	Lt	9.5	4	77.05%	27.64%	50	21
16	31	M	B	Lt	7.2	4	59.40%	24.70%	48	28
17	36	M	B	Rt	7.3	5	60.60%	35.90%	53	30
18	46	M	B	Rt	6.5	3	47.05%	16.50%	43	15

Variable	Groups	Mean	SD	SE	t-value	P-value
Pre test	Group A	7.75	1.22	0.29	-0.1489	0.8825
	Group B	7.81	1.01	0.24		
Post test	Group A	2.56	0.78	0.18	-3.0438	0.0045*
	Group B	3.98	1.83	0.43		
Difference	Group A	5.19	1.20	0.28	2.3468	0.0249*
	Group B	3.82	2.17	0.51		
*p<0.05						

Table 1 - Comparison between the groups with respect to VAS scores

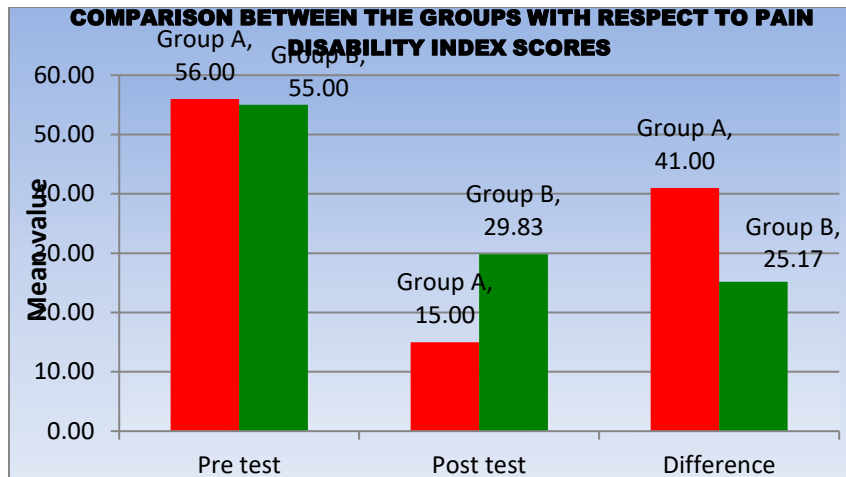
The above table shows the result of comparison of pain scores on VAS in both the groups. The t and p value for post treatment was found to be -3.438 and <0.001+ and mean difference value was 2.34 and <0.005+ which is statistically significant in group A. The above shows that there was reduction of pain in both the groups.



Variable	Groups	Mean	SD	SE	t-value	P-value
Pre test	Group A	56.00	4.59	1.08	0.5664	0.5749
	Group B	55.00	5.92	1.40		
Post test	Group A	15.00	5.63	1.33	-4.7657	0.0001*
	Group B	29.83	11.95	2.82		
Difference	Group A	41.00	8.74	2.06	5.0396	0.0001*
	Group B	25.17	10.07	2.37		
*p<0.05						

Table 2: Comparison between the Groups with respect to PainDisability Index scores

The above table shows the comparison of pain scores on PDI in both the groups. The t and p value for post treatment was found to be -4.76 and <0.0001 + and mean difference value was 5.03 and <0.0001+ which is statistically significant in group A. There was reduction of pain in both the groups.



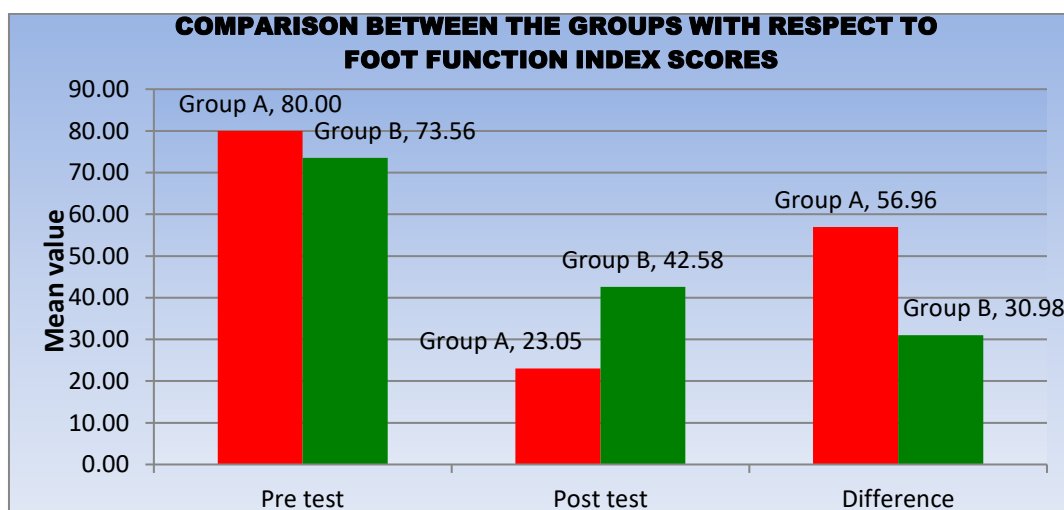
Variable	Groups	Mean	SD	SE	t-value	P-value
Pre test	Group A	80.00	8.20	1.93	1.9217	0.0631
	Group B	73.56	11.63	2.74		
Post test	Group A	23.05	9.61	2.26	-3.8785	0.0005*
	Group B	42.58	19.09	4.50		
Difference	Group A	56.96	12.08	2.85	5.4050	0.0001*
	Group B	30.98	16.43	3.87		

*p<0.05

Table 3: Comparison between the Groups with respect to Foot Function Index Scores

The above table shows the results of comparison of pain scores on FFI in both the groups, the t and p value for post treatment was found to be -3.87 and <0.0005+ and mean difference value was 5.405 and <0.0001+ which is statistically significant in group A.

Therefore, we conclude that, performances of both treatment groups are same in reducing pain and improve in function. However, subjects in Group A shows better results in reducing pain compared to group B.



DISCUSSION

The present randomized clinical trial was done to compare the effectiveness of kinesio taping and rigid taping in plantar fasciitis. The conventional treatment was given to both the groups which include icepacks, therapeutic ultrasound, stretching and strengthening exercise for 6 days. In addition to the above-mentioned treatment Group-A received kinesio taping and Group- B received rigid taping. The outcome measures were measured by using (a) VAS to assess pain, (b)PDI and (c)FFI were used to assess functional abilities. Both the groups had shown improvement in all the above-mentioned parameters. The result from the statistical analysis of this study supports the alternate hypothesis that Group A treated with kinesio taping technique was more beneficial, even though both the groups proved to be effective in treating plantar fasciitis.

In the present study the age, gender distribution and the other variables showed no statistically significant difference in group which represents the homogeneity of the participants. It is estimated that 7% of people aged over 65 years of age reported tenderness in the region of the heel and plantar fasciitis accounts for over 1 million visits a year to physicians in India. The condition affects both athletic and sedentary people, and does not seem to be influenced by gender. The present study correlates with the above statement where there was no influence of gender on sedentary people and athletes. A systematic review suggests that there is improvement in discomfort regardless of the intervention received, suggesting that the condition is partially self-limiting. The prevalence of plantar fasciitis was found to be more in the age group from 25 to 65 years

which could be considered as a working age group. Another study suggests the peak age affected is between 40-60 years and this study showed results that conform to previous studies, where the mean age was 41.11 ± 10.96 years in group A, 42.33 ± 10.76 years in group B.

Mean Body mass index of the participants for both the groups was 24.4 for group A and 26.2 for group B. According to WHO ideal BMI is in the range of 18.5- 24.9. (David Sweeting 2011). Sudden gain in the body weight results plantar fasciitis. Literature suggests that the incidence of plantar fasciitis affecting over 10% of the general population. According to literature 83% affected are active working adults aged between 25 and 65 years, (22%) runners and 65- 70% (overweight). This study relates with the above study where individuals were in overweight category (25 kg/m^2).

Hana Hronkova et al 2015 performed a study on possibilities of the analgesic effect of ultrasound therapy and non-invasive therapy, and concluded that there was complete reduction of pain in 50% of participants, partial improvement in 16.6% and no effect in 33.3% of participants treated with ultrasound therapy (Matthew R. Hyland 2006). This study correlated with the therapeutic effect of ultrasound in the treatment of plantar heel pain by physiotherapists to quantify the placebo effect of this electrophysical agent. Hence concluded that Therapeutic ultrasound at a dosage of 0.5 W/cm^2 , 1MHz, pulsed 1:4, for eight minutes is no more effective than placebo in the treatment of plantar heel pain (Bruna Reclusa Martinez 2016). Therapeutic ultrasound prior to the exercises, causes a temporary increase in their extensibility, and hence a decrease in joint stiffness as it is due to preferential heating of collagen tissue and effective penetration of this energy to deeply placed structures and thus accelerates the rate of phagocytosis, movement of particles and the cells. The increase in functional ability may be due to increase mobility of soft tissue and subsequently improves range of motion (ROM) by elongating (lengthening) structures that have adaptively shortened and have become hypomobile. Present study correlated with chronic plantar fasciitis stretching programme for a week and concluded that there is a better functional activity and reduction in pain with first step in the morning. The VAS for group A changes to mean score 5.19

and for group B changes to mean score 3.82. Hence Group A receiving Kinesio taping showed more pain relief and increase in functional ability compared to Group B receiving Rigid taping and coincides with previous study. Similar study was done by Hechler T, et al. 2014 who conducted the study on chronic pain, interdisciplinary outpatient and intensive inpatient treatment has shown to improve pain intensity and disability. Outcomes between=992 outpatients v/s. n=320 inpatients. The results highlight the necessity of intensive inpatient pain treatment for highly affected children, as children who declined inpatient treatment and were treated as outpatient did less well and concluded that pain intensity and disability is a reliable and valid instrument by F Crawford et al 1996.

In the present study showed statistical significance in improving functions and reduction in pain. The study concluded that the interventions given to both the groups showed an improvement in terms of pain intensity, increased range of motion and reduced the disability level in subjects with plantar fasciitis, But subjects in Group A treated with Kinesio taping along with conventional Physiotherapy showed significant improvement in terms of reduction of pain and disability level and increased range of motion compared to subjects in Group B treated with rigid taping along with conventional physiotherapy

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