Randomized Controlled Trial

Comparison of the efficacy of Kinesiology Taping versus Therapeutic Ultrasound in the management of Plantar Fasciitis

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ABSTRACT: Plantar fasciitis (PF) is one of the most common musculoskeletal complaint of the foot affecting a huge population. However there is a scarcity of evidence regarding treatment efficacy, therefore this trial aimed to compare the efficacy of Kinesiotaping (KT) vs. Ultrasound Therapy (UT) in the management of pain and physical functioning of foot/ankle in patients with PF.

Methodology: Two arms, parallel-group design RCT was conducted on PF patients. Participants aged between 25-60 years, having symptoms of PF for at least 6 months, presenting with unilateral and/or bilateral heel pain were included. However, patients with fractures, dislocations, or open wounds around ankle/soles and patients allergic to taping were excluded. 30 patients were randomly divided into group A (KTG=15): received KT and group B (UTG=15): received Ultrasound Therapy (UT). Both the groups also received cold pack with stretching exercises. Treatment was provided on an alternate days for 30 minutes to each group for two weeks. Visual Analogue Scale (VAS) was used to determine pain and Foot/Ankle disability index (FADI) was used to assess foot and ankle functioning. Readings were taken pre and post intervention.

Results and discussion: The mean pain score before treatment was 8.00 but after treatment was reduced to 1.13, in KTG. However, in UTG mean pain score before treatment was 9.13 and after treatment reduced to 4.20. The mean FADI score before treatment was 52.80 but after treatment decreased to 11.46 in KTG. However, in UTG the mean score of FADI before treatment was 58.53 and after treatment, it was decreased to 39.46.

Conclusion: The results concluded that KT and UT both are effective techniques for reducing pain and improving ankle/foot physical functioning in patients with PF. However, KT was found to be more effective than UT.

Keywords: Foot/ankle disability index, Plantar Fasciitis, Pain, Kinesiotaping, Therapeutic ultrasound

1. INTRODUCTION

Plantar Fasciitis (PF) also known as heel pain syndrome, heel spur syndrome, or painful heel syndrome is defined as inflammation of the plantar fascia, it usually worsens on arising in the morning and after periods of prolonged standing and sitting (1). PF is one of the most common musculoskeletal complaint of the foot as it accounts for about 85% of all the cases of heel pain, however, researchers observed that 10% of the general population experience it at least once in their lifetime (2). The prevalence of PF in the security forces of Peshawar, Pakistan was reported to be 13.2% (3). Previous researches show that PF mostly affect athletes; however, current literature shows that people with a sedentary lifestyle are also commonly affected. PF can occur at any age and both genders are equally prone (4, 5).

PF is considered the most common cause of foot pain and is estimated to account for 11–15% of all foot problems in adults (6). The exact pathology is still unknown (7).
disorder is reported to be multifactorial in origin and can be triggered by obesity, excessive periods of weight-bearing activity and decreased ankle range of motion (8). Evidence reported numerous non-surgical treatments as effective in relieving symptoms associated with PF including anti-inflammatory agents (NSAIDs, steroid injections), modalities (iontophoresis, ultrasound, extracorporeal shock wave therapy, electrical stimulation, cryotherapy, and whirlpool), manual therapy (joint and neural mobilizations, massage), stretching and external support (orthotics, night splints, and taping) (9, 10). Most treatments endeavor to resolve the symptoms caused by PF; while orthotics and taping aim to repair the poor biomechanics of the foot (11).

Kinesio-taping (KT) is a common clinical intervention utilized in physical therapy facilitating pain reduction, joint support, proprioception, and muscle tone normalization with a simple procedure requiring no more than ten minutes to implement, resulting in an immediate positive effect on pain and occasionally on function (12). The rigidity of the tape allows a mechanical correction in joint position (13), changing patellar inclination (14), and foot position (15).

Evidence shows that most health care professionals also recommend Ultrasound Therapy (UT) for the treatment of PF and proved it to be effective in reducing pain and enhancing the quality of life (16).

A plethora of studies were conducted to compare the various treatment modalities for PF and highlighted the positive effects (17). Although many researchers have reported KT and UT as effective in the management of PF complications. However no research to date has compared the efficacy of KT with UT, therefore this Randomized Controlled Trial (RCT) aimed:

• To compare the efficacy of KT vs. UT in the management of pain using the Visual Analogue Scale (VAS) in patients with PF after two weeks of intervention.
• To compare the efficacy of KT vs. UT in improving foot/ankle function through Foot and Ankle Disability Index (FADI) in patients with PF after two weeks of intervention.

2 Methodology:

A two-arm, parallel-group design RCT was conducted on the patients suffering from PF at the outpatient physiotherapy Department of Jinnah Post Graduate Medical Centre and KK Rehabilitation Centre and Consultant Clinics Karachi, Pakistan. The trial was completed from February to August 2021. The inclusion criteria of this trial was voluntary participants aged from 25 to 60 years, having symptoms of PF for at least 6 months, presenting with the pain that worsens when the step is placed on the floor or walking after rest or increasing with activity, presenting with unilateral and/or bilateral heel pain, pain localized to the inferior heel or plantar surface of the foot. However patients with fractures, dislocations, or open wound around ankle/soles of feet, elderly individuals with weakened connective tissue such as (ligaments sprain and muscles strain, marked osteoporosis, history of lower limb congenital or traumatic deformity, congenital anomalies, patients allergic to taping were excluded from the study. VAS was used to determine PF pain intensity and FADI was used to assess foot and ankle functioning. VAS is marked between 0-10. Patients mark on it considering the intensity of pain, ‘0’ representing ‘no pain’ and ‘10’ maximum pain. The FADI is a 34-item questionnaire. Both the assessment parameters establish good reliability. ICC value of VAS= 0.92 (18) and ICC value of FADI= 0.89 (19).

A total of 30 PF patients were included in the study. This sample was calculated by using online software OPEN EPI version 3. Participants whose have given written informed consent and fulfill the eligibility criteria were randomly divided into group A=15 (KTG group) and group B=15 (UTG). Group A received KT and cold pack with stretching exercises (see figure 1), and group B received UT (Ultrasound at 0.5 w/cm², 3 MHz, pulsed 1:4, for eight minutes) and cold pack with stretching exercises (see figure 2). Treatment was provided on an alternate days for 30 minutes to each group for two weeks. All
patients were examined for pain and foot/ankle function before and after 2 weeks of treatment.

Figure 1: Application of KT (Group A)

Figure 2: Application of UT (Group B)

Data were stored and analyzed using IBM-SPSS version 20.0. Counts with percentages and mean were reported for baseline characteristics of studied samples. P-values less than equal to 0.05 were considered significant at 95% CI.

3 Results:
This trial was conducted on 30 PF patients. Randomly divided into group A (KTG=15) and group B (UTG=15). The age of the participants ranges from 25 to 60 years. 33.3% of the participants were male and 66.7% were female (see table 1).

Table 1: Gender Distribution (N=30)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>%</th>
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<tbody>
<tr>
<td>Male</td>
<td>10</td>
<td>33.3%</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>66.7%</td>
</tr>
<tr>
<td>Total</td>
<td>30</td>
<td>100%</td>
</tr>
</tbody>
</table>

The results show that the mean pain score of VAS before treatment was 8.00±1.06 but after treatment was decreased to 1.13±1.06, in group A. The mean pain score of VAS before treatment was 9.13±0.63 and after treatment, it was decreased to 4.20±0.56 in group B. (see table 2).

Table 2: VAS score pre and post-treatment

<table>
<thead>
<tr>
<th>VAS scale</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>8.00</td>
<td>1.06</td>
<td>0.00</td>
</tr>
<tr>
<td>After</td>
<td>1.13</td>
<td>1.06</td>
<td></td>
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<tr>
<td>Group B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before</td>
<td>9.13</td>
<td>0.63</td>
<td>0.00</td>
</tr>
<tr>
<td>After</td>
<td>4.20</td>
<td>0.56</td>
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The results show that the mean FADI before treatment was 52.80 ± 4.36 but after treatment was decreased to 11.46 ± 3.20 in group A. The mean score of FADI before treatment was 58.53 ± 1.35 and after treatment, it was decreased to 39.46 ± 4.61 in group B. (table 3).

Table 3: FADI Scale pre and post-treatment

<table>
<thead>
<tr>
<th>FADI Scale</th>
<th>Mean</th>
<th>SD</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Group A</td>
<td></td>
<td></td>
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<tr>
<td>Before</td>
<td>52.80</td>
<td>4.36</td>
<td>0.00</td>
</tr>
<tr>
<td>After</td>
<td>11.46</td>
<td>3.20</td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Before</td>
<td>58.53</td>
<td>1.35</td>
<td>0.00</td>
</tr>
<tr>
<td>After</td>
<td>39.46</td>
<td>4.61</td>
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Discussion:
This trial compared the effectiveness of KT vs. UT for PF, which showed that both the treatment strategies are significantly effective in reducing PF pain and improving foot/ankle function. However, more improvement was found in the KT technique. The findings of this trial are comparable to the study by Radford which showed that low dye taping decrease pain and improve functional outcome (20). Similarly the results of this study are in line with the findings of a study conducted in 2018 by Robert A (21). Furthermore a study endorsed KT to be easier, cost effective and faster to apply for therapist, than other techniques (22).
In September 2019, a RCT was conducted by Aishwarya A et al. to find out the comparative effectiveness of low dye taping in conjunction with conventional treatment, it was found that KT improves heel pain and disability in subjects with PF (23). Another study by Apr, Banu Ordahan et al. aimed to compare the efficacy of extracorporeal shockwave therapy (ESWT) and KT in the treatment of PF and concluded that both ESWT and KT treatments improved pain levels, function and quality of life in individuals with PF. Neither method was superior in treating PF (24).
Research published in the Journal of Orthopaedic & Sports Physical Therapy by Yigal Katz, aimed to evaluate the additive effect of UT in the treatment of PF in terms of pain, function, and quality of life, study concluded that addition of therapeutic ultrasound did not improve the efficacy of conservative treatment for PF. Therefore, the authors recommend excluding therapeutic ultrasound from the treatment of PF and agree with the results of previous studies that stretching may be an effective treatment for healing PF (25). Among all the positives discussed above, it is worth mentioning that this study provided specific results with the easier determination of cause and effect relationships. On the other hand, small sample size, human error, and short follow-up duration were the few limitations that need to be addressed in the future.

Conclusion:
The results concluded that KT and UT both are effective techniques for reducing pain and improving ankle/foot physical functioning in patients with PF (26,27). However, KT was found to be more effective than UT. Hence calcaneal taping is found to be an effective tool for the relief of plantar heel pain and may act as a precursor to long-term management through the use of tape. It is easy and quick for the therapist to apply, and creates immediate symptom relief.

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Conflict of Interest:
No conflicting interests were declared.

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References