Effectiveness of Low-Dye Taping for the Short-term Management of Plantar Fasciitis

Karl B. Landorf, DipAppSc(Pod), GradDipEd, PhD*
Joel A. Radford, BAppSc(Pod)Hons*
Anne-Maree Keenan, BAppSc(Pod), MAppSc†
Anthony C. Redmond, DPodM, MSc, PhD†

Low-Dye taping is often used as a short-term treatment for plantar fasciitis. We evaluated the short-term effectiveness of low-Dye taping in relieving pain associated with plantar fasciitis. In this comparative study conducted at a university-based clinic, 65 participants with plantar fasciitis who received low-Dye taping for 3 to 5 days were compared with 40 participants who did not receive taping. Pain before and after treatment was measured using a visual analog pain scale. Analysis of the data was by the intention-to-treat principle, and a linear regression approach to analysis of covariance was used to compare effects. The visual analog pain scale score improved by a mean of 20 mm (from 44 to 24 mm) in the taping group and worsened by a mean of 6 mm (from 51 to 57 mm) in the control group. The analysis of covariance–adjusted difference in therapeutic effect favored the taping group by 31.7 mm (95% confidence interval, 23.6–39.9 mm) and was statistically significant (t = 7.71). In the short term, low-Dye taping significantly reduces the pain associated with plantar fasciitis. These findings are the first quantitative results to demonstrate the significant therapeutic effect of this treatment modality in relieving the symptoms associated with plantar fasciitis. (J Am Podiatr Med Assoc 95(6): 525-530, 2005)
ters the mechanical function of the foot, decreasing stress on the plantar fascia and subsequently producing symptom relief. Most research to date has examined the mechanical effects of the tape on the lower limb. Only one study has evaluated the symptom relief offered by low-Dye taping, but it had small numbers of participants and did not include a control group. Consequently, there is a need for larger studies that use a control group for comparison. The aim of this study, therefore, was to evaluate the short-term effect of low-Dye taping in the treatment of plantar fasciitis.

**Methods**

This experimental study compared a symptomatic group of patients with plantar fasciitis treated with low-Dye taping with a symptomatic group of individuals who did not undergo taping. Data for the group undergoing low-Dye taping were collected as part of another study, with control group data collected independently for comparison later. Thus treatment allocation was not randomized. Data collection took place at the University of Western Sydney Uniclinic, and ethical approval was provided by the University of Western Sydney Ethics Committee.

**Participants**

One hundred five participants who had experienced symptoms consistent with plantar fasciitis for at least 4 weeks were enrolled. Plantar fasciitis was diagnosed from a clinical assessment on the basis of the following criteria: 1) pain was reproduced by palpation of the plantar fascia or its origin at the medial calcaneal tubercle, 2) pain was sharp and localized but not radiating, 3) pain was worse when first standing or walking in the morning or after rest, and 4) pain decreased initially after first standing but worsened with increased activity. Potential recruits were excluded from the study if they had any inflammatory, osseous metabolic, or neurologic abnormalities. In addition, individuals were excluded if they had received a corticosteroid injection in the past 3 months.

**Clinical Protocol**

Taping was applied and data were collected for the intervention group by a podiatric physician with 15 years of clinical experience (K.B.L.). Control group data (which consisted only of demographic characteristics and patient-completed self-assessment questionnaires) were collected by a fourth-year student of podiatric medicine (J.A.R.). Participants in both groups received identical assessments at all appointments, and both groups were advised to perform calf muscle stretches and were given advice on appropriate footwear. The only difference between the two groups was that participants in the taping group received low-Dye taping at the first appointment and those in the control group did not. Participants in the taping group were instructed to leave the tape on for 3 to 5 days. All participants were requested to note their pain levels during the 3 to 5 days after this baseline appointment (ie, while the taping group performed stretches and had tape on and the control group performed stretches only). Participants returned for reassessment and dispensing of orthoses 2 to 3 weeks later. At this follow-up appointment, participants were asked to rate their pain during the 3 to 5 days after the initial baseline appointment.

The taping method used was a slight modification of the original taping method described by Dye—now commonly referred to as low-Dye taping. Slight modifications of this technique have been described in recent research. The tape used in this study was 3.8-cm-wide Leuko Sports Tape (Beiersdorf Australasia Ltd, North Ryde, Sydney, Australia), and it was applied using the following technique:

1) The first strip of tape is applied with no tension around the forefoot just proximal to the metatarsal heads (Fig. 1); this strip acts as an anchor for subsequent pieces.

2) A second strip of tape is applied from just proximal to the lateral aspect of the fifth metatarsal head and runs proximally around the posterior aspect of the calcaneus to return to just proximal to the medial aspect of the first metatarsal head. Tension is placed on the tape as it is pulled along the medial side of the foot to invert the rearfoot and adduct the forefoot on the rearfoot (Fig. 1).

3) Three to four strips of tape are then applied in a similar manner as for the first strip, with each strip overlapping the more distal piece by half the width of the tape (Fig. 2). The last piece is applied just distal to the ankle joint. Tension is placed on these pieces as they are pulled onto the medial dorsal aspect of the midfoot to support the arch of the foot. Care is taken not to dorsiflex the first metatarsal; the metatarsal can be plantarflexed or the hallux can be dorsiflexed while applying these strips.

**Outcome Measures**

The primary outcome measure was a 100-mm visual analog pain scale. Visual analog pain scales are widely used and provide valid and reliable assessments of
A verbal response question was designed to provide complementary data to the visual analog pain scale and was used as a secondary outcome measure. Participants were asked either “Did the strapping help?” (taping group) or “Did the stretching help?” (control group). Four responses were allowed: yes, a lot; yes, a little; no, not at all; and no, made it worse.

Data Handling and Analysis

Sample size for the control group was calculated using an equation for continuous variables developed by Friedman et al. A 15-mm difference between groups on the visual analog pain scale was considered a clinically important difference to detect statistically. Power was set at 80%, with an SD of 20 and an α level of .05. A control group of 33 participants was required, and the final sample size of 40 participants was chosen to allow for unplanned dropouts and noncompliance.

The results of the study were analyzed using the intention-to-treat principle. Data were initially assessed for gross departures from normality. A linear regression approach to analysis of covariance (ANCOVA) was used to compare the differences in visual analog pain scale scores. The covariate adjusted for was the visual analog pain scale score at baseline (ie, any difference between the two groups in the baseline visual analog pain scale score was adjusted for in the ANCOVA model). A Mann-Whitney test was used to compare the differences in the verbal response question. All tests were considered statistically significant at the conventional level of \( P < .05 \).

Results

A total of 105 participants were included in the study: 65 in the taping group and 40 in the control group. Participant characteristics at baseline for both groups were similar (Table 1). No participants were lost to follow-up.

The mean ± SD baseline visual analog pain scale score for the taping group was 44.0 ± 17.9 mm, and it decreased to 23.7 ± 19.5 mm during the intervention period (Fig. 3). The mean ± SD baseline visual analog pain scale score for the control group was 52.6 ± 23.8 mm, and it increased to 58.8 ± 24.2 mm during the intervention period.

The ANCOVA-adjusted difference in the means between the taping group and the control group during the intervention period favored the taping group by 31.7 mm (95% confidence interval [CI], 23.6–39.9 mm). This result was statistically significant (\( t = 7.71; P < .001 \)).

The verbal response question showed that 63.1% of participants in the taping group felt that the low-Dye taping combined with stretching helped “a lot,”
whereas only 40.0% of patients in the control group felt “a lot” of improvement from stretching alone (Fig. 4). This finding was also statistically significant ($U = 1010.5; P = .034$).

**Discussion**

Few objective data have been published on the effectiveness of low-Dye taping in reducing the painful symptoms of plantar fasciitis. Lynch et al. and Martin et al. studied low-Dye taping in conjunction with foot orthoses; however, in these studies, the effect of taping alone was not compared with a control group. The only research to date specifically examining the effect of low-Dye taping on the symptoms of plantar fasciitis is a small study by Saxelby et al. It is difficult to draw definitive conclusions from this study, however, because a control group was not included and the sample size was small ($n = 8$).

The present study used a more rigorous method than has been reported previously in the literature. Our study was powered using a priori power calculations, used a control group for comparison, and was designed to use clinically meaningful outcome measurements. This is the first study to demonstrate a clinically important and statistically significant difference between participants who received low-Dye taping and those who did not. The taping has a large therapeutic effect—the ANCOVA-adjusted difference in the means favored the taping group by 31.7 mm (95% CI, 23.6–39.9 mm). This result was statistically significant ($P < .001$), and it may be viewed as highly clinically important because the minimum clinically significant change in pain severity on a 100-mm visual analog pain scale is reported to be 9 to 13 mm.

The verbal response question also supported these results by revealing that more participants in the taping group thought that low-Dye taping helped “a lot” compared with the control group. However, it should be noted that when the scores for “a lot better” and “a little better” are combined for the taping and control groups, they are 86.2% and 80%, respectively, indicat-

**Figure 3.** Mean visual analog pain scale (VAPS) scores at baseline and follow-up. Note that the follow-up appointment occurred 2 to 3 weeks after baseline, although all pain ratings related to the 3 to 5 days after baseline.

**Figure 4.** Verbal response question results.
ing that there was at least a little improvement for 80% or more of participants in both groups.

Although this study is an improvement on previous methods, the findings of this study must be viewed in light of the design limitations. Randomization of the participants was not undertaken. Randomization between the groups at baseline in either visual analog scale scores or the demographic profile, which suggests that this did not prove problematic in practice. The less experienced researcher did not apply any taping (his role was limited to relatively basic tasks requiring no substantial clinical experience), thus minimizing the possible influence of clinician-specific effects. Finally, the pain ratings were retrospective, although this affected both groups, so it should not have affected the results.

Conclusion

Low-Dye taping is a popular short-term treatment for plantar fasciitis, but until now its effectiveness has not been rigorously evaluated. The results of this trial indicate that low-Dye taping as a short-term treatment may be highly effective in reducing the painful symptoms of plantar fasciitis. A rigorous randomized controlled trial is required to confirm this result.

References

179, 1993.


