

The Effects of Low Dye Taping on Foot Pressure in Subjects With Plantar Fasciitis

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The rising interest in physical activity has led to the development of a wide array of overuse injuries. With the increased number of individuals participating in physical activity, healthcare professionals are faced with the challenge of treating many overuse injuries. Plantar fasciitis, inflammation of the plantar fascia, is an example of this type of injury (McKenzie, Clement & Taunton, 1985; Neale & Adams, 1989). Plantar fasciitis is usually characterized by a gradual, insidious onset of heel pain but may also be associated with a history of trauma or overuse (Chandler & Kibler, 1993; Harbison, 1987). Point tenderness is evident on palpation over the medial tuberosity of the calcaneus and/or throughout the plantar fascia (Kwong, Kay, Voner & White, 1988). Another symptom of plantar fasciitis is pain with the first few steps in the morning, and after prolonged sitting. The pain improves with walking but becomes worse by the end of the day (Cailliet, 1983; Chandler & Kibler, 1993; DeMaio et al., 1993; Harbison, 1987; Kosmahl & Kosmahl, 1987; Schepsis et al., 1991). Plantar fasciitis is usually unilateral, but bilateral involvement may occur (Harbison, 1987; Kosmahl & Kosmahl, 1987). It is most common in middle-aged adults with the incidence steadily increasing during the fifth and sixth decades of life (Neale & Adams, 1989). This problem is common in obese individuals and athletes. In athletes, plantar fasciitis is more common in sports that involve running such as tennis and basketball. Plantar fasciitis occurs in non-athletes as well. It is common in working occupations that require prolonged weight bearing such as labourers or cooks (DeMaio, Paine, Mangine & Drez, 1993). There is no consistent pattern of leg, ankle and foot malalignment associated with plantar fasciitis. Most studies have also shown no consistent radiological changes with plantar fasciitis (Kosmahl & Kosmahl, 1987). The treatment of plantar fasciitis ranges from the conservative use of ice and heat, to the more aggressive surgical intervention and resection of the plantar fascia or neural structures.

The purpose of the investigation was to analyze the effect of low dye taping on the vertical foot pressure and the path of the centre of pressure (COP) in individuals with plantar fasciitis. Ten subjects (8 females and 2 males) meeting the specified diagnostic criteria were included in the study. The mean age of the subjects was 28.4 years. Each subject was tested under two conditions, walking with low dye taping and walking without. Subjects were instructed to walk a total distance of 50 feet at a self-selected speed first without tape and then with tape. Vertical foot pressure and COP was measured using the F-Scan Gait Analysis System. A total of three trials were completed and recorded.

A within-subjects t-test was used to detect significant relationships between the dependent variable pressure measured in pounds per square inch (PSI) for the contact, midstance and propulsion phases and the independent variable taping. Statistical techniques were not used to analyze the COP curves rather they were qualitatively described in terms of medialization or lateralization of the COP line.

Vertical foot pressure was significantly decreased in the rearfoot with the application of low dye taping during contact ($M = 0.29$, $SD = 0.37$, $t(9) = 2.46$, $p < 0.05$). Subjects did not demonstrate a significant change in pressure in the midfoot

during midstance ($M = 0.18$, $SD = 0.51$, $t(9) = 1.12$, $p \geq 0.05$). Subjects also did not demonstrate a significant change in pressure in the forefoot during propulsion ($M = 0.08$, $SD = 0.59$, $t(9) = 0.46$, $p \geq 0.05$) (Table 1). Analysis of the COP curves revealed no consistent change (Table 2). Throughout contact, midstance and propulsion there was also no tendency towards medialization in the COP.

Table 1: **Summary of Foot Pressure Measures(PSI)**

Phase of Stance	Mean	Std. Dev. (+/-)	Range	Minimum	Maximum
CONTACT					
Without tape	1.64	0.51	1.47	0.94	2.41
With tape	1.35	0.40	1.32	0.79	2.11
MIDSTANCE					
Without tape	2.33	0.84	2.74	1.31	4.05
With tape	2.15	0.52	1.38	1.35	2.73
PROPULSION					
Without tape	2.10	0.68	2.23	1.26	3.49
With tape	2.02	0.47	1.37	1.44	2.81

N of cases: 10

Table 2: **Summary of COP Changes**

Phase of Stance	# of Subjects	Findings
Contact	5 out of 10 5 out of 10	-lateralization of COP line -no change in COP line
Midstance	6 out of 10 4 out of 10	-lateralization of COP line -no change in COP line
Propulsion	3 out of 10 7 out of 10	-lateralization of COP line -no change in COP line

N of Cases: 10

The results of this study supports the research in that low dye taping decreases the amount of pressure transmitted through the foot during contact. However, there was no consistent change in the COP curves with the application of low dye taping failing to support the inferences reported by some researchers. Based upon the results of this investigation low dye taping decreases the foot pressure under the rearfoot during contact. Low dye taping has no consistent effect on the COP, and does not produce any medialization of the COP thereby increasing tension on the plantar fascia.

Further study should be pursued analyzing the effects of low dye taping. To further validate the effects of the low dye taping technique on patients suffering from plantar fasciitis, it is recommended that:

- (i) a larger sample size be used in order to attempt to generalize findings
- (ii) two more control groups be used, one which does not receive any intervention and another group which only receives the low dye taping
- (iii) the use of a 3D gait analysis system be employed in combination with the F-scan Gait Analysis System to more accurately assess the lower extremity kinematics, more specifically foot kinematics, during gait.

There are a number of areas related to this study that require further investigation. The methodology used and results from this study can be incorporated into future investigations analyzing the effects of various other modalities on pathological gait, or on the effect of low dye taping on different patient populations suffering from other common overuse injuries.

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