

REARFOOT MECHANICS IN COMPETITIVE RUNNERS WHO HAD EXPERIENCED PLANTAR FASCIITIS

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INTRODUCTION

Plantar fasciitis (PF) is one of the five most common overuse injuries that runners sustain (Mechelen, 1992). It is believed that this injury is a result of repetitive strain to the plantar fascia. Attempts to correlate structural factors to this injury have been unsuccessful (Warren et al, 1984). More recently, Warren et al (1987) reported that runners either currently, or formerly experiencing PF, exhibited greater pronation of the foot while in a loaded stance position than runners with no history of this injury. However the running mechanics associated with PF have received little attention in the literature. Therefore, the purpose of this study was to compare the rearfoot mechanics of runners with a history of PF to a group of uninjured controls. It was hypothesized the PF group would exhibit greater rearfoot motion in terms of eversion at heel strike, peak eversion, eversion excursion and eversion velocity.

METHODS

This is an ongoing study in which, to date, 13 females with a history a PF injury have been compared to 13 females with no history of PF (CON). All subjects were between ages 18-35 and ran between 30-80 miles per week. Subjects ran along a 25m runway at a speed of 3.7±0.2m/s and 3D kinematic data were recorded for 5 trials. Variables of interest included eversion angle at heel strike (EVatHS), maximum rearfoot eversion angle (MaxEV), eversion excursion (EVEXC), and maximum eversion velocity (EVVEL). Variables were compared using independent t-tests ($P < 0.05$).

RESULTS AND DISCUSSION

Results indicate that the PF group landed in slightly ($P=0.12$) greater eversion at heel strike and exhibited significantly ($P=0.01$) greater maximum rearfoot eversion angle compared to the control group (Table 1; Figure 1). These mechanics could result in placing excessive tension on the plantar fascia. This tension, repeated over many foot contacts likely places a runner at greater risk for PF. The PF group also demonstrated slightly ($P=0.12$) greater EVVEL than the control group. A significant increase in EVVEL would increase the strain rate on the structures resisting foot pronation such as the plantar fascia. Others have also implicated excessive velocity as a contributing cause of running related injuries (Smith et al, 1986). As additional subjects are added to the study, it is possible that this trend towards an increased EVVEL and greater EVatHS will become significant.

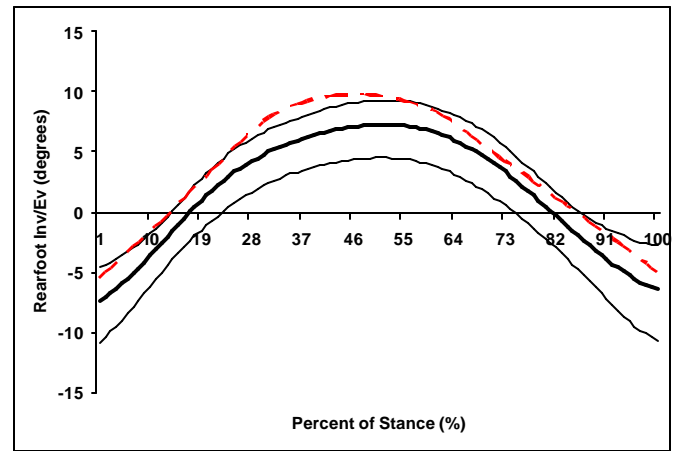


Figure 1: Rearfoot inversion/eversion angular position curves for the stance phase of gait for PF (thick dashed line) and CON groups (solid thick line and thin lines are mean±1SD). Positive values indicate eversion, negative values indicate inversion.

SUMMARY

Subjects who had experienced plantar fasciitis exhibited significantly different rearfoot mechanics than uninjured controls. Exposure to greater rearfoot eversion and eversion velocity may result in excessive linear and torsional forces necessitating greater passive restraint from the plantar fascia. These excessive loads, repeated over many footstrikes could result in producing an inflammatory response in the plantar fascia. However, this study is retrospective in nature and prospective investigations are necessary to further validate these associations.

REFERENCES

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Table 1: Mean (SD) of variables of interest for Plantar Fasciitis (PF) and Controls (CON).

Group	EVatHS (degrees)	Max EV (degrees)	EVEXC (degrees)	EVVEL (degrees/sec)
PF	-5.27 (2.53)	9.17 (2.22)	12.43 (2.95)	216.62(65.40)
CON	-6.92 (2.71)	6.30 (2.29)	11.21(2.87)	179.34(52.37)
P-value	0.12	0.01 *	0.30	0.12

Note: * Significantly greater than CON