

ORIGINAL RESEARCH

THE USE OF A STATIC MEASURE TO PREDICT FOOT POSTURE AT MIDSUPPORT DURING RUNNING

Michael B. Bade, PT, DPT, PhD¹

Timothy L. Chi, SPT¹

Kelly C. Farrell, SPT¹

Amanda J. Gresl, SPT¹

Laura J. Hammel, SPT¹

Bradley N. Koster, SPT¹

Ashley B. Leatzow, SPT¹

Emily C. Thomas, SPT¹

Thomas G. McPoil, PT, PhD¹

ABSTRACT

Background: The posture of the foot has been implicated as a factor in the development of running-related injuries. A static measure of foot posture, such as the longitudinal arch angle (LAA), that can be easily performed and is predictive of the posture of the foot at midsupport while running could provide valuable information to enhance the clinician's overall evaluation of the runner.

Purpose: The purpose of this study was to determine if the LAA, assessed in relaxed standing, could predict the posture of the foot at midsupport while running on a treadmill.

Study Design: Cross-sectional Study

Methods: Forty experienced runners (mean age 26.6 years) voluntarily consented to participate. Inclusion criteria included running at least 18 miles per week, previous experience running on a treadmill, no history of lower extremity congenital or traumatic deformity, or acute injury three months prior to the start of the study. Each runner had markers placed on the medial malleolus, navicular tuberosity, and medial aspect 1st metatarsal head of both feet. A high speed camera (240 Hz) was used to film both feet of each runner in standing and while running on a treadmill at their preferred speed. The LAA in standing and at mid-support while running was determined by angle formed by two lines drawn between the three markers with the navicular tuberosity serving as the apex. The LAA in midsupport was determined using the mean of the middle five running trials.

Results: The levels of intra-rater and inter-rater reliability for the dynamic LAA were excellent. The results of the t-tests indicated that mean values between the left and right foot were not significantly different for the standing or running LAA. The results of the t-tests between male and female runners were also not significantly different for standing or running LAA. The Pearson correlation between standing and running LAA for all 80 feet was $r = 0.95$ ($r^2 = 0.90$).

Conclusions: The standing LAA was found to be highly predictive of the running LAA at midsupport while running. Approximately 90% of the variance associated with foot posture at midsupport in running could be explained by the standing LAA.

Keywords: Foot posture, longitudinal arch angle, running

Level of Evidence: 4, Controlled laboratory study

CORRESPONDING AUTHOR

Thomas G. McPoil, PT, PhD

School of Physical Therapy

Regis University

3333 Regis Blvd., G-4

Denver, CO, 80221

Phone: 303 964-5137

E-mail: tmcpoil@regis.edu

¹ School of Physical Therapy, Regis University, Denver, CO, USA