

FOOT ARCH STRAIN OF EXCESSIVE PRONATORS DURING TWO-LEGS AND ONE-LEG STANDING AND WALKING

Wan-Sub Han, Seung-Jae Kim, and Hae-Dong Lee*

Department of Leisure Sports, Hanseo University, Seosan, Korea

* BK21 Mechatronics Group, Chungnam National University, Daejeon, Korea

KEY WORDS: foot arch, strain, excessive pronators

INTRODUCTION: The movement of plantar fascia under the foot has been characterized by foot arch strain in vitro (Kogler, Solomonidis, & Paul, 1995). The characteristics of the foot arch strain under the static and dynamic conditions in excessive pronators are not well known. Therefore, the purpose of this study is to investigate the foot arch strain during two legs, one-leg standing and walking in excessive pronation.

METHOD: 17 excessive pronators were recruited for this study. The arch length and height strains during two-leg, one-leg standing and treadmill walking (1.5 m/s) with barefeet were calculated with 3D positional data of the head of the first metatarsal, bottom of the midline of the posterior calcaneus and navicular tuberosity.

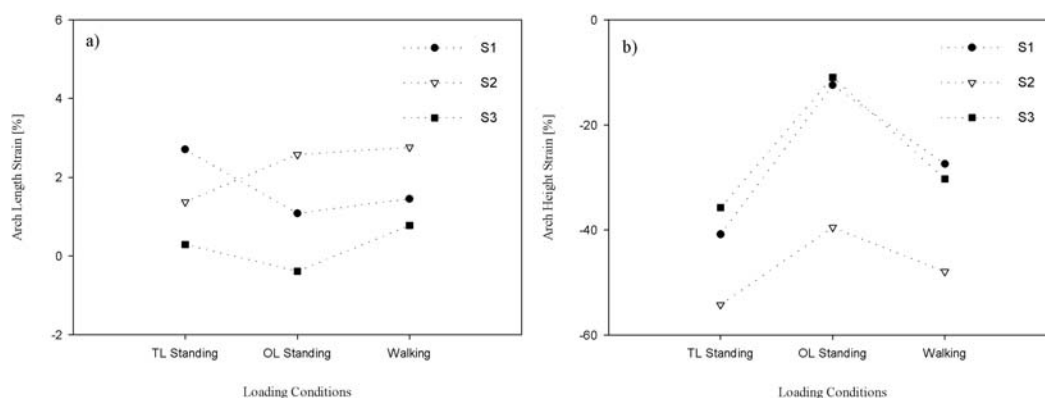


Figure 4 a) Arch length strains and b) arch height strains of three excessive pronators during two-leg (TL) standing, one-leg (OL) standing and walking.

RESULTS AND DISCUSSION: The arch length strains in 3 subjects show subject-specific and movement-specific characteristics, however, need more subjects to better understand (Figure 1a). The arch height strains in 3 subjects constantly show the largest negative strains during two-leg standing, the smallest negative strains during one-leg standing and intermediate negative strains during walking (Figure 1b). The hypotheses that the arch length strain will increase and the arch height strain will decrease according to the sequence of TL, OL standing and walking are not accepted at this point.

In conclusion, considerations of extrinsic and intrinsic muscle-tendon activities as well as ligaments related to the foot and leg movement are critical to better understand the movement of the foot arch during TL and OL standing and walking.

REFERENCES:

Kogler, G.F., Solomonidis, S.E., & Paul, J.P. (1995). In vitro method for quantifying the effectiveness of the longitudinal arch support mechanism of a foot orthosis. *Clinical Biomechanics*, 10, 245-52.

Acknowledgement

This work was supported by the Korean Research Foundation Grant funded by the Korean Government (MOEHRD) (KRF-2003-041-G00136).