

REFERENCE

Whitney JA, Burnfield JM, Few CD, Taji SS, O'Hara M, Perry J (2004). Influence of custom inserts on plantar pressures during ambulation in persons at risk for ulceration secondary to diabetes mellitus. *Journal of Geriatric Physical Therapy*, 26(3), pg. 37.

ABSTRACT

Purpose

To determine the influence of footwear on plantar pressures during walking in persons at risk for ulcers due to diabetes mellitus (DM).

Hypothesis

Walking with shoes and a tri-layer custom insert (CUSTOM) would result in lower pressures and increased contact area compared to shoes with a standard insert (STANDARD) or barefoot (BF).

Subjects

Persons with DM at risk for ulcers due to a previous history of ulcer or unilateral partial foot amputation participated (3 transmetatarsal, 5 ray, 12 toe, and 1 history of ulcers only; mean age=52 yrs).

Methods

Pressures were recorded (Pedar) as subjects walked in 3 footwear conditions. Maximum Mean Peak Pressure (MMPP) was assessed on both feet. The area at risk for skin breakdown was defined as the region with highest MMPP while BF. Foot contact area was calculated. The influence of footwear on contact area and MMPP in the area at risk was determined by separate 3x1 analyses of variance with repeated measures.

Results

Involved: The most common areas at risk were the central metatarsals (40%) and heel (25%). CUSTOM reduced MMPP 57% compared to BF (18 vs. 43 N/cm²; p<.001) and 30% compared to STANDARD (18 vs. 24 N/cm²; p<.001). STANDARD reduced MMPP 44% compared to BF (24 vs. 43 N/cm²; p<.001). CUSTOM increased contact area compared to both BF (41%, p<.001) and STANDARD (13%, p<.001). The contact area increased in STANDARD compared to BF (25%; p<.001). **Uninvolved:** The most common areas at risk were the central metatarsals (40%) and heel (40%). CUSTOM reduced MMPP 54% compared to BF (16 vs. 35 N/cm²; p<.001) and 16% compared to STANDARD (16 vs. 20 N/cm²; p<.001). MMPP was reduced 20% in STANDARD compared to BF (16 vs. 20 N/cm²; p<.001). CUSTOM increased contact area compared to both BF (33%; p<.001) and STANDARD (9%; p<.001). STANDARD increased contact area compared to BF (22%; p<.001).

Discussion

Subjects experienced greater pressure reductions while walking in custom inserts compared to either STANDARD inserts or BF due, in part, to increased contact area. In light of previous research correlating elevated plantar pressures to an increased risk of ulceration, use of custom inserts in persons at risk for ulcers appears indicated.