

# CHANGES IN PLANTAR PRESSURE CHARACTERISTICS IN THE ELDERLY WITH COMFORT FOOTWEAR AS COMPARED TO THE BAREFOOT WALKING

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## INTRODUCTION

Aging changes in the foot are related to structure and function. Typical features of the aged foot include decreased peripheral sensation and unevenly distributed plantar pressure patterns [1]. Previous researches showed that plantar pressures of the elderly were significantly reduced as compared to those of the young [2]. Burns et al. [3] emphasized the need of comfortable shoes for the elderly whose feet are more exposed to increased risk of foot pathologies and danger of fall. Despite the plethora of various comfort footwear from many Western multinational manufacturers in recent years, it is not yet completely clear how they affect the foot pressure distributions of the elderly, especially in Orientals. The purpose of this study was to investigate the change in plantar pressure characteristics of the oriental elderly with and without the comfort shoes. In addition, gender and age related differences during barefoot walking were assessed.

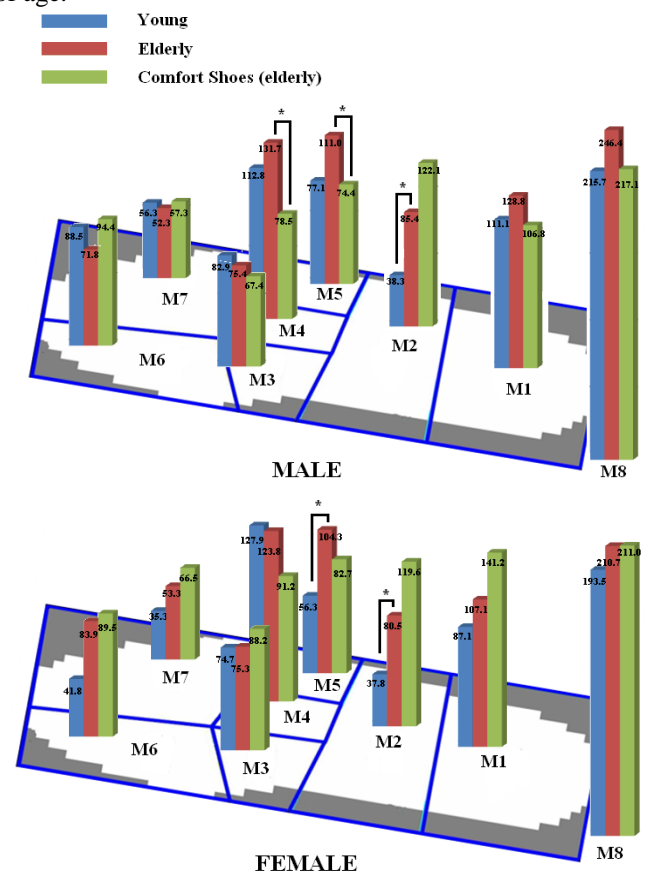
## METHODS

20 male (15 elderly, 69.0±4.4 years; 5 young, 28.4±2.0 years) and 24 female (19 elderly, 69.2±5.9; 5 young, 21.2±0.5 years) were tested. All subjects had no foot pathologies and their plantar pressures (right foot) were measured with F-scan (Tekscan Inc., South Boston, USA) while walking at self-selected walking speed [4]. Then, the elderly subjects were tested again in a same fashion while wearing commercially available comfort shoes (SAS, San Antonio Shoemakers, Texas, USA). The plantar regions were divided into eight anatomical masks [2,4] for regional PCP (peak contact pressures) measurement. To analyze aged-related differences in gender, independent-samples t-Test and comparison of with/without comfort shoes, paired samples t-Test were used by SPSS 12.0 (SPSS Inc., Chicago, USA).

## RESULTS AND DISCUSSION

Wearing comfort shoes altered foot pressure distribution in the elderly, for both male and female (Figure 1). Significant decreases were found at the forefoot regions, especially at M4 (central forefoot region, 40%) and M5 (lateral forefoot region, 33%) for male. For female, pressure decreases at the forefoot regions were noted, although statistically not significant. In other regions slight changes (not statistically significant) were noted in both cases. Our results demonstrated that the comfort shoes effectively induced relief of high plantar foot pressures at the forefoot region to other areas, which may be related to feeling of foot comfort. The effect was more prominent in male than in female. During Barefoot walking the elderly group showed higher plantar pressures at mid- and rear-foot regions as compared to the young. Particularly, 120% higher PCP was noted at

the mid-foot region (statistically significant) in male and 113% and 85% larger at the mid-foot and the lateral forefoot regions for the female. This was contrary to the reports in literature with Caucasian subjects [2] that indicated higher plantar pressure at mid-foot region in the young group, which warrants more close investigation on Oriental subjects for the design of the comfort shoes. In addition, the plantar pressure results between male and female showed no statistically significant gender-related differences, regardless of age.



**Figure 1:** Plantar pressure results. \* indicates statistically significant ( $P < 0.05$ )

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