

The effect of insole configurations on plantar pressure in diabetic patients with neuropathic feet

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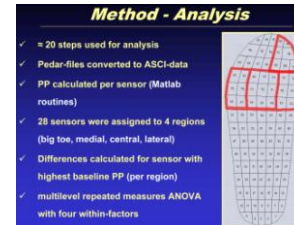
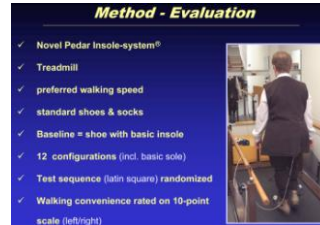
INTRODUCTION

Foot orthoses are widely prescribed in an attempt to decrease elevated plantar pressures in areas of actual or potential ulceration at the shoe-foot interface. The objective of this study was to evaluate the effects of a metatarsal dome, a varus and a valgus wedge and two arch supports on plantar pressures in patients with diabetic neuropathy.

METHOD

17 male diabetic patients with elevated bare foot plantar pressure were selected from an outpatient clinic.

The insoles were tailor made following standardized construction procedures and using identical materials. Two arch 'inserts' could be placed on the basic insole, resulting in three support heights: no support (basic insole), standard support and extra support, whereas the standard and the extra support were respectively 5 and 10 mm higher than the basic insole. For the dome condition, a standard manufactured metatarsal dome was positioned on the basic insole. Full-length 5 degrees varus and valgus 'posts' or 'wedges' made of cork were placed underneath the basic insole.

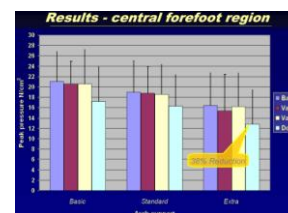
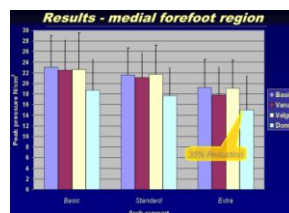
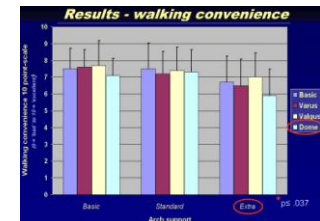
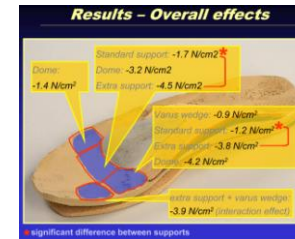


Eleven insole configurations were compared with the basic insole. For each region, the highest peak pressure measured during the baseline condition (basic insole) was used to calculate the difference between the experimental conditions. A four-way within-factor repeated measures ANOVA design was used for analysis of the plantar pressure data.

RESULTS

In the lateral region, only the effect of a metatarsal dome was statistically significant ($p < .001$). For the central forefoot region, the effects of a metatarsal dome, standard - and extra arch support were statistically significant ($p < .001$). This was also true for the effects on in the medial forefoot region. There were no statistically significant effects of the insole configurations in the big toe region ($p \geq .224$), with exception of the combination of the extra arch support and a varus wedge ($p \leq .017$).

The highest reductions were accomplished with an extra arch support in combination with a metatarsal dome. The reductions achieved with a combination of components were not attributable to an interaction effect, but an additive effect of the independent components. The effects of the insole components in the lateral and big toe regions were small. Both varus and valgus wedges resulted in minor effects. The variation of the plantar pressure data in the big toe region points toward the specific individual responses in this region.



CONCLUSION

For non-deformed flexible neuropathic feet, the greatest effects on peak pressure reductions were achieved in the central and medial forefoot regions through application of a metatarsal dome and an (extra) arch support. Walking convenience must be taken into account when designing insoles with a metatarsal dome and/or arch support.