

Proprioceptive effects of mechanical stimulation on the plantar arch: modification of the functional relationships between the foot and posture

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Aim: Previous studies suggest that the podalic stimulation can restructure the functional relationships between the lower limbs and trunk (Gordon et al. 1995). Furthermore, the selective stimulation of the plantar mechanoreceptors induce a displacement of body's CoP always opposite to the vibration simulated pressure increase (Kavounoudias et al. 1998) but the direction of illusory body tilts were always orthogonally directed and ipsilateral to the vibrated plantar site (Roll et al. 2002).

The aim of this study was to verify if the insertion of an Internal Heel Wedge (IHW) and External Heel Wedge (EHW) applied according to the Bricot's method can produce modifications of stabilometric and podobarometric variables, functional changes during the gait cycle and any temporal summation of the proprioceptive stimulation.

Methods: Twenty-three healthy subjects with the right dominating lower limb (age 31±5 years) were recruited. First trials with IHW was performed, three months later second trials with EHW. The IHW and EHW was made from a cork half moon thickness of 1.5 mm, length 6 cm and a height of 3 cm.

The sequence of tests foresaw: trials baseline without IHW or EHW, trials with IHW or EHW, trials after an adaptation period of 15 minutes on treadmills with IHW or EHW.

Results: Data showed statistically significant variations (Parametrical statistic analysis ANOVA, Post-hoc, Baseline vs After 15 min, $p < 0.05$) in the Cadence steps, Duration of the cycle of the left step and Single Right Support phase for the IHW; Duration Single Right support and Single Left Support phase for the EHW.

Conclusions: Data showed that the proprioceptive stimulation of the plantar arch, thickness of 1,5 mm, is enough to induce changes in the gait cycle and which changing the position of the proprioceptive stimulation it inverts the functional response of the feet.

Reference

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