Influence of Custom-Moulded Footorthoses (CMFO) with Neuromuscular Operating Elements (NME) on plantar pressure distribution during gait and standing

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Custom-Moulded Footorthoses
Low Back Pain
Plantar Pressure Distribution

Introduction
- The aim of the orthopedic treatment with NME is the improvement of the whole human posture.
- That should result in a reduction of the existing malposition.
- Flexion and extension chain are supposed to be influenced through the NME via gamma reflex arc.
- The importance of receptor cell input for coordinated static and dynamic muscle activation is recognized [1].
- CMFO provides benefits like increased comfort, compliance [2] and better receptor functionality [3].

Leading question
Is it possible to take a specific influence of CMFO and NME on plantar pressure parameters?

Methods
- 12 subjects (38±6 years) with hypotonic posture, Low Back Pain, functional malposition
- CMFO (OPCT Tonic01, Sidas) with retrocapital NME (SH55, Sidas) (Fig. 1)

- Insole measurement system (MobilData, GeBioM; 200Hz)
- 2 conditions; during upright standing and treadmill walking: A: without FO (w/o FO), B: with FO

Data analysis
- Parameters:
  - Mean pressure, sum force gradient and the first and second active maximum of the sum force
  - Differences between condition A and B presented in % difference to condition A
  - Paired t-test; p < .05 (*)

Results
- Only results for retrocapital NME are presented
- No influences on sum force parameters during upright standing
- Sum force gradient at foot strike decreases significantly by 14% during gait (Fig. 2)

- First active maximum of sum force decreases significantly by 12% (Fig. 3)

- Second maximum not affected
- Mean pressure decreases significantly (entire foot ~6%; medial foot ~14%) (Fig. 4)

Discussion
- The essential effects of the NME are found on first part of the stance phase.
- The decrease of sum force gradient supposes an improved damping at foot strike.
- However previous studies detected similar effect by using CMFO without surface modulated footorthoses [4].
- Despite of the specific decrease of the first sum force maximum, the postulated boost at the end of stance phase can not be detected.
- The mean pressure results suppose a more centralized pressure load and indicate a possible change in muscle status.
- Further studies analyze the short- and long-term effects on muscle activation, subjective parameters.

References