Effects of a whole body vibration as a means for controlling spasticity in post-stroke patients: A F-wave study

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Objectives: The purpose of this study was to investigate whether the whole body vibration (WBV) inhibits spasticity and improves motor function and walking ability in the hemiplegic legs of post-stroke patients.

Patients and Methods: This before-and-after intervention trial examined 13 post-stroke patients (11 male and 2 female; mean age, 54.3 ± 13.0 years; range, 24–72 years). The Brunnstrom Recovery Stage of the hemiplegic lower limb was stage 3 in three patients, stage 4 in 7, stage 5 in three. The modified Ashworth scale (MAS) score for the gastrocnemius muscles was 1 in one case, 1+ in 6 cases and 2 in six cases. All patients had increased muscle tonus of the affected lower limb (MAS score ≥1), and were able to walk without assistance using a T-cane or an ankle-foot orthosis. Exclusion criteria were any medical condition preventing vibratory stimulation (such as uncontrolled cardiopulmonary disease, severe joint disability and severe sensory disturbance), severe aphasia that made it impossible to follow verbal instructions, and dementia that interfered with outcome assessments. Each subjects sat on the chair with hip joint angles to approximately 90° of flexion, and with knee joint angles to 0° of extension. WBV was applied at 30 Hz (4–8 mm amplitude) for 5 min on hamstrings, gastrocnemius and soleus muscles (Figure 1). The parameters measured before and after the intervention were the MAS, the F-wave parameters as a measure of motor-neuron excitability, the active and passive range of motion (A-ROM, P-ROM) as a measure of motor function, and the 10-m walk test as a measure of walking ability.

Results: None of the subjects experienced discomfort before, during or after the intervention and all assessments were completed safely in all subjects. The MAS and F-wave parameters were significantly decreased (p < 0.05), the A-ROM and P-ROM for ankle dorsiflexion increased (p < 0.01), and the P-ROM for straight leg raising increased (p < 0.01), and walking speed improved (p < 0.01) after the 5-min intervention.
Conclusion: These findings suggest that WBV is an effective method for controlling spasticity, and improves motor function and walking ability in post-stroke patients.

Keywords: Whole body vibration, Spasticity, F-wave