

## Assessment of Influence of Short-Lasting Whole-Body Vibration on Joint Position Sense and Body Balance-A Randomised Masked Study

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**Abstract :** Introduction: Whole-body vibration (WBV) uses high frequency mechanical stimuli generated by a vibration plate and transmitted through bone, muscle and connective tissues to the whole body. Research has shown that long-term vibration-plate training improves neuromuscular facilitation, especially in afferent neural pathways, responsible for the conduction of vibration and proprioceptive stimuli, muscle function, balance and proprioception. Some researchers suggest that the vibration stimulus briefly inhibits the conduction of afferent signals from proprioceptors and can interfere with the maintenance of body balance. The aim of this study was to evaluate the influence of a single set of exercises associated with whole-body vibration on the joint position sense and body balance. Material and methods: The study enrolled 55 people aged 19-24 years. These individuals were randomly divided into a test group (30 persons) and a control group (25 persons). Both groups performed the same set of exercises on a vibration plate. The following vibration parameters: frequency of 20Hz and amplitude of 3mm, were used in the test group. The control group performed exercises on the vibration plate while it was off. All participants were instructed to perform six dynamic exercises lasting 30 seconds each with a 60-second period of rest between them. The exercises involved large muscle groups of the trunk, pelvis and lower limbs. Measurements were carried out before and immediately after exercise. Joint position sense (JPS) was measured in the knee joint for the starting position at 45° in an open kinematic chain. JPS error was measured using a digital inclinometer. Balance was assessed in a standing position with both feet on the ground with the eyes open and closed (each test lasting 30 sec). Balance was assessed using Matscan with FootMat 7.0 SAM software. The surface of the ellipse of confidence and front-back as well as right-left swing were measured to assess balance. Statistical analysis was performed using Statistica 10.0 PL software. Results: There were no significant differences between the groups, both before and after the exercise ( $p > 0.05$ ). JPS did not change in both the test (10.7° vs. 8.4°) and control groups (9.0° vs. 8.4°). No significant differences were shown in any of the test parameters during balance tests with the eyes open or closed in both the test and control groups ( $p > 0.05$ ). Conclusions. 1. Deterioration in proprioception or balance was not observed immediately after the vibration stimulus. This suggests that vibration-induced blockage of proprioceptive stimuli conduction can have only a short-lasting effect that occurs only as long as a vibration stimulus is present. 2. Short-term use of vibration in treatment does not impair proprioception and seems to be safe for patients with proprioceptive impairment. 3. These results need to be supplemented with an assessment of proprioception during the application of vibration stimuli. Additionally, the impact of vibration parameters used in the exercises should be evaluated.

**Keywords :** balance, joint position sense, proprioception, whole body vibration

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