

## Quantitative assessment of the level of instability of a single-plane balance platform

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### ABSTRACT

**BACKGROUND:** Balance training is widely used in various fields of medicine and sport. Balance workouts include exercises performed on unstable surfaces. The main disadvantage of these existing and used platforms is that they do not have a definable assessment of the level of instability (LI) they create.

**OBJECTIVE:** To evaluate the mechanical characteristics of the suspended single-plane instability balance platform, which determine the quantitative instability characteristics.

**METHODS:** Three criteria influencing the level of instability at different levels of instability were evaluated: 1. The displacement of the platform board was measured by changing the position of the object on the board; 2. Force demand required for board displacement was measured; 3. The vibration damping of the platform was measured by deducting the damping factor.

**RESULTS:** 1. At instability level 1 (IL), the displacement of the object on the board affected 0.66 cm. the displacement of the board relative to the platform frame; 2 IL - 0.79 cm; 3 IL - 0.91 cm.; 2. A force of 2.64 is required for a board displacement of 1 IL compared to 2 IL and 5.76 times that of 3 IL. 3. Damping factor 1 IL - 0.015, 2 IL - 0.006, 3 IL - 0.003.

**CONCLUSIONS:** 1. The longer the suspension, the change in the position of the object on the board affects the greater movement of the board relative to the platform. For each IL, this size is defined. 2. Different levels of instability can be compared with each other depending on how different the force required to cause the board to move. 3. The platform dampens vibrations weakly, but the damping between 1 and 3 IL differs significantly i.e. about 5 times.

**KEYWORDS:** Balance assessment, suspended single-plane instability balance platform, level of instability.