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Evaluation of Postural Instability Produced By Convenctional Balance Board Vs Innovasive Control Motion Balance Board Balance Boards In Healty Subject Vs Skater Using Inertial Sensors.A Potential For Early Proprioceptive Excercice In Knee Rehabilitatio

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Faculty Disclosure Information

- Nothing to disclosure

Objective:

- Objectives: Proprioceptive exercises on balance boards are commonly used both in rehabilitation and in prevention. The degree of instability that these platforms offer is very variable and often it is not associated to the capability of the specific subject. Therefore, the aim of this work is to analyze, using inertial sensors, the postural sway of different subjects standing over different balance boards (B1, B2, B3) in order to characterize the degree of instability that each balance board offers. While B1 is a commercial board, B2 and B3 are new prototypes specifically designed to control and reduce the subject's postural sway.
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Materials and methods:

A total of 18 subjects were involved in this study and they were divided in two groups: 9 skating athletes (G1) and 9 healthy subjects (G2). All the subjects were tested while standing for 30 seconds on B1, B2 and B3 with the arms always fixed to the waist, the eyes open, and without wearing shoes. Each subject carried out 3 different tests on each type of balance board, with 30 seconds resting between the acquisitions. One Showmotion sensor (NCS Lab, Carpi, Italy) was positioned on the subject's pelvis while performing the tests. The sensor orientation, accelerations and angular velocity data were acquired at 40 Hz and they were used to analyze the postural sway. 6 stability indices were extracted from each analysis using antero-posterior and medio-lateral axis of both acceleration and angular velocity: area of the rectangle that contains all the points (RA, if considering acceleration; RG, if considering angular velocity), area of the ellipse that contains 95 % of all the points (EA, if considering acceleration; EG, if considering angular velocity) and Root Mean Square Distance (DA, if considering acceleration; DG, if considering angular velocity).

Materials and methods:

Results:

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- . No significant difference, in any parameter, was found between the G1 and G2. Mean and standard deviation, calculated on all the tests performed by the 18 subjects, of each stability indices for each balance board have been analyzed
- All the stability indices related to B1 are significantly different ($p<0.05$) from the same index on B2 and B3. No significant difference was found between B2 and B3.
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Conclusions:

All the indices related to B2 and B3 are significantly smaller than the same indices on B1; consequently, both B2 and B3 balance boards facilitate stability with respect to B1. Moreover, the degree of instability offered by B2 and B3 is similar, due to the fact that no significant difference was found between B2 and B3. The two groups (G1 and G2) acquired showed the same stability on all the platforms tested, indicating that the postural sway is more dependent on the balance board used with respect to the training level if the focus is on healthy subjects.

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