Dynamic Postural Stability Index: Test-Retest Reliability When Landing from Three Types of Jumps

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Introduction

• Dynamic Postural Stability Index (DPSI) assesses an individual’s ability to maintain balance while transitioning from a dynamic state to a static state on a single leg.
• DPSI is a composite measure of landing forces in the mediolateral, anterior-posterior, and vertical directions.
• Control of dynamic posture promotes postural stability and is associated with enhanced athletic performance and prevention of sport related injury.
• The test-retest reliability of the DPSI has only been examined when landing from jumps that combine vertical and forward movements. However, the nature of sport activity often requires the athlete to perform a lateral or rotational movement prior to establishing dynamic postural stability.

Methods

• Forty-two healthy college students (19 men and 23 women) active in club or intramural change of direction sports participated in the study.
• Subjects completed three types of jumps (forward, lateral, and 90 degree mid-air rotational) on three occasions (total of 9 jumps).
• Subjects jumped from their left leg, landing on their right leg; the jump distance was equivalent to 50% of their previously tested maximum jump distance for each jump.
• The jumps were completed on three occasions with 24- to 48-hour between test sessions.
• Subjects were instructed to land onto the center of an AccuPower® force platform, stabilize as quickly as possible without taking their hands off their hips or touching their left foot to their right leg, and balance for 3 seconds.
• Ground reaction forces in the x-, y-, and z-directions were sampled at 400 Hz for 3 seconds and used to calculate the DPSI.
• Data were analyzed using an intraclass correlation coefficient (ICC 3.1) formula.

Results

Table 1. Comparison of Dynamic Postural Stability Index scores for three jumps.

<table>
<thead>
<tr>
<th></th>
<th>Forward Jump</th>
<th>Lateral Jump</th>
<th>Rotational Jump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean DPSI</td>
<td>.0064</td>
<td>.0062</td>
<td>.0061</td>
</tr>
<tr>
<td>ICC (3,1)</td>
<td>.807*</td>
<td>.885</td>
<td>.753*</td>
</tr>
<tr>
<td>95% Confidence Interval</td>
<td>.678 to .890</td>
<td>-.531 to .478</td>
<td>.588 to .859</td>
</tr>
<tr>
<td>ICC Rating</td>
<td>Good</td>
<td>Poor</td>
<td>Fair</td>
</tr>
<tr>
<td>SEM</td>
<td>.00015</td>
<td>.00012</td>
<td>.00014</td>
</tr>
</tbody>
</table>

*p indicates significant results (p < .001)

Discussion

• The test-retest reliability of the DPSI is good when a forward jump is performed prior to landing, consistent with previous research. However, the test-retest reliability of the DPSI is reduced when a 90 degree mid-air rotation is performed prior to landing and is severely reduced when a lateral jump, challenging frontal plane stability, is performed prior to landing.
• The reduced test-retest reliability of the DPSI with landing from rotational and lateral jumps limits the use of the DPSI in a clinical setting, particularly when assessing and tracking postural stability when more advanced postural stability training are utilized.

Conclusion

• The test-retest reliability of the DPSI is dependent on the direction of body movement performed prior to landing.
• DPSI is a reliable measure of dynamic postural stability when the jump prior to landing emphasized anterior and vertical body movement.
• DPSI is not a reliable measure of dynamic postural stability when the jump prior to landing emphasized lateral body movement.

Future Research

• Assess the test-retest reliability of the DPSI when more sport-specific, near maximal jumps are performed.
• Examine the test-retest reliability of the DPSI with a shorter recording time, such as 400 milliseconds, consistent with the length of time the foot is on the ground during running and change of direction activities in sport.
• Examine the effect of footwear on the test-retest reliability of the DPSI when landing from different types of jumps.

Literature Cited