A PILOT STUDY: FEASIBILITY OF USING THE BERG BALANCE SCALE IN LOWER LIMB PROSTHESIS USERS

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INTRODUCTION

Individuals with a lower limb amputation are at an increased risk of falls compared to age-matched healthy controls (Miller 2001a). When combined with a fear of falling and reduced balance confidence (Miller 2001a, Miller 2001b), this results in restricted mobility, social activity and participation (Miller 2001b). The ability of lower limb amputees to maintain upright balance is critical for minimizing the risk of falls (Quai 2005), and has a direct relationship with walking performance (van Velzen 2006). Measures that accurately and precisely assess balance in this population would help evaluate the progress and effectiveness of therapeutic interventions and identify individuals at a greater risk of falling. However, there is currently no single standardized clinical assessment tool available to quantify the functional balance of lower limb amputees. Therefore, the purpose of this study was to assess the feasibility of testing, construct validity, and inter-rater reliability of the Berg Balance Scale (BBS) (Berg 1989) for individuals with lower limb amputation.

METHOD

Subjects: 4 persons with unilateral amputation participated in this study (2 males, 2 transtibial, 2 transfemoral, 63±8 years, 165±4 cm, 81±14 kg).

Apparatus: Six exams were administered: three self-report questionnaires (Activities-specific Balance Confidence Scale (ABC), Prosthesis Evaluation Questionnaire-Mobility Subscale (PEQ-MS), and Frenchay Activities Index (FAI)) and three performance measures (two-minute walk test (2MWT), L-Test, and BBS).

Procedures: The six exams were administered by three researchers during a single session. Following collection of informed consent and subject information (e.g., fear of falling), the three questionnaires were administered to each subject in random order. The 2MWT, L-test, and BBS were also administered in random order with 5 minutes of rest between each test. Then, following 20 minutes of rest, a second BBS exam was administered by a different researcher who was blinded to the results of the first exam.

Data Analysis: Construct validity was assessed by observing relationships between the BBS and five other exams in the balance and mobility domains. Inter-rater reliability was assessed with the intraclass correlation coefficient (ICC(2,1) of BBS exam 1 & 2).

RESULTS

All subjects completed the protocol (Table 1). The BBS required 15-20 minutes/subject to administer. Of all measures, only the ABC did not correlate well with the BBS. An example of construct validity results are presented in Figure 1. The ICC(2,1) for inter-rater reliability with the BBS was 0.92.

Table 1. Group results (median [range] of performance measure).

<table>
<thead>
<tr>
<th>Measure</th>
<th>Median [Range]</th>
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<tbody>
<tr>
<td>ABC (#/100%)</td>
<td>63.4 [37.5-83.1]</td>
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<tr>
<td>PEQ-MS (#/4)</td>
<td>2.2 [1.5-3.5]</td>
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<tr>
<td>FAI (#/45)</td>
<td>30.5 [25-39]</td>
</tr>
<tr>
<td>2MWT (meters)</td>
<td>100 [80-140]</td>
</tr>
<tr>
<td>L-Test (seconds)</td>
<td>37.9 [22.4-44.1]</td>
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<tr>
<td>BBS (#/56)</td>
<td>50.3 [41-56]</td>
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</tbody>
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DISCUSSION

The BBS demonstrates proportional relationships with other exams that measure balance and mobility, and exhibits high inter-rater reliability. One study limitation is the small subject number. However, we plan to expand the study design to assess reliability and validate the BBS for this population.

CONCLUSION

The BBS appears to be a feasible and useful tool for assessing balance in lower limb prosthesis users.

REFERENCES


American Academy of Orthotists & Prosthetists
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