Pilot Study to Assess Benefit of Virtual Reality Game System, Wii, on Balance and Gait in Persons With Parkinson's Disease

Peter J. Barbour MD  
*Lehigh Valley Health Network*, Peter.Barbour@lvhn.org

Amy L. Kerstetter PT  
*Lehigh Valley Health Network*, Amy.Kerstetter@lvhn.org

Allyn Danni PT, NCS, ATP, MSCS  
*Lehigh Valley Health Network*, Allyn.Danni@lvhn.org

Jolene Hammer PT  
*Lehigh Valley Health Network*, Jolene.Hammer@lvhn.org

Michael J. Weiss MPH  
*Lehigh Valley Health Network*, Michael_J.Weiss@lvhn.org

See next page for additional authors

Follow this and additional works at: [http://scholarlyworks.lvhn.org/medicine](http://scholarlyworks.lvhn.org/medicine)

Part of the Medical Sciences Commons, Neurology Commons, and the Physical Therapy Commons

Published In/Presented At

Objective:

To assess the benefit of virtual reality gaming (VRG), using a Nintendo Wii gaming system, to maintain gait and balance in Parkinson’s disease.

Background:

Repetitive, task-oriented activity is important for motor learning. Virtual reality gaming (VRG), Nintendo Wii, is inexpensive and provides visual and proprioceptive feedback in the context of a repetitive task-specific activity.

It is difficult to demonstrate sustained benefit from physical therapy. Group exercise programs are utilized to sustain the benefits achieved through physical therapy. Activities employed in these programs include VRG Wii.

Method:

Ten participants with Parkinson’s disease were recruited from a community rehabilitation fitness program on stable medication for 30 days.

All were independent ambulators over age 60.

A physical therapist designed the VRG Wii exercise regimen utilizing Wii Fit balance board with associated gaming software.

Participants engaged in VRG program weekly, for 6 weeks; were assessed at baseline, 6 weeks, and every 4 weeks for 4 months.

Assessments Included:

1. Unified Parkinson’s Disease Rating Scale (UPDRS).
2. Limits of stability using Neurocom’s SMART EquiTest.
3. Timed Up and Go (TUG).
4. Gait assessment using GAITRite; cadence, step length, and speed.
5. Global impression statement (GI).
6. Question regarding impulse control (IC).

Results:

Table 1.

<table>
<thead>
<tr>
<th>Activity</th>
<th>LE Baseline</th>
<th>Week 26</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Length</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>62.9 cm</td>
<td>68.1 cm</td>
<td>0.002</td>
</tr>
<tr>
<td>Left</td>
<td>61.9 cm</td>
<td>69.7 cm</td>
<td>0.007</td>
</tr>
<tr>
<td>Cadence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>106.2 steps/min</td>
<td>115.6 steps/min</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>Gait Speed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>106.2 cm/sec</td>
<td>129.4 cm/sec</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td>UPDRS ADL Score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Wii Step Aerobics Score</td>
<td>108.5</td>
<td>161</td>
<td>0.015</td>
</tr>
<tr>
<td>Wii Half-Moon Score</td>
<td>63</td>
<td>71</td>
<td>0.05</td>
</tr>
</tbody>
</table>

Gait speed and step length correlated as expected (r=.896, p<.001)

* There were no strong correlations between Wii scores and standard assessments.

Conclusions:

- Although the study sample was small, use of commercial low cost VRG appears safe and effective in improving and sustaining important functional areas in Parkinson’s disease.
- Selection of VRG games may enhance treatment plans.
- Statistically significant improvement was found in step length, cadence, gait speed, and UPDRS ADL scores.
- Patients engaged in VRG program weekly to augment biweekly community based fitness program.
- Further study is warranted.