Dual Task Mobility and Falls Risk in persons with Multiple Sclerosis
M.K. Boes1, J.J. Sosnoff, PhD2, & R.W. Motl, PhD2

1Dept. of Bioengineering 2Dept. of Kinesiology and Community Health, University of Illinois at Urbana-Champaign

Introduction

- There is increasing interest in falls among persons with multiple sclerosis (MS).
- 50% of persons with MS have reported falling during a 3-12 month period of time [1-6].
- Between 15-58% of the reported falls were injurious [1, 2, 4].
- There are general categories of factors that have been investigated as correlates of falls, namely balance, gait, and cognitive function.

Physiological Profile Assessment (PPA)

- Overall falls risk score is determined by comparing the outcomes of the tested components to age and gender matched controls [11].
- Component tests include
  - Vision – acuity and contrast sensitivity
  - Lower limb sensation
  - Proprioception
  - Strength (knee flexion and extension)
  - Postural sway
  - Cognitive function

Participants

- 52 community-residing persons with a neurologist confirmed diagnosis of MS.
- 44 Females and 8 Males
- Age of participants ranged from 30-73 years with a median of 55 yrs.
- Expanded Disability Status Scale (EDSS) scores ranged from 2.0-6.5 with a median of 4.0

Methods

Tasks

- 4 walking trials on a 26-foot GAITRite™ electronic walkway at a comfortable pace.
  - 2 – Dual task (modified word list generation (WLG) task)
  - 2 – Dual task (modified WLG task)

Results

DTC t-test Values compared to 0

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean</th>
<th>95% C.I. Low</th>
<th>95% C.I. High</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cadence</td>
<td>9%</td>
<td>7%</td>
<td>11%</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Norm. Walk Velocity (NWV)</td>
<td>14%</td>
<td>10%</td>
<td>17%</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Postural Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sway Area (SA)</td>
<td>-85%</td>
<td>-14%</td>
<td>-37%</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Median Velocity – AP</td>
<td>-41%</td>
<td>-62%</td>
<td>-19%</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Median Velocity – ML</td>
<td>-45%</td>
<td>-64%</td>
<td>-26%</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

- When dividing the population into two groups based on previous falls
  - Fallers (n = 28) and Nonfallers (n = 23)
- The Fallers demonstrated a significant correlation between PPA score and DTC for normalized walking velocity ($r = 0.35, p = 0.03$)
- No significant correlations were observed between PPA score (level of falls risk) and any DTC parameter.

Discussion

- There is a significant DTC for both balance and walking in persons with MS, and this consistent with other research reporting cognitive motor coupling in MS [7].
- There is minimal association between DTC in walking and balance tasks and falls risk as determined by the PPA.
- The correlation between PPA and DTC of NWV in the faller group suggests that a slowed NWV while dual tasking could be an indicator of risk for more falls in a person who has already experienced a fall.
- The results from this study and others suggest that performance of extra tasks during walking should be discouraged to minimize falls in populations with an inherently high risk of falling [12].
- More analysis should be completed to fully investigate the relationship between DTC and falls, as using a dual task to exacerbate motor impairments in a clinical setting may help to fully understand the fall risk of an individual.

References: