OBJECTIVES

- Discuss effective physical therapy interventions for Parkinson’s patients
- Review current literature regarding interventions for Parkinson’s Disease
- Examine outcome measures pertinent to Parkinson’s Disease
INTERVENTIONS
CUEING AND GAIT IMPROVEMENT

- PD gait deviations are characterized by increased cadence, decreased stride length and velocity, freezing of gait

- Auditory and visual cues are used throughout rehab to help improve gait
  - Auditory: metronome, rhythmic cues, verbal
  - Visual: lines marked on floor, laser pointers, adaptive glasses
Auditory cueing: resulted in significant increases in:
- Cadence
- Stride length
- Gait velocity

Visual cueing: resulted in significant increase in stride length
- Results not significant for cadence or gait velocity

An increase in cadence indicated overall improvement in gait quality
VERBAL INSTRUCTIONS AND GAIT

- 5 verbal instructions were examined: “take big steps”, “walk fast”, “swing arms”, “count rhythm”, “walk fast with big steps”
  - Overall weak evidence to support the benefits of verbal instructions
  - Some evidence supports short term stride length improvement with “take big steps”
  - Insufficient evidence for immediate or short term gait velocity improvement
Focuses on intensive, high amplitude exercises

Characterized by multiple repetitions, high intensity, increasing complexity

Goal: Improve movement perception and recalibrate disturbed scalings of movement amplitudes

Patients encouraged to walk with “at least 80% of max energy”
  ▪ Taught to use bigger movements in routine activities for continuous exercise in everyday movements
“Advancing the idea of treating AMPLITUDE in neurological disorders as a SINGLE FOCUS”

- Amplitude = the largest ROM that can be performed with highest effort and most maximally efficient biomechanics every trial/everyday!

- Bigness: what the patient feels when completing movements WNL!
60 patients randomly assigned to one-on-one BIG training (BIG), group Nordic Walking (WALK), or domestic nonsupervised exercises (HOME)

Difference in change measured by UPDRS

Mean improvement of UPDRS was -5.05 in BIG
- Mild deterioration of .58 in WALK and 1.68 in HOME

BIG: significant improvements in TUG and 10m Walk compared to WALK and HOME

No significant changes in QOL

https://www.youtube.com/watch?v=cV8FjbC_MMW
Weakness may result from physical inactivity due to the disability, changes in muscle activation.

Parameters from systematic review:

- Intensity: 8-12 reps at 60-70% 1 rep max
- Frequency: 2-3 nonconsecutive days of the week
- Duration*: 45-60 minutes
- Program Length: 8-12 weeks

Strength and functional improvements were demonstrated in all studies.
Land based vs. aquatic therapy

- Sessions focused on trunk mobility exercises, postural stability, transferring oneself, changing body positions

- Both significantly improved in Functional Reach Test

- Postural stability significantly improved in aquatic therapy group (BBS and UPDRS)
- Walking (water depth at xiphoid process): participant walks supported by physiotherapist

- Participant is supine, lying with flotation devices. Physiotherapist stands at the head of participant holding 1 hand and abducts/adducts the arm while participant’s trunk bends to the opposite side

- Trunk mobility: Participant begins initially sitting on a float, resting the arms on the pool edge and moving the lower limb from side to side. Then movement is repeated with physiotherapist support (facing and not facing the physiotherapist)
AQUATIC THERAPY AND PD¹

Postural Stability:
- Balance control on standing changing upper limb position
- Balance control with 1 leg resting on a step

Transferring/Changing positions
- Reaching forward, right and left directions: in standing position, taking a hoop from hand of physiotherapist and fitting it in a stick in front of him
- Sitting and standing training: on a chair placed into the water
Fall prevention is important for PD patients

Gait measures were recorded with use of: cane, standard walker, 2WW, 4WW, U-Step Walker

4WW produced gait pattern with higher velocity, longer stride length, and more time spent in swing

- Least variability in gait measures compared to no AD

- 4WW and U-Step had lowest episodes of freezing

- U-Step had highest gait variability
OUTCOME MEASURES
Brief BESTest addresses all 6 balance components of the BESTest

- Less time and equipment than Mini BESTest
- Scores significantly correlated to Mini BESTest and BESTtest
- No significant differences between the 3 for retrospective or prospective falls prediction at 6 and 12 months
### Table 3.
Predictive Values for the Brief-BESTest, Mini-BESTest, and BESTest at Each Time Point

<table>
<thead>
<tr>
<th>Time Point</th>
<th>AUC (95% CI)</th>
<th>Score</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Brief-BESTest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retrospective (6 mo)</td>
<td>0.82 (0.69–0.90)</td>
<td>≤11/24 [45.8%]</td>
<td>0.76 (0.54–0.90)</td>
<td>0.84 (0.71–0.92)</td>
</tr>
<tr>
<td>Prospective (6 mo)</td>
<td>0.88 (0.74–0.94)</td>
<td>≤11/24 [45.8%]</td>
<td>0.71 (0.42–0.90)</td>
<td>0.87 (0.70–0.95)</td>
</tr>
<tr>
<td>Prospective (12 mo)</td>
<td>0.76 (0.51–0.89)</td>
<td>≤11/24 [45.8%]</td>
<td>0.53 (0.26–0.80)</td>
<td>0.93 (0.74–0.99)</td>
</tr>
<tr>
<td><strong>Mini-BESTest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retrospective (6 mo)</td>
<td>0.86 (0.76–0.95)</td>
<td>≤20/32 [62.5%]</td>
<td>0.88 (0.68–0.97)</td>
<td>0.78 (0.64–0.88)</td>
</tr>
<tr>
<td>Prospective (6 mo)</td>
<td>0.87 (0.72–0.94)</td>
<td>≤20/32 [62.5%]</td>
<td>0.86 (0.56–0.97)</td>
<td>0.78 (0.61–0.90)</td>
</tr>
<tr>
<td>Prospective (12 mo)</td>
<td>0.77 (0.55–0.89)</td>
<td>≤20/32 [62.5%]</td>
<td>0.62 (0.32–0.85)</td>
<td>0.74 (0.53–0.88)</td>
</tr>
<tr>
<td><strong>BESTest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retrospective (6 mo)</td>
<td>0.84 (0.75–0.93)</td>
<td>≤69%</td>
<td>0.84 (0.63–0.95)</td>
<td>0.76 (0.62–0.86)</td>
</tr>
<tr>
<td>Prospective (6 mo)</td>
<td>0.89 (0.74–0.95)</td>
<td>≤69%</td>
<td>0.93 (0.64–0.99)</td>
<td>0.84 (0.67–0.93)</td>
</tr>
<tr>
<td>Prospective (12 mo)</td>
<td>0.68 (0.45–0.83)</td>
<td>≤69%</td>
<td>0.46 (0.20–0.74)</td>
<td>0.74 (0.57–0.91)</td>
</tr>
</tbody>
</table>
### Scoring Form for the Brief Balance Evaluation Systems Test (Brief-BESTest)*

<table>
<thead>
<tr>
<th>Section</th>
<th>Item</th>
<th>Description</th>
<th>Score Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section I. Biomechanical Constraints</strong></td>
<td>Item 1</td>
<td>Hip/Trunk Lateral Strength</td>
<td>(3) Normal (10 s with trunk vertical) (2) Mild (10 s without trunk vertical) (1) Moderate (1 hip abducts with trunk vertical) (0) Severe (neither hip, 10 s and vertical or not vertical)</td>
</tr>
<tr>
<td>Item 2</td>
<td>Functional Reach Forward</td>
<td>Stand normally; lift both arms straight in front of you; reach as far forward as you can with arms parallel to the ruler without lifting your heels. 2 attempts</td>
<td>(3) &gt; 32 cm (12.5 in) (2) 16.5–32 cm (6.5–12.5 in) (1) &lt; 16.5 cm (6.5 in) (0) No measurable lean (or must be caught)</td>
</tr>
<tr>
<td>Item 3 and 4</td>
<td>Stand on One Leg—Left and Right</td>
<td>Look ahead; hands must stay on hips; bend one leg behind you; stand on 1 leg as long as you can for up to 30 s. Do not let your lifted leg touch the other leg. Allow 2 attempts, record best attempt; record time up to 30 s (stop time if hands off hips or leg on floor or leg touches supporting leg).</td>
<td>(3) Normal (stable &gt; 20 s) (2) Trunk motion OR 10–20 s (1) Stand 2–10 s (0) Unable</td>
</tr>
<tr>
<td>Item 5 and 6</td>
<td>Compensatory Stepping—Lateral, Left and Right</td>
<td>Stand with feet nearly together; lean into my hands; I will remove my hands; do whatever necessary to keep balance, trying to take 1 step. Note: Stand next to and behind participant. Place hand on greater trochanter and brace yourself to hold the person’s weight shifted to supported leg.</td>
<td>(3) Recovers with 1 side/crossover step (2) Several steps to recover independently (1) Steps but needs assist to prevent fall (0) No step OR falls</td>
</tr>
<tr>
<td><strong>Section II. Stability Limits</strong></td>
<td>Item 7</td>
<td>Stance With Eyes Closed, on Foam Surface</td>
<td>(3) 30 s stable (2) 30 s unstable (1) &lt; 30 s (0) Unable</td>
</tr>
<tr>
<td>Item 8</td>
<td>Timed “Up &amp; Go” Test</td>
<td>“When I say ‘go,’ stand up and walk quickly but safely to the tape, turn, and walk back and sit in chair.” Start with back against chair; stop timing when buttocks hit the chair; chair should have arms to push from, if necessary. Imbalance might include trips or lateral/backward stumbles or crossovers.</td>
<td>(3) Fast, &lt; 11 s, good balance (2) Slow, &gt; 11 s, good balance (1) Fast, &lt; 11 s, imbalance (0) Slow, &gt; 11 s, imbalance</td>
</tr>
</tbody>
</table>

**TOTAL:** Time (s)
Overall summary of impairments, functional limitations and disability

- 6 categories:
  I. mentation, behavior, and mood
  II. ADL
  III. motor exam
  IV. complications of therapy
  V. modified Hoehn and Yahr stage
  VI. modified Schwab and England ADL scale

<table>
<thead>
<tr>
<th>UPDRS part</th>
<th>Measurement</th>
<th>Best score possible</th>
<th>Worst Score Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part 1</td>
<td>Mentation, Behavior &amp; Mood</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Part 2</td>
<td>Activities in Daily Living</td>
<td>0</td>
<td>52</td>
</tr>
<tr>
<td>Part 3</td>
<td>Motor Examination</td>
<td>0</td>
<td>56</td>
</tr>
<tr>
<td>Part 4</td>
<td>Complications of Therapy</td>
<td>0</td>
<td>23</td>
</tr>
</tbody>
</table>
REFERENCES


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