Exercise programs in Parkinson’s disease

Colleen Canning
Motor impairments

bradykinesia, hypokinesia, akinesia (freezing)
rigidity
tremor
dyskinesia
dystonia

postural instability
↓ muscle strength
Non-motor impairments

- Cognitive impairment and dementia
- Anxiety, depression
- Sleep disorders
- Hallucinations
- Autonomic disorders, eg, orthostatic hypertension
- Sensory impairment, eg, pain, sensory integration deficits
- Fatigue
Risk factors for falls

Pickering et al (2007)

- Previous falls
- ? Increased disease severity

fixed
Risk factors for falls

Latt et al 2009

- Previous falls
- Leg extensor muscle weakness
- Reduced balance
- Freezing of Gait

fixed

remediable
Exercise to reduce falls and fall risk in PD?
The Effects of an Exercise Program on Fall Risk Factors in People with Parkinson’s Disease: A Randomized Controlled Trial

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Questions

Does a 6 month exercise program which targets leg muscle strength, balance and freezing:

1. Improve performance in measures of fall risk?
2. Improve physical abilities, fear of falling and quality of life?
Inclusion criteria

1. Idiopathic PD
2. Walk independently (with or without an aid)
3. 30 – 80 yrs
4. One or more falls in prior 12 mths or at risk of falls

Exclusion criteria

- Significant cognitive impairment (MMSE<24)
- Other neurological, musculoskeletal, cardiopulmonary or metabolic condition that would interfere with the safe conduct of the training protocol
Allen et al 2010

Initial assessment (at home) → random allocation

usual care (n=24)
- Falls prevention advice

exercise (n=24)
- Falls prevention advice
- Monthly exercise class
- Home exercise 3 x week

6 months

Post-assessment (at home) by blinded assessor

Doctor’s approval
Retention

• 3 drop outs from exercise group
  - did not wish to continue (n=1)
  - health problems unrelated to intervention (n=2)

Allen et al 2010
Allen et al 2010

7% improvement in Parkinson’s disease falls risk score
4kg improvement in knee extensor strength

Results

favours X
favours C

Allen et al 2010
3 point improvement in Freezing of Gait Questionnaire

Results favours X

Allen et al 2010
2 second improvement in sit → stand speed (5 reps)
Allen et al 2010

Trend towards improvement in
- walking speed
- fear of falling

No improvement in
- balance (apart from sit to stand and walking speed)
Exercise delivery

- 5 x Parkinson’s NSW support groups
  - St George/Sutherland
  - Liverpool
  - Parramatta
  - Blue Mountains
  - Macarthur

- 3-6 participants/group
- 1-2 physiotherapists/group

Allen et al 2010
Exercise prescription

PD-WEBB
Weight Bearing Exercise for Better Balance
• Balance exs
• Strength exs
• Cueing strategies to reduce freezing of gait

40-60 mins, 3 x wk, 6 months
1 class per month + home-based exercise
2-4 home visits
WEBB
balance exercises

Allen et al 2010
WEBB
strength exercises

Allen et al 2010
PD-WEBB

cueing strategies

based on the RESCUE trial

(Nieuwboer et al 2007)

Allen et al 2010
Equipment for one participant
Information for participants and exercise recording

Prevention of falls in Parkinson’s disease (PD-FIT)

Information for Exercise Participants

Name: ____________________________ Date commenced: ____________

Remember: if you have any concerns about your current exercise program, or if you have any decided to discontinue it, please inform your therapist immediately.

Your therapist: ____________________ Phone: ____________________


6. No exertion at all
7. Extremely light (7.5)
8. Very light
9. Light
10. Somewhat hard
11. Hard (heavy)
12. Very hard
13. Extremely hard
14. Maximal exertion

Please record your completed exercise test:

Date: ____________ Time: ____________
**USING THE WEIGHTED VEST OR BELT**

**Placing the weights into the pockets**

Always place the required weights into the weight pockets and ensure the pockets are closed before putting the vest or belt on. Only use the weight prescribed by your physiotherapist. If you feel you may require more or less weight, please contact your therapist and follow advice given.

**Example**

1. Sitting down to apply and remove

The vest will be heavy with the weights added – have someone help you if you need to. Place the vest on a lounge or bed. Sit down in front of, or next to the vest. Put the vest on. If you have a sore arm or restricted movement in one arm, then place that arm through the sleeve hole first. Zip the vest up, and do up the catch at the front. To remove the vest, repeat these steps in reverse.
4(d) Stepping over obstacles - sideways

Position yourself standing with a stable object in front (eg. table) and a small obstacle on the floor beside you. Practice stepping over the obstacle sideways and back without touching it. Try not to hold on.

Repeat ______ times each leg.

<table>
<thead>
<tr>
<th>Week Starting</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
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</tr>
</tbody>
</table>
Results

Participants’ record of exercise effects

Name: ___________________   Month: ________________

EFFECTS OF EXERCISE

Please record any adverse or unwanted effects of your exercise (for example, muscle soreness or ongoing fatigue) in the table below.

<table>
<thead>
<tr>
<th>Date</th>
<th>Exercise number</th>
<th>Description of Problem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>
Class essentials

5 Heel raises
4 Sit to stand
3 Stepping in different directions (4)

6 No exertion at all
7 Extremely light (1-5)
8 Very light
9 Light
10 Somewhat hard
11  Hard (Heavy)
12 Very hard
13 Extremely hard
14 Maximal exertion
Road trip!
## Prevention of falls in Parkinson’s disease (PD-FIT)

### Class Training Log

**Exercise Name and Number:** Standing Number 2

**Date:** 29/4/10  
**Exercise Class Number:** 1

<table>
<thead>
<tr>
<th>Name</th>
<th>Version of exercise completed (eg, a,b,c)</th>
<th>Details of exercise (eg, weight, block height)</th>
<th>Amount of exercise (number of repetitions, or time spent exercising)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td></td>
<td>Chair and table for safety</td>
<td>3 mins</td>
<td>Left foot forward more difficult, occas. loss of balance</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>Chair and table for safety</td>
<td>3 mins</td>
<td>Occas. loss of balance</td>
</tr>
<tr>
<td>C- progressed to D</td>
<td></td>
<td>Chair and table for safety</td>
<td>3 mins</td>
<td>Occas. use of hands, managed approx 10 sec SLS</td>
</tr>
<tr>
<td>A- progressed to B</td>
<td></td>
<td>Chair and table for safety</td>
<td>3 mins</td>
<td></td>
</tr>
<tr>
<td>C- Progressed to D</td>
<td></td>
<td>Chair and table for safety</td>
<td>3 mins</td>
<td>Managed approx 10 secs SLS</td>
</tr>
</tbody>
</table>
**Prevention of falls in Parkinson's disease (PD-FIT)**

**Home Visit Training log**

<table>
<thead>
<tr>
<th>Participant's Name</th>
<th>Ph. No.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Exercise No.</th>
<th>Date</th>
<th>Supervised Session No.</th>
<th>Exercise details (eg, weight, no. reps)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>4/6/10</td>
<td>1</td>
<td>2 mins 2 mins 1 min</td>
<td>Warm up. 5 mins.</td>
</tr>
<tr>
<td>2d</td>
<td>4/3/10</td>
<td>1</td>
<td>As long as possible on each leg then change for up to 3 mins.</td>
<td>3 mins.</td>
</tr>
<tr>
<td>3f</td>
<td>4/3/10</td>
<td>1</td>
<td>Up to 5 mins</td>
<td>3 mins.</td>
</tr>
<tr>
<td>4d 4c</td>
<td>4/3/10</td>
<td>1</td>
<td>Stepping with each foot until standing leg fatigues then change to other leg. Each exercise for 10 mins.</td>
<td>3 mins. 6bd.</td>
</tr>
<tr>
<td>6c</td>
<td>4/6/10</td>
<td>1</td>
<td>Vest - 2kg 2 sets x 15 reps each</td>
<td>Borg 14</td>
</tr>
<tr>
<td>7a</td>
<td>4/6/10</td>
<td>1</td>
<td>Vest - 2kg 2 sets x 15 reps each</td>
<td>Borg 93</td>
</tr>
<tr>
<td>86</td>
<td>4/6/10</td>
<td>1</td>
<td>Vest - 2kg 2 sets x 15 reps each</td>
<td>Borg 13</td>
</tr>
</tbody>
</table>

*Note: The table includes exercises and comments for different participants*
Adherence

- 3.6 (SD 2.1) exercise classes attended
- 2.2 (SD 0.9) home visits completed
- 70% (SD 32%) of 78 exercise sessions completed
- No adverse events (1310 exercise sessions)

Allen et al 2010
Trainers’ perspective

- Medical screening for participation in moderate intensity exercise program

- Assessment
  - motor and non-motor impairments, activity limitations
  - variable effects of Parkinson’s medications
  - exercise history, beliefs about exercise, expectations about ability to exercise, perception of benefits
Trainers’ perspective

- Establish any need for full supervision use of transfer belt
- Prepare exercises for each participant in advance of class
- Allow time to set up before and clear up after class
- Home exercise only commenced after home visit to deliver equipment and set up exercise (usually 2 visits)
- Safety / challenge of balance exercises
Trainers’ perspective

Class organisation
- Instructor led, pairs, circuit

Vests
- Putting vests on and off, especially when heavy

Progression
- Maintaining variety and interest (not always progression)
- For those with some cognitive impairment, consider using less variety and only progress when necessary
Participant’s experience of the exercise program
(Qualitative study in progress O’Brien C, Canning CG, Clemson L)

- Appreciated PT understanding the challenges of PD

- When asked if anything to do with PD made exercising difficult, the participant replied “balance is one because it’s not like weight bearing or the physical side…it’s in your brain as well as your coordination and you can get disappointed if you can’t do it”

- “Parkinson’s invites negative thoughts”
Participant’s experience of the exercise program
(Qualitative study in progress O’Brien C, Canning CG, Clemson L)

- Commenting on a participant who stopped attending the group exercise class
  “It was a pity because she might have felt she wasn’t able to compete and rather than do her best in every circumstance she might have felt a bit out of it”

- Reported variations in ability to exercise
  “I was trying to work out whether they were better in the morning or the evening”

- Negative impact of co-morbidities and complications, on recommencing exercise
Environmental considerations

Class
- Difficult to set up multipurpose venues prior to commencement of class
- Storage of equipment when not used

Home
- Storage of equipment when not being used
- Cluttered environment may impact of safety

Transport
- Participants
- Equipment – one set at home, separate sets available for classes
Non-significant improvement in falls risk

Lack of statistical power

7% reduction in falls risk \(\Rightarrow\) less falls

PD Falls Intervention Trial (PD_FIT)


230 participants - 21 groups
Acknowledgements

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• Christine O’Brien
• Jooeun Song
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• Parkinson’s NSW
• NHMRC
References


Resources

• **Weight-Bearing Exercises for Better Balance Program**
  

  
  Can purchase from: [http://hcres.unn.ac.uk/rescue/pubs/cd-rom.htm](http://hcres.unn.ac.uk/rescue/pubs/cd-rom.htm)

• **KNGF Guidelines** for physical therapy in patients with Parkinson’s disease
  