The effects of physical therapy in Parkinson's disease: a research synthesis

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Authors' objectives
To assess the effect of physical therapy (PT) on neurological signs, activities of daily living (ADL) and walking ability in patients with Parkinson's disease.

Searching
MEDLINE, CINAHL and the Cochrane Controlled Trials Register were searched from 1966 to May 1999. The search terms were stated. In addition, the reference lists of relevant reports were checked. Only studies that were published in a book or journal, in either English, German or Dutch, were eligible.

Study selection
Study designs of evaluations included in the review
Studies described as true or quasi-experimental were eligible for inclusion. Studies classified as pre-experiments were excluded. True experimental studies appear to have been randomised controlled trials (RCTs).

Specific interventions included in the review
Studies of PT were eligible for inclusion. The PT intervention in the included studies comprised one or more of the following elements: physical exercises, sensory-enhanced PT, PT exercises, occupational therapy, education, skills training, behavioural treatment, speech therapy, mobility training, and rhythmic auditory stimulation. The control intervention in the included studies comprised one or more of the following elements: no intervention, conventional PT, assessments, regular exercises, non-specific psychological treatments, PT, karate arm training, waiting list, and self internally-paced training. The total duration of the intervention, where stated, ranged from 9 to 157.5 hours.

Participants included in the review
Studies of patients with Parkinson's disease were eligible for inclusion. The mean age of the patients in the included studies was 66 years, while the mean duration of Parkinson's disease was 8 years.

Outcomes assessed in the review
Studies that evaluated the effect of Parkinson's disease were eligible for inclusion. The review assessed ADL, walking speed, stride length and neurological signs.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Validity was assessed on the basis of the following criteria: method of randomisation; matching procedures; adequacy of methods to ensure blinding; treatment of drop-outs in the analysis; reliability and validity of the instruments used to assess the outcomes; control for cointerventions; baseline comparability of the treatment groups; adequacy of the control for duration and frequency of PT; and the adequacy of the statistical analysis. The maximum score attainable was 19 points Two reviewers independently assessed validity and resolved any disagreements through discussion, with the aid of a third reviewer where required. The reviewers were not blinded to the authors, institution or journal. Interrater agreement on the validity scores was estimated.

Data extraction
One reviewer extracted the data.
Methods of synthesis
How were the studies combined?
Hedge's 'g' summary effect size (SES) and 95% confidence interval (CI) was calculated for each outcome, using a fixed-effect model where no statistical heterogeneity was found and a random-effects model where significant heterogeneity was detected. For the SES estimate, each study was weighted using the reciprocal of the standard deviation.

How were differences between studies investigated?
Statistical heterogeneity was assessed using the Q statistic and was illustrated graphically using forest plots. Where significant statistical heterogeneity was found, some investigation was undertaken and the influence of study quality on effect size was explored in a post hoc analysis.

Results of the review
Twelve studies (n=349) were included: 8 true experimental studies (RCTs, n=212) and 4 quasi-experimental studies (n=137).

Study quality: the inter-rater agreement on validity scores was good (kappa 0.85). The validity scores were generally low and ranged from 8 to 14 out of a potential 19 points. One of the 8 RCTs described the method of randomisation; one RCT and two quasi-experimental studies reported observer blinding; six RCTs and two quasi-experimental studies described drop-outs by treatment group. None of the studies analysed the data on an intention-to-treat basis. Two RCTs and two quasi-experimental studies reported either the inter- and intra-rater reliability, or referred to reports of the reliability of the method used to assess the outcomes.

ADL (4 RCTs and 3 quasi-experimental studies): compared with the control, PT significantly improved ADL; the SES (fixed-effect model) was 0.40 (95% CI: 0.17, 0.64). No significant statistical heterogeneity was found (Q=5.51). Two studies found statistically-significant effects.

Walking speed (3 RCTs and 3 quasi-experimental studies): compared with the control, PT significantly improved walking speed; the SES (random-effects model) was 0.49 (95% CI: 0.21, 0.77). Significant statistical heterogeneity was found. Three studies found statistically-significant effects. After excluding one study that reported a large positive effect, the studies were statistically homogeneous (SES 0.31, 95% CI: 0.01, 0.61).

Stride length (2 RCTs and 2 quasi-experimental studies): compared with the control, PT significantly improved stride length; the SES was 0.46 (95% CI: 0.12, 0.82). No significant statistical heterogeneity was found (Q=2.97). Two studies found statistically-significant effects. Neurological signs (3 RCTs and 2 quasi-experimental studies): there was no significant difference between PT and the control; the SES was 0.22 (95% CI: -0.08, 0.52). No significant statistical heterogeneity was found (Q=2.07). None of the studies found a statistically-significant effect.

Authors' conclusions
Physical therapy improves ADL and walking ability in patients with Parkinson's disease, but does not improve neurological signs.

CRD commentary
The review question was broadly described in terms of the study design, intervention and participants. Neither the intervention 'physical therapy' nor the eligible participants' diagnosis of 'Parkinson's disease' were defined. This makes it uncertain whether the interventions and populations included in the studies were similar. Three databases were searched and the search terms were stated, but no attempt was made to locate unpublished studies, thus raising the possibility of publication bias. The methods used to select the studies were not described, hence the adequacy of these methods cannot be judged. Two reviewers assessed validity, but only one reviewer extracted data for the meta-analysis; the lack of a duplicated data extraction may lead to bias and errors. Validity was assessed using validated criteria and the results were tabulated.

No information was given on the patient characteristics so it is not possible to assess the generalisibility of the results.
The studies were combined in meta-analyses and statistical heterogeneity was assessed. The interventions described as 'physical therapy' varied considerably, while the control interventions included both inactive and active interventions of various types. In view of the differences in the interventions compared, it is questionable whether meta-analysis was appropriate. The evidence presented appears to support the authors' conclusions.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.

Research: The authors stated that well-conducted, adequately-powered controlled trials are required to determine the clinical relevance of effect sizes and the optimal PT regimen. They also stated that future studies should use patients on stable drug treatment of Parkinson's disease and standardise assessment times.

**Funding**

Parkinson Patienten Vereniging and Prinses Beatrix Fonds, grant number POO-03-11.

**Bibliographic details**


**PubMedID**

11295012

**Indexing Status**

Subject indexing assigned by NLM

**MeSH**

Activities of Daily Living; Exercise Therapy; Humans; Parkinson Disease /physiopathology /rehabilitation; Physical Therapy Modalities; Walking /physiology

**AccessionNumber**

12001001023

**Date bibliographic record published**

31/03/2004

**Date abstract record published**

31/03/2004

**Record Status**

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