

REHABILITATION AND PARKINSON'S DISEASE

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ABSTRACT. In this study we evaluated the efficacy of physical therapy together with drug therapy in a group of parkinsonian patients, compared with a group of patients treated using drug therapy only. The physical therapy program lasted four months and included passive and active mobilization exercises, adopted for postural control and equilibrium, walking and prevention of contractures and ankylosis. The assessment was accomplished by means of clinical rating scales and motor performance tests. Patients treated by means of physiotherapy showed an improvement at the end of the study in both clinical scales and motor performance tests. This improvement was noted in both patients with less severe and more severe symptoms as well as in those with shorter and longer disease duration. It is not easy to assess the role played by physical therapy due to the difficulty of an objective evaluation; our results, however, show an improvement in the functional performance of patients and suggest the usefulness of physical therapy associated with drug therapy in a comprehensive treatment for Parkinson's disease.

Key words: Parkinson's disease, physical therapy, rehabilitation.

Physicians tend to underestimate the importance of physical therapy for Parkinson's disease (PD). Moreover, for PD patients physical therapy is often considered as secondary to pharmacological treatment. As a consequence, rehabilitative treatment is often delayed and this fact might influence the clinical outcome of patients.

A descriptive study on patients suffering from Parkinson's disease reported that only 7% of the patients had been treated by a physical therapist, 4.4% by a speech therapist, and that 25% had consulted an occupational therapist (11).

The efficacy of early and specific physical therapy for Parkinson's disease has been suggested by some authors (2, 6, 10). To our knowledge, only Gibberd (7) reported negative results in rehabilitation programs for parkinsonian patients, but these data were challenged by other studies (1, 13, 14).

In a comparison between parkinsonian patients treated using drug therapy only and patients treated with drug and physical therapy, Doshay reported a significantly lower disability in the latter group, in both the short and long term evaluations (4).

Palmer and others (12) compared two groups of patients treated with a rehabilitation program proposed by the United Parkinson Foundation (UPF), and a karate program, respectively; the latter program is supposed to improve the preparation of movements and the control of long latency reflex responses. The authors found improved gait, ameliorated fine coordination in all four limbs and reduced tremor in both groups, with no significant modifications in the long latency reflex responses. Finally, Hurwitz (9) reported an improvement of motor performances in severely disabled parkinsonian patients, without finding objective modifications in tremor, rigidity and automatic movements; this author used these data to emphasize that there is no close correlation between rigidity, bradykinesia and postural control in parkinsonian patients.

Physical, speech and occupational therapy can indeed help patients to feel less isolated socially and to maintain a high degree of independence as long as possible (15).

The aim of this study was to evaluate the clinical response of a group of parkinsonian patients receiving combined drug and physical therapy, compared with a second group of patients treated using drug therapy only.

PATIENTS AND METHODS

Sixteen parkinsonian patients were treated by means of physical therapy together with drug therapy, and were compared with a group of seventeen parkinsonian patients who received only drug treatment (control group) (Table I).

The drug treatment remained unchanged during the whole period of the study for both groups of patients. The two groups of patients were homogeneous as regards age, disease duration, severity of symptoms, and antiparkinsonian drugs.

Neurological assessment was accomplished by means of

Table I. Clinical details

	Physical therapy group	Control group
Number of patients	16	17
Sex		
M	12	10
F	4	7
Age	67.1 (60–75)	65 (59–76)
Disease duration (yrs)	5.5 (2–14)	5 (1–12)
Hoehn and Yahr staging		
II	13	15
III	3	2
Clinical form		
Mixed	14	14
Akinetic	2	3
Bilateral	8	9
Unilateral right	3	3
Unilateral left	5	5

Hoehn and Yahr Staging (HY) (8) and Columbia University Rating Scale (CURS) (5). Daily living activities were studied by means of Northwestern University Disability Scale (NUDS) (3). The following specific activities were also timed, before and at the end of the physical therapy program: (a) walking for 10 metres; (b) walking around a chair; (c) 18 hole pegboard test (time taken to insert a set of pegs into a peg board); (d) fitting cubes test (time taken to fit together a set of little plastic cubes).

Physical treatment lasted one hour, 3 times a week, for a period of 4 months and included the following exercises:

- passive mobilization for the prevention of contractures, ankylosis and muscular atrophy;
- on ground roll exercises, for stimulation of postural control;
- exercises in quadrupedal position, with stabilization on two limbs for equilibrium training;
- alternate exercises of the four limbs in supine position for the recovery of muscular coordination and for the preparation of walking;
- exercise in standing position: flexo-extension of hip, knee and ankle joints; lateral flexion and rotation of the trunk, shoulder adduction with the help of a stick;
- walking with wide base and long steps; walking with hurdles and control of limb raising;
- finger training and occupational therapy;
- exercises in mirror to stress the mimic expressions;
- speech exercises which included loud phonation and reading;
- breathing exercise: deep breaths and pronunciation of numbers and letters in the expiratory phase for the control of breathing duration.

Control patients were evaluated by means of HY, CURS and NUDS, for one hour, 3 times a week, for the period of 4 months, so as to give them the same special attention and stimulation as the treated patients and above all to control psychic and placebo effects.

Non-parametric analysis of unpaired and paired data was performed using Mann-Whitney's U-Test and Wilcoxon's T-Test, respectively; Student's *t*-test was used for parametric analysis of paired and unpaired data.

RESULTS

At the end of the study the patients treated with physical therapy showed greater improvements than the control group in both clinical rating scales

Table II. Clinical rating scales, daily living activity scale and motor performance tests. Basal and final scores and their differences in the two groups of patients (mean \pm SEM)

	FKT treated group		Control group		Differences (final-basal)		
	Basal	Final	Basal	Final	FKT treated	Controls	<i>p</i>
CURS total	24.3 \pm 2.6	21.6 \pm 2.3	23.9 \pm 2.1	22.9 \pm 1.9	-2.8 \pm 1.6	-1.0 \pm 1.5	NS
Bradyk.	7.1 \pm 0.7	6.7 \pm 0.7	7.2 \pm 0.6	6.9 \pm 0.4	-0.4 \pm 0.8	-0.3 \pm 0.3	NS
Rigidity	5.9 \pm 0.4	5.8 \pm 0.6	5.9 \pm 0.8	5.7 \pm 0.5	-0.1 \pm 0.7	-0.2 \pm 0.8	NS
Tremor	3.0 \pm 0.7	1.8 \pm 0.5	2.8 \pm 0.9	1.9 \pm 1.2	-1.4 \pm 0.6	-0.9 \pm 1.5	NS
NUDS	5.9 \pm 1.2	3.6 \pm 0.4	5.7 \pm 0.6	5.6 \pm 0.1	-2.3 \pm 1.1	-0.1 \pm 0.1	<0.05*
Fitting cubes							
RT	7.7 \pm 0.9	7.1 \pm 0.8	7.9 \pm 0.7	7.5 \pm 0.9	-0.6 \pm 0.7	-0.4 \pm 0.8	NS
LT	8.9 \pm 1.2	6.3 \pm 0.7	9.0 \pm 0.3	8.7 \pm 0.1	-2.6 \pm 0.7	-0.3 \pm 0.2	NS
Pegboard test							
RT	47.7 \pm 1.7	47.6 \pm 2.4	47.2 \pm 1.6	47.1 \pm 0.5	-0.1 \pm 2.0	-0.1 \pm 1.0	NS
LT	53.2 \pm 2.9	51.6 \pm 2.9	52.9 \pm 1.0	52.4 \pm 3.1	-1.6 \pm 2.9	-0.5 \pm 2.0	NS
Walking	19.8 \pm 0.9	15.5 \pm 1.0	19.5 \pm 0.4	19.3 \pm 0.1	-4.3 \pm 1.2	-0.2 \pm 0.2	<0.05**
Chair	6.3 \pm 0.4	5.9 \pm 0.3	6.5 \pm 0.9	6.1 \pm 0.5	-0.4 \pm 0.4	-0.4 \pm 0.7	NS

* Mann-Whitney's U-test, ** Student's *t*-test.

Table III. Physical therapy treated group. Comparison between basal and final scores (mean \pm SEM)

	Basal	Final	<i>p</i>
CURS total	24.3 \pm 2.6	21.6 \pm 2.3	NS
Bradyk.	7.1 \pm 0.7	6.7 \pm 0.7	NS
Rigidity	5.9 \pm 0.4	5.8 \pm 0.6	NS
Tremor	3.0 \pm 0.7	1.8 \pm 0.5	NS
NUDS	5.9 \pm 1.2	3.6 \pm 0.4	* < 0.05
Fitting cubes			
RT	7.7 \pm 0.9	7.1 \pm 0.8	NS
LT	8.9 \pm 1.2	6.3 \pm 0.7	** < 0.01
Pegboard test			
RT	47.6 \pm 2.4	47.7 \pm 1.7	NS
LT	53.2 \pm 2.9	51.6 \pm 2.9	NS
Walking	19.8 \pm 0.9	15.5 \pm 1.0	NS
Chair	6.3 \pm 0.4	5.9 \pm 0.3	NS

* Wilcoxon's T-test, ** Student's *t*-test.

(CURS) and motor performance tests (Table II). Moreover, this comparison revealed statistically significant differences in the daily activity scale (NUDS) and in the walking test ($p < 0.05$) (Table II). Scores for the group treated with physical therapy also improved significantly in one of the motor performance tests (fitting cubes test) on the left side and in the NUDS,

Table IV. Motor performance tests in physical therapy treated patients divided according to severity of symptoms (mean \pm SEM)

	Basal scores	Final scores	<i>p</i>
<i>Patients with less severe symptoms (CURS < 23)</i>			
Fitting cubes			
RT	6.1 \pm 1.2	6.4 \pm 0.7	NS
LT	8.0 \pm 2.2	6.7 \pm 1.7	NS
Pegboard test			
RT	40.6 \pm 2.1	44.8 \pm 1.6	NS
LT	46.9 \pm 3.3	51.1 \pm 4.6	NS
Walking	20.8 \pm 1.3	15.5 \pm 1.3	* < 0.02
Chair	5.8 \pm 0.6	5.9 \pm 0.4	NS
<i>Patients with more severe symptoms (CURS \geq 23)</i>			
Fitting cubes			
RT	9.0 \pm 1.3	7.6 \pm 1.4	NS
LT	9.6 \pm 1.3	6.3 \pm 0.6	* < 0.02
Pegboard test			
RT	53.8 \pm 2.6	50.1 \pm 2.7	NS
LT	58.8 \pm 4.0	52.0 \pm 3.9	NS
Walking	18.8 \pm 1.4	15.5 \pm 1.8	NS
Chair	6.9 \pm 0.6	6.9 \pm 0.4	NS

* Student's *t*-test.

Table V. Motor performance tests in physical therapy treated patients divided according to duration of disease (mean \pm SEM)

	Basal scores	Final scores	<i>p</i>
<i>Patients with disease duration < 5 years</i>			
Fitting cubes			
RT	7.1 \pm 1.3	6.1 \pm 1.1	NS
LT	9.6 \pm 2.2	7.3 \pm 1.2	NS
Pegboard test			
RT	46.5 \pm 2.3	47.6 \pm 2.6	NS
LT	51.9 \pm 3.9	52.0 \pm 4.9	NS
Walking	20.3 \pm 1.2	15.5 \pm 1.1	* < 0.01
Chair	5.8 \pm 0.7	5.9 \pm 0.4	NS
<i>Patients with disease duration \geq 5 years</i>			
Fitting cubes			
RT	8.3 \pm 1.4	7.0 \pm 1.3	NS
LT	8.0 \pm 0.9	5.6 \pm 0.6	* < 0.05
Pegboard test			
RT	48.9 \pm 4.6	47.7 \pm 2.3	NS
LT	54.7 \pm 4.9	52.0 \pm 3.1	NS
Walking	19.3 \pm 1.5	15.5 \pm 1.8	NS
Chair	6.9 \pm 0.5	5.9 \pm 0.4	NS

* Student's *t*-test.

when compared with the respective basal scores (Table III). HY assessments did not change in either treated or control groups.

We finally divided the treated patients into different subgroups according to the severity and duration of Parkinson's disease. Values for patients with less severe parkinsonian symptoms (CURS < 23) showed statistically significant differences at the end of the treatment, when compared with the basal values in the walking test ($p < 0.02$). In patients with more severe symptoms (CURS \geq 23) there was a statistically significant improvement in values in the fitting cubes test on the left side, when compared with the basal values ($p < 0.02$) (Table IV). The same division in the control patients (cut-off point: CURS score 23) showed no differences between the patients with more severe and less severe symptoms.

As regards the disease duration, the patients with Parkinson's disease for more than 5 years showed a statistically significant amelioration in the fitting cubes test on the left side ($p < 0.05$), whereas patients with a shorter disease duration showed a statistically significant improvement in the walking test ($p < 0.01$) (Table V). The same division in the control group (disease duration > or < 5 years) showed no differences between patients in this case either.

DISCUSSION

It is well known that parkinsonian symptoms cannot be fully controlled by means of drug therapy, particularly after some years from the beginning of L-Dopa treatment (long-term levodopa syndrome).

The role of physical therapy in PD is not yet well defined, as there are few controlled studies to date, and because of the difficulties in objective clinical evaluations; indeed, many psychological factors (motivation, depression, anxious state) are likely to influence the motor performances in parkinsonian patients. Our results, though based on data from a small group of non-consecutive and selected patients, have actually demonstrated that physical therapy can have a significant, beneficial effect on some aspects of the motor functions in parkinsonian patients. These improvements cannot be related to variations in drug therapy as this therapy was unmodified for the duration of the trial in both groups of patients.

Although we tried to control psychic effects by examining control patients for a long time (visits lasting about one hour) as often as we examined the experimental group, it is not possible to exclude a certain placebo effect in the patients treated by means of physical therapy. However, the selectivity of the amelioration in some tests only is unlikely to be related to a placebo effect. The significant amelioration found on the left side in the majority of the tests could be interpreted as a higher sensitivity to physical therapy for the left hand, which is used less in daily life activities, at least by right-handed patients.

To conclude, our data are consistent with previous studies and suggest the usefulness of physical therapy for patients with Parkinson's disease, including those with more severe symptoms. Our patients were advised to continue the training after being discharged. It will be interesting to see, in the long-term follow-up, how many patients have the possibility to continue physical therapy and how long after the end of the training the improvement in patients lasts.

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