



Effects of a physical therapy home-based exercise program for Parkinson's disease

Efeitos de um programa domiciliar de exercícios para doença de Parkinson

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Abstract

Introduction: Parkinson's disease (PD) is a neurological disorder that causes loss of functional abilities and independence. The aim of this study was to evaluate the effects of a physical therapist-supervised home-based exercise program in patients with PD using the UPDRS scale. **Materials and methods:** Thirty-three PD patients in the 1.5 to 3 Hoehn and Yahr stages participated in the trial. The patients and their relatives received a booklet with a 12-week home program, with a series of strengthening, stretching and flexibility exercises. The patients were trained by a physical therapist, and each session took 60 minutes, three times a week. **Results:** We classified our patients in four groups: Group 1 - patients under 60 years of age and less than five years of PD; Group 2 - patients under 60 years of age and more than five years of PD; Group 3 - patients over 60 years of age and less than five years of the disease; and Group 4 - patients over 60 years of age and more than five years of PD. Significant improvement was found in group 1 in mentation, activities of daily living and motor function

($p > 0.05$). Group 3 presented statistically significant differences in motor function subscale ($p > 0.05$) and Group 4 showed no worsening in mentation subscale ($p > 0.05$). Group 2, however, presented no difference in all subscales ($p < 0.05$). **Conclusion:** Although not all patients improved their UPDRS scores, our data support the use of a home program as an alternative method of physical therapy treatment for PD patients.

Keywords: Parkinson's disease. Physiotherapy. Rehabilitation.

Resumo

Introdução: A doença de Parkinson (DP) é uma desordem neurológica que causa declínio funcional e da independência. O objetivo deste estudo foi avaliar os efeitos de um programa terapêutico autossupervisionado em pacientes com DP pelas escalas UPDRS e Hoehn-Yahr. **Materiais e métodos:** Participaram do estudo 33 indivíduos nos estágios entre 1,5 e 3 de Hoehn-Yahr. Pacientes e familiares receberam um folheto (programa domiciliar) de 12 semanas, composto de atividades de fortalecimento e alongamento. Os pacientes foram treinados por um fisioterapeuta, e cada sessão teve duração de 60 minutos, três vezes por semana. **Resultados:** Os pacientes foram classificados em quatro grupos: Grupo 1 - com menos de 60 anos de idade e menos de cinco anos de PD; Grupo 2 - com menos de 60 anos de idade e mais de cinco anos de PD; Grupo 3 - mais de 60 anos de idade e menos de cinco anos da doença; e Grupo 4 - com mais de 60 anos de idade e mais de cinco anos de PD. Melhorias significativas foram percebidas no grupo 1 quanto a atividades diárias e função motora ($p > 0,05$). O grupo 3 apresentou diferenças estatisticamente significativas na função motora (subescala) ($p > 0,05$) e o grupo 4 não mostrou piora na subescala mental (subescala) ($p > 0,05$). O grupo 2, no entanto, não apresentou diferenças em nenhuma das subescalas ($p < 0,05$). **Conclusão:** Embora nem todos os pacientes tenham apresentado melhorias em suas pontuações pela UPDRS, nossos dados indicam o uso de um programa domiciliar como método alternativo fisioterapêutico na doença de Parkinson.

Palavras-chave: Doença de Parkinson. Fisioterapia. Reabilitação.

Introdução

Parkinson's disease (PD) is a common, progressive neurodegenerative disease that causes progressive loss of functional abilities and independence. People with PD present neurologic symptoms such as tremor, rigidity, akinesia and imbalance (1, 2).

In general, the combination of pharmacotherapy and rehabilitation is the optimal treatment strategy for symptom control and improving quality of life (3-6). By using exercises, gait training and relaxation therapy, physical therapy aims to improve the volitional movements, posture, gait, balance, and rigidity. Although a number of studies have shown that supervised exercise programs have short-term beneficial effects, there are few studies addressing the effectiveness of home-based exercises programs (7).

The Unified Parkinson's Disease Rating System (UPDRS) incorporates elements from existing scales to provide an efficient and flexible mean of monitoring PD-related disability and impairment. It is currently the most used scale and has proven to be an easy-to-use clinical instrument, with a good data

exchange rate between patients and the neurologist who interviews them (8, 9). The purpose of this study is to investigate the effects of a home based exercise program using the UPDRS.

Materials and methods

This study was case series in which patients with PD referred to the Movement Disorders Outpatient Neurology Unit of the Antonio Pedro University Hospital (Fluminense Federal University - Medicine School) in Niteroi, Rio de Janeiro State (Brazil) were included. The inclusion criteria were: 1 - Idiopathic PD between 50-80 years of age; 2 - To be classified as grade 1 to 3 according to the Hoehn & Yahr (H&Y) Scale; 3 - Stable PD medication regimen through the 12 weeks before the study; 4 - No physical therapy treatment in the last 12 months; 5 - Independent gait. The exclusion criteria were: 1 - Comorbidities that could interfere in the results of functional tests; 2 - Any medical or musculoskeletal contraindication to exercises; 4 - Presence of dementia (Mini-Mental

Test Scale). The patients were evaluated by the same experienced physical therapist. All patients gave written informed consent and the protocol was approved by the Ethics Committee of our Hospital.

All patients were evaluated by the UPDRS scale. The UPDRS has proven to be an easy-to-use instrument in clinical practice with an average time requirement for administration between 10 and 20 minutes. It has four components: 1 - Mentation, behaviour and mood; 2 - Activities of daily living; 3 - Motor function; and 4 - Complications. The scale ranges from 1 ("very much improved") to 7 ("very much worse"). The maximum score is 154, that corresponds to the most severe disabilities. The advantage of the UPDRS is that it was developed to assess multiples aspects of PD (10).

After baseline evaluation by the UPDRS, the patients and their relatives were given a series of exercises in a brochure recommended by the Parkinson Society of Canada (11). All patients received a booklet with instructions and illustrations of the exercise program. It consisted of 13 strengthening exercises, and six stretching and flexibility exercises. The flexibility or stretching activities aimed to maintain a good range of movement in all joints and muscles. Strengthening exercises challenged the muscles to maintain or improve its contractile function, improve balance and posture, diminish falls and help to carry out more daily activities. Each exercise session took about 60 minutes and was done three times a week for 12 weeks. At the first visit, the patients and their relatives were given instructions about how to do the exercises. Subjects had to adhere strictly to their usual medications. Every week the physical therapist phoned the patients or their relatives to verify if they were doing the exercises correctly. The final evaluation by UPDRS was performed after the 12 weeks of treatment.

Since most of the studies considered 60 years old as an clinically important threshold age and five years as an appropriate follow-up time to observe the disease evolution and find statistically significant changes in the foremost outcomes, we classified our patients in four groups: Group 1 - Patients under 60 years of age and less than five years of PD; Group 2 - Patients under 60 years of age and five years or more of PD; Group 3 - Patients over 60 years of age and less than five years of the disease; and Group 4 - Patients over 60 years of age and more than five years of PD (Table 1). In our sample there was no

Table 1- Classification of the patients according to the age and duration of the disease

Age (Years)	Duration of the disease (Years)		Total
	< 5	≥ 5	
< 60	9	4	13
≥ 60 or more	16	7	23
Total	25	11	36

Source: Research data.

statistical association between age and duration of the disease to these two classifications ($p > 0.05$).

Statistical analysis was carried out with SPSS v.10 using the binomial test to compare no worsening and worsening proportions of groups. Descriptive statistics of UPDRS scores used minimum, maximum, mean, standard deviation, median and the interquartile interval. Independence between variables that constitute the groups of patients was investigated by a chi-square test.

Results

Fifty-one patients entered the study. Out of the 33 subjects who completed the trial, 27 were males and 12 females. Fourteen patients dropped out of the study: ten patients did not return and five required adjustment of medication. The mean age was 64.69 ± 8.75 years old (minimum: 50, maximum: 80). The average disease duration was 4.61 ± 3.64 years (minimum: six months, maximum: 15 years). H&Y scores ranged from 1.5 to 3. The patients' treatment regimen remained constant throughout the study.

Baseline and 12-week UPDRS scores are presented in Table 3 for the four groups of patients. Comparison between groups showed that the changes were statistically significant only for the first group (patients with less than 60 years of age and less than five years of PD duration (Table 2).

Figure 1 summarizes the effects of the exercises at the baseline and the final evaluation in the four groups.

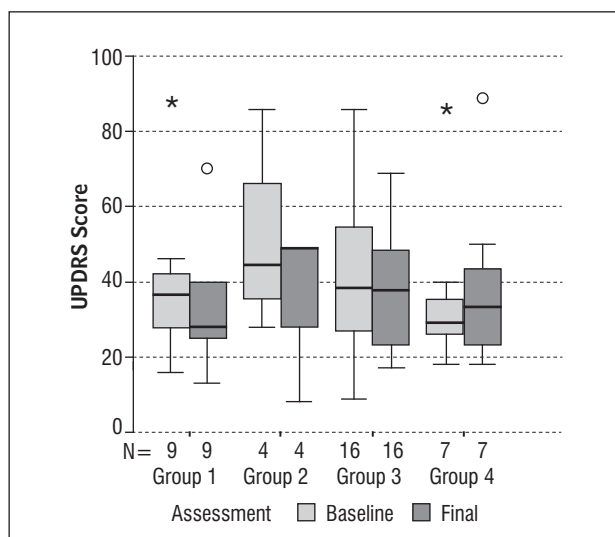
As the number of patients reduced in the three groups according to the UPDRS subscales (1 - Mentation, behaviour and mood; 2 - Activities of daily living; 3 - Motor function), we considered the treatment outcome according to the two types of results: those cases that became worse and those that did not worsen after the

Table 2 - Statistical description of UPDRS scores

Group	Moment	n	min	max	mean	s.d.	median	i.q.i
1	Baseline	9	16	88	38,7	21,14	36	21
	Final		13	70	32,9	16,66	28	18,5
2	Baseline	4	28	86	50,8	24,78	44,5	44,25
	Final		8	49	38,5	20,34	48,5	31
3	Baseline	16	9	86	42,6	22,07	39	29,25
	Final		17	69	37,9	16,26	38	25,25
4	Baseline	7	18	86	36,4	22,82	29	15
	Final		18	89	39,0	24,57	33	29

Source: Research data.

Notes: s.d. = standard deviation; i.q.i. = interquartile interval.

**Figure 1**- UPDRS scores in the four groups

Source: Research data.

home-based physical therapy program. As we can see in Table 3, Group 1 showed a statistically significant difference among the three subscales. Group 2, however, presented no statistically significant difference in all subscales, and Group 3 presented a statistically significant difference in the motor function subscale. In Group 4, none of the patients showed any worsening in the scores of mentation subscale.

Discussion

Even with medical management using appropriate drugs or modern neurosurgical techniques, PD is a

progressive and degenerative disease with increased impairments, limitations to activity and many other motor and functional restrictions (12, 13). In this context, physical therapy and rehabilitation have been proposed as allied methods to recover or maintain the functionality. Since the publication of the first randomized trial in 1981 (14), the quantity and quality of clinical trials on the efficacy of physical therapy in PD has been developing rapidly (15). More recent studies have described the use of a home-based physical therapy program for PD (16-20).

Our study accessed the effect of a home exercise program taught by a physical therapist to 36 patients with PD in stage 1-3 of the H&Y scale. Our results showed that patients with PD younger than 60 years of age and with less than five years of disease (Group 1) had a statistically significant improvement in the UPDRS scale. Although the other groups had no additional beneficial effects, we could conclude that patients over 60 years old and less than five years of the disease (Group 3) presented a significantly statistical difference in the motor examination subscale and that patients over 60 years old and more than five years of disease (Group 4) showed no worsening in the mentation subscale. Surprisingly, Group 2 (patients under 60 years of age and five years or more of disease) did not show any improvement in the UPDRS scale.

Studies with a similar design and a higher sample size are necessary to confirm or reject this outcome. Some previous studies used the UPDRS scale in non-home-based exercise programs. Comella et al. (21) conducted an exercise training program with 16 patients with PD. Changes in UPDRS were measured

Table 3- Worsening and no worsening evaluation assessment on the home-based physiotherapy program

Group	Evaluation	MBM	ADL	Motor	UPDRS
1	No worsening	100,0%*	77,8%*	77,8%*	77,8%*
	Worsening	0,0%	22,2%	22,2%	22,2%
2	No worsening	50,0%	50,0%	75,0%	75,0%
	Worsening	50,0%	50,0%	25,0%	25,0%
3	No worsening	68,8%	43,8%	75,0%*	75,0%*
	Worsening	31,3%	56,3%	25,0%	25,0%
4	No worsening	100,0%*	85,7%	42,9%	42,9%
	Worsening	0,0%	14,3%	57,1%	57,1%
All patients	No worsening	80,6%*	61,1%	69,4%*	69,4%*
	Worsening	19,4%	38,9%	30,6%	30,6%

Source: Research data.

Notes: MBM = Mentation, behaviour and mood; ADL = Activities of daily living; Motor = motor function.

* = Statistically significant difference between no worsening and worsening on respectively subscale ($p < 0.05$).

and they found an improvement in the rigidity and akinesia. Another study using the UPDRS was done by Baatile et al. (22). They demonstrated an improvement in the UPDRS. However, only seven patients participated in their study and they did not specify in which components of the scale they had observed the improvements. Fisher et al. (23) applied a conventional and high-intensity exercise protocol in 30 patients with PD (1 to 3 in the H&Y scale) during eight weeks and observed a modest improvement in two kinds of exercises of the UPDRS scale.

These findings suggest that exercise is a useful adjunct to pharmacologic therapy (24, 25, 26). A home-based rehabilitation programme for patients with Parkinson's disease helped to improve motor performance compared to patients who did not take advantage of a regular, professionally designed exercise program (27). Individuals with Parkinson's Disease (PD) may experience challenges with physical mobility, swallowing, speech and cognition related to their disease. This may result in a decline in their quality of life and difficulty carrying out their daily routine. Recent research indicates that individuals with PD have the potential for regaining independence through participation in a rehabilitation program (28- 30).

The UPDRS scale was also used in some clinical trials of home-based exercises (16-20). Nieuwboer et al. (16) separated their patients in two groups. In the first, the exercises were provided at home,

whereas the second group performed the exercises in the hospital. They concluded that the group doing exercises at home had a better performance. Similarly, Caglar et al. (17) studied 30 patients with PD (from 1 to 3 in the H&Y scale) and concluded that the group that performed the exercises at home had a significant improvement. Neither Nieuwboer et al. (16) nor Caglar et al. (17) studies reported results of different UPDRS subscales scores. A similar trial was conducted by Lun et al. (18). They also separated their PD patients in two groups: one performing exercises in the clinic and the other at home. They used different scales, including the UPDRS. Although they did not report the UPDRS sub scores, the authors concluded that the patients' improvement was seen only in UPDRS.

As we see it, the exercises performed at home led to a better performance of functional activities (16). The patients are more motivated; they are accompanied by their relatives; in many cases, as commonly occur in our country, the hospital is far from the patient's residence, representing an additional operational and financial difficulty to the treatment. In our study, not all PD patients had a significant improvement after the treatment. As we used a home-based protocol and some patients and their relatives had a limited cognitive capacity, it is possible that they did not perform the exercises correctly. Despite the small sample size and the absence of a control group, our data supports the use of a home-based physical

therapy program as an alternative method of physical therapy treatment for PD patients.

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