

# Multidisciplinary care and the reduction of levodopa intake of patients with advanced Parkinson's disease

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## ABSTRACT

**Objective:** To identify and compare people with Parkinson Disease (PD) doing multidisciplinary activities with those who do not realize. **Method:** Participants were evaluated for the Hoehn and Yahr (HY) (1-4), age, daily dose of levodopa, what activities they participate in and quality of life (PDQ-39), UPDRS activities of daily living and motor (UPDRS). They compared participants and non-practicing multidisciplinary activities stratifying the levels of HY between those with balance deficit (levels 3 and 4 HY), and those who do not have balance problems (levels 1 and 2 HY). **Results:** Attended by 49 participants of both genders (21 women, 28 men), these 17 do not participate in other therapies and 32 perform at least one multidisciplinary activity. There were no differences between groups participants and non-participating multidisciplinary activities. However, when stratifying the levels of HY, we realized that there was a statistical difference at the highest level of HY, the daily dose prescribed levodopa, between participants and non-participating multidisciplinary activities ( $P=0.017$ ). **Conclusions:** The finding points that for this group of people with PD, with greater severity of PD, those who practice multidisciplinary activities need a statistically lower dose of levodopa.

**Keywords:** Parkinson Disease, Complementary Therapies, Levodopa

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## INTRODUCTION

The Parkinson disease (PD) is a progressive, neurological disease that affects 1% of the population over 50 years of age, with a peak incidence at the age 60 and higher prevalence among the male population.<sup>1</sup> It is the second most common neurodegenerative disease<sup>2</sup> and one of the most relevant extrapyramidal neurodegenerative syndromes that causes motor function losses.<sup>3,4</sup> Its classic cardinal signs are bradykinesia, rigidity, postural instability and tremor at rest.<sup>5</sup> In addition, it has non-motor symptoms such as neuropsychiatric dysfunctions, sleep disorders, autonomic dysfunctions and some sensory dysfunctions.<sup>6</sup>

It has been observed that 5 to 10 years after the diagnosis, most people with PD tend to present severe motor incapacity<sup>7</sup> due to the severe decrease of dopamine and its metabolites in the nigrostriatal pathway. Currently there is the drug treatment that aims to replace this neurotransmitter with its precursor, the levodopa (L-dopa), because it crosses the blood-brain barrier and is converted into dopamine by neurons of the substantia nigra. This treatment reduces the severity of motor symptoms and may promote a better quality of life, but its prolonged use leads to the alteration of voluntary movements with presence of choreic movements<sup>7-9</sup> combined with the decrease of the desired effect of the drug in the inhibition of the motor patterns of the DP.

The lack of dopamine also causes inefficient control of movements and recurrent changes in motor control such as instability and disturbances of balance and gait, among other symptoms. Moreover, vestibular impairments can trigger labyrinthine symptoms due to its pharmacotherapy<sup>10</sup> and all these associated alterations contribute to the reduction of the quality of life of the person with PD and increase of the postural oscillation that leads to functional reduction.<sup>11</sup>

Unfortunately, there are still no drugs that can stop or prevent the course of the disease. As the disease progresses, it becomes necessary to increase the dose and reduce the time in between each administration of levodopa. In the long term, there are limitations to the use of levodopa that are caused by loss of efficacy, fluctuations in motor performance and mental alterations.<sup>12</sup>

Therefore, a multiprofessional team can positively contribute to the non-pharmacological treatment of PD, and reduce adverse effects, by focusing on the maintenance of the quality of life and functional independence, understood as the condition for performing activities of daily life and the social interac-

tions in labor and leisure activities.<sup>13</sup> Such social independence may change due to cardinal signs of PD,<sup>5</sup> so multidisciplinary care and biopsychosocial approach may be considered the ideal model for PD management. However, the literature is still limited regarding its real benefits, in contrast to traditional pharmacological therapy alone.<sup>14,15</sup>

Different professionals within their expertise apply the multidisciplinary care. Its performance is related to the individual praxis of each professional applied to the specific population or subjects.<sup>16</sup>

In the contextual human development, the integrative approach between the person, his / her functions and / or tasks, and the environment in which he or she lives can contribute to new insights into quality of life.<sup>17</sup> In this perspective, there is now a breakthrough in joining multidisciplinary therapies for promotion, prevention and rehabilitation of the population health, with emphasis on meditation, yoga, hydrogymnastics, massage therapy, acupuncture, music therapy, manipulative therapies, Tai Chi, dance, among others<sup>18</sup> performed mainly by the elderly population as a resource for quality of life improvements and reduction of functional limitations.

## OBJECTIVE

To compare the use of levodopa, stage of PD and quality of life in people with PD who participate in multidisciplinary therapies with those who do not practice such therapies.

## METHODS

This is a quantitative cross-sectional research. The approval was granted by the Ethics Committee in Human Research (CEP) of the *Hospital do Trabalhador*, Curitiba-PR, registered with CAAE number 05271512.7.00005225 and proof number 0629919/2015 in accordance with the Resolution 466/12 of the Brazilian National Health Council. Participants interested in willing to participate in this study were from an association of patients with PD from the city of Curitiba, in the state of Paraná. All patients enrolled agreed and signed the Informed Consent Form.

Patients with clinical diagnosis of PD, of both sexes, with Hoehn and Yahr (HY) classification scale between 1 and 4 were included. The exclusion criterion was the diagnosis of any other disease with motor and cognitive effects that could confuse the evaluations.

All participants were evaluated by the Hoehn and Yahr classification of PD, their age, daily dose of Levodopa, practice of multidisciplinary activities, quality of life with the PDQ-39 (Parkinson Disease Questionnaire) and activities of daily life and motor function with the Unified Parkinson's Disease Rating Scale (UPDRS).

The modalities of multidisciplinary care available to the patients of this association are Physical Therapy on the ground, Pilates and Aquatic Physiotherapy performed twice a week with duration of 40min a day; Speech Therapy, Psychology, Occupational Therapy, Dance, Music Therapy and Art Therapy performed once a week with duration of 40min a day; and Acupuncture and Massotherapy applied in programs of 10 sessions per semester.

Within the professional abilities of each multidisciplinary activity, therapeutic goals that complement the health process of each participant are outlined, based on the domains found in each of the areas of knowledge.

The variables between the participants who use and who do not use the multidisciplinary services were compared. The same variables were also compared for the participants with greater deficit of PD progression and impaired balance (HY 3 and 4), and less severe motor condition, without the deficit of balance (HY 1 and 2).

The data were evaluated according to their distribution, and was presented as median and 2<sup>nd</sup> and 4<sup>th</sup> percentile (25% and 75% interquartile) as they did not have homogeneous distribution. The comparison was performed with the Mann-Whitney test. SPSS 22.0 software for Windows was used for all statistical tests.

## RESULTS

We evaluated 49 people with PD, of both genders, 21 female patients and 28 male patients. All participants attended regular visits to a neurologist. Seventeen of them did not have any another health professional medical attention or the multidisciplinary care, whereas 32 participants had regular care of other professionals and undertook multidisciplinary care, with an average of  $2.65 \pm 1.42$  different professionals. The variables between practitioners and non-practitioners of multidisciplinary activities were compared, and the Table 1 describe the median and the 25 and 75% interquartile interval.

There were no differences between the groups after the comparison of the practitioners and non-practitioners of multidisciplinary activities. However, when comparing the severity of PD according to the HY staging level, there was a statistically significant difference ( $p = 0.017$ ) between the daily levodopa dose for the group with a higher HY level (levels 3 and 4), which represents a reduction in the daily drug intake among the practitioners of multidisciplinary activities, as can be seen in Table 2.

## DISCUSSION

In this research, no significant difference was found between the groups of practitioners and non-practitioners of multidisciplinary activities, except among the more severe patients (levels 3 and 4 of HY) regarding the use of levodopa. It was noticed that in this population there was a reduction of the use of the drug in the group of people practicing multidisciplinary care.

Many patients use multidisciplinary health care in PD. Scientific evidence is gradually beginning to report studies with this approach, and each day there is a greater use of the team in treatment programs for patients with DP<sup>19</sup> with good results.

Several professionals from different areas of health sciences may be part of the multi-

professional health care team of a person with PD.<sup>20</sup> The most common in the literature for global health care patients with PD are swimming (swimming learning and cardiorespiratory fitness), Dance (body perception), hydrotherapy (aquatic motor skills), physiotherapy (functional motor skills on the ground), gymnastics (body practices with the objective to enhance strength and physical fitness), music therapy (relaxation), memory exercises (memory deficit prevention), cognitive and behavioral therapy (social intercourse), stretching (maintenance and gain of range of motion), Pilates (stretching, resistance and muscle strength) and phonaudiology (attention to the speech and swallowing process).<sup>12,20</sup>

On the other hand, long-term drug therapy with the use of levodopa (a dopamine isomer) tends to decrease its effect and may even cause adverse effects such as gastrointestinal, vascular, mobility and sleep disturbances.<sup>7,21</sup> Opposed to this perspective, multidisciplinary therapies have a positive effect on the functionality of the person with PD, even after stages 3 and 4 of HY.

An increase in functional limitations,<sup>22</sup> loss of agility and increased dependence over the years with PD is observed, but the time since the disease onset is not related to the stage of PD progression,<sup>23</sup> which reassures the fact that the multidisciplinary and guided therapeutic exercise can promote benefits for the population with this disease, even after many

years since the diagnosis, oppositely to the drug effects.<sup>24</sup>

The therapies provided by the multidisciplinary team can prevent functional losses related to the progression of PD and help self-esteem, disturbed by the years of PD that can cause increased rigidity, bradykinesia, osteoporosis, arthrosis<sup>9</sup> and cognitive alterations.

In a study that compared balance, functional independence and quality of life after 8 months of multidisciplinary rehabilitation or conventional physiotherapy of 64 patients with PD a significant effect over time and duration of interaction of the multidisciplinary rehabilitation group was observed in all variables.<sup>25</sup>

Another randomized, controlled study, with blind raters compared the care of a multidisciplinary team with the assistance of a neurologist, along 8 months of.<sup>14</sup> The variables were quality of life, depression, UPDRS, psychosocial assessment and caregiver overload. One hundred people with PD participated and significant improvements were observed in the multidisciplinary group regarding of quality of life, motor and total score of the UPDRS, depression and psychosocial aspects.<sup>14,19</sup>

The dose reduction of levodopa in the group with the greatest impairment was a relevant point in this study. However, we are cautious in extrapolating this finding, given the study design limits its generalization, but this it suggests a beneficial potential of integrated therapies for maintenance of function, even in a progressive degenerative disease.

The heterogeneity of multiprofessional care is one of the main limiting factor for this type of research,<sup>19</sup> however it is the one that favors the adherence of people with PD who look for therapies that are pleasurable and that fulfill their individual demands.

Thus, further research on the multidisciplinary care in the management of PD, with special attention to the costs and effectiveness, is still necessary<sup>14,18</sup> for which control groups of intervention, as well as a description of the therapeutic processes is suggested.

## CONCLUSIONS

In this study, people with higher HY scores and practitioners of multidisciplinary groups had statistically significant lower dosages of drug intake than their non-practitioner peers.

There is a demand for more studies for a greater understanding of all the mechanisms

**Table 1.** Patient characteristics

Variable	Multidisciplinary activities practitioners	Multidisciplinary activities non-practitioners
Age (years)	62 (54-72)	65 (57-72.5)
Levodopa (mg/day)	660 (400-800)	500 (300-1000)
Hoehn and Yahr	2 (1-3)	2 (1-3)
PDQ-39	23.95 (16.04-32.7)	30.88 (9-40)
ADL – UPDRS	13 (10-17)	12 (10-16)
Motor – UPDRS	14 (7-27)	13 (8-22)

mg, milligrams; PDQ-39, Parkinson Disease Questionnaire; ADL, activities of daily life; UPDRS= Unified Parkinson's Disease Rating Scale.

**Table 2.** Differences between groups after stratification of severity of PD among people with and without balance deficit by the HY scale, according to the variables evaluated

Variables	HY 1-2 Median 50% (25-75%)		p	HY 3-4 Median 50% (25-75%)		p
	Multidisciplinary practitioner	Multidisciplinary non-practitioner		Multidisciplinary practitioner	Multidisciplinary non-practitioner	
AGE (years)	62 (52-69)	66 (57-72)	0.211	63 (55-72)	64 (58-73)	0.898
LEVODOPA (mg/day)	750 (400-800)	425 (200-1000)	0.408	600 (400-800)	1100 (1000-1500)	0.017*
PDQ-39	23.17 (15.93-31.76)	17.86 (7.29-41.3)	0.621	29.78 (20.2-35.25)	35.83 (30.88-38.95)	0.219
ADL	11 (8-13)	11.5 (7-12)	0.897	16 (13-18)	17 (14-19)	0.537
MOTOR	9 (4-14)	9.5 (5-14)	0.866	27 (14-28)	22 (12-32)	0.792

\*statistically significant difference ( $p < 0.05$ ); mg, milligrams; PDQ-39, Parkinson Disease Questionnaire; ADL, activities of daily life; UPDRS= Unified Parkinson's Disease Rating Scale.

that led to these results, reassuring the need to broaden the interaction among the multidisciplinary tasks for functional advances, and improvement of quality of life of people with PD.

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