

The impact of Parkinson's disease severity on performance of activities of daily living: an observational study

Jorge Alegre-Ayala, Lydia Vela, Diego Fernández-Vázquez, Víctor Navarro-López, Yolanda Macías-Macías, Roberto Cano-de-la-Cuerda

Introduction. Parkinson's disease (PD) affects the ability to perform activities of daily living (ADL), increasing with disease progression. The study of the association between PD severity and occupational performance skills may improve the understanding of the functional impairment associated with this pathology.

Objective. To study the relationship between PD severity and the loss of functional performance.

Patients and methods. 49 non-demented PD patients were assessed with The Assessment of Motor and Process Skills (AMPS) scale, the Hoehn & Yahr scale (HY), the section III of the Unified Parkinson Disease Rating Scale (UPDRS), and the Schwab & England scale.

Results. PD severity was related to the AMPS scale ($p < 0.001$). There was a strong correlation between the AMPS motor skills and the HY scale ($p < 0.001$) and UPDRS III ($p < 0.001$), as well as between process skills and the Schwab & England E scale ($p < 0.001$). A moderate correlation was found between Schwab & England scale and AMPS motor skills, while a strong correlation was found with the process skills. Finally, a weak correlation was found between the AMPS scale and disease duration, yet only in the motor section.

Conclusions. The severity of PD is closely related to the impairment of functional skills measured with the AMPS scale in non-demented PD patients. A strong correlation was found with the motor skills. A strong correlation was found between the AMPS process skills scale and Schwab & England ADL scale. A weak correlation was found between the AMPS motor scale and disease duration. The AMPS scale might be a useful tool to monitoring the PD progression through the observation of ADL performance.

Key words. Activities of daily living. Assessment of motor and process skills. Neurological rehabilitation. Neurology. Parkinson's disease. Physical functional performance.

Introduction

Parkinson's disease (PD) affects an individual's capacity to perform activities of daily living (ADL), causing severe limitations and increased dependency on other people to perform everyday tasks. Indeed, as PD progresses to more advanced disease stages, the assistance of a caregiver becomes necessary [1], further diminishing their quality of life [2]. The clinical manifestations of the disease hinder the functional performance of PD patients [3], deteriorating as the disease progresses and dopaminergic medication loses effectiveness to control PD symptoms [4].

Several authors consider that health status interacts with personal factors, and environmental factors as cause of the impairments in daily functioning problems in PD patients [5]. The interpretation of this biopsychosocial model is reflected by the *International classification of functioning, disability*

and health of the World Health Organization [6]. Impairment of ADL in PD has been related to the level of independence [7], showing that most PD patients are institutionalized because of the increased severity of PD [8].

Although the relationship between the severity of the disease and the functionality of PD patients is clear, the relationship between the different specific symptoms of PD and the functional limitations suffered by these patients or their ability to perform ADL has been poorly studied. The study of the association between PD severity and occupational performance skills may improve the understanding of the functional impairment associated with this pathology. This information could help to plan therapeutic interventions in a rehabilitation context [5].

Consequently, the main objective of this study was to analyze the relationship between occupational performance skills assessed with the Assess-

Motion Analysis, Biomechanics, Ergonomy and Motor Control Laboratory (LAMBECOM group) (D. Fernández-Vázquez, V. Navarro-López, R. Cano-de-la-Cuerda). Department of Physical Therapy, Occupational Therapy, Rehabilitation and Physical Medicine. Health Sciences Faculty. Universidad Rey Juan Carlos (J. Alegre-Ayala, D. Fernández-Vázquez, V. Navarro-López, R. Cano-de-la-Cuerda). Department of Neurology, Division of Movement Disorders. Hospital Universitario Fundación Alcorcón (HUFA). Alcorcón, Madrid, Spain (L. Vela, Y. Macías-Macías).

Correspondence:

Dr. Víctor Navarro López. Laboratorio de Análisis del Movimiento, Biomecánica, Ergonomía y Control Motor (grupo LAMBECOM). Departamento de Fisioterapia, Terapia Ocupacional, Rehabilitación y Medicina Física. Facultad de Ciencias de la Salud. Universidad Rey Juan Carlos. Avda. Atenas s/n. E-28922 Alcorcón, Madrid.

E-mail:

victor.navarro@urjc.es

Acknowledgments:

The authors would like to thank all the participants who collaborated in this study.

Accepted:

24.03.23.

Conflict of interests:

The authors declare no conflicts of interest.

How to cite this article:

Alegre-Ayala J, Vela L, Fernández-Vázquez D, Navarro-López V, Cano-de-la-Cuerda R. The impact of Parkinson's disease severity on performance of activities of daily living: an observational study. *Rev Neurol* 2023; 76: 249-55. doi: 10.33588/rn.7608.2022263.

ment of Motor and Process Skills (AMPS) scale, and disease severity assessed by the Hoehn and Yahr (HY) scale and part III of the Unified Parkinson's Disease Rating Scale (UPDRS III).

Patients and methods

Design

An observational study was conducted. *Strengthening the Reporting of Observational Studies in Epidemiology* guidelines were followed to standardize the reporting of this work. The study was approved by the local ethics committee (Hospital Fundación Alcorcón, ref. 10/79 11/02/10). An informed consent was obtained from each subject in accordance with the 1964 Declaration of Helsinki. All patients gave their informed consent prior to their inclusion in the study.

Participants

Patients with PD were recruited from the Movement Disorders Division of the Hospital Universitario Fundación Alcorcón (Madrid, Spain). The diagnosis of idiopathic PD was made according to the United Kingdom Brain Bank criteria. Patients included in the present study had to meet the following inclusion criteria: a) be diagnosed with idiopathic PD according to the United Kingdom Parkinson's Disease Society Brain Bank [9]; b) be in HY stage II, III or IV [10]; c) have a stable or slightly fluctuating motor response to pharmacological treatment; d) be in the on phase of the medication; e) have the cognitive ability to understand the instructions provided in the tests. Patients were excluded if: a) scored less than 26 points on the Montreal Cognitive Assessment [11]; b) had any other condition that could limit their functional capacity, such as joint problems, pain or oncologic conditions.

Procedure and outcome measures

After signing informed consent, all patients were evaluated by a neurologist specializing in movement disorders in the on phase of medication, within two hours of the administration of anti-Parkinsonian medication, as this is the period during which patients do most of their daily activities.

Unified Parkinson's Disease Rating Scale (UPDRS) part III (motor), Hoehn & Yahr (HY) stage, Schwab & England ADL and other sociodemographic in-

formation were recorded. The UPDRS is the most commonly used scale in the clinical evaluation of PD patients. This scale has several sections; the UPDRS III (motor function) was used in this study. It evaluates speech, facial expression, tremor at rest, action tremor, rigidity, finger taps, hand movements, rotation of the hands and forearms, leg agility, rising from a chair, posture, gait, postural stability, and bradykinesia with a final score in this section [12].

HY stage was used for the staging of the functional disability associated with PD in the sample. It describes the progression of the disease through various stages (1 through 5), to measure the severity of the case [13].

Schwab & England ADL scale assesses the ability to perform daily activities in term of speed and independence through a percentage figure. The rating can be determined by the professional or by the PD patient, with values from 100% (indicating total independence) to 0% (state of complete dependence) [14].

The second phase of the study was carried out at each patient's home, where they were examined by an occupational therapist two hours after the first dose of medication. Patients were assessed with the AMPS scale, an observational assessment that allows for the simultaneous evaluation of motor and process skills, and their effect on the ability of an individual to perform complex or instrumental and personal activities of daily living. Through observation, the AMPS measures these skills used in performing two activities, and how these contribute towards the subject's performance of ADL. Thus, the AMPS provides an estimate of an individual's level of independence in his or her social environment. The two tasks to be performed by patients are selected from a total of 113 standardized tasks based on the maximum functional capacity of the patients (grilled sandwich and beverage and making a bed against a wall, changing sheets and duvet cover), and the administration and scoring of the test takes 30 to 50 minutes.

AMPS analyzes 16 types of motor tasks and 20 process tasks, which are evaluated by the examiner and scored on a four-point scale according to the patient's performance (4: competent; 3: questionable; 2: ineffective; 1: markedly deficient) [15]. This raw motor and process scores are entered into the AMPS computer-scoring program and analyzed using many-faceted Rasch analysis, which is used to allow for the calibration. The higher the ADL motor and process skills are, the more able is the patient.

The cut-off scores of the AMPS scale are scores less than two points for motor skills, and less than one point for processing skills. Scores below these cut-off points indicate that the person may need some type of assistance to live in the community [15].

Statistical analysis

Data were analyzed using the SPSS statistical program (SPSS Inc., Chicago, IL; version 27.0). The Shapiro-Wilk test was used to screen all data for normality of distribution. The confidence interval used to establish statistical significance was set at 95%. Pearson and Spearman's correlation coefficients were used to determine the correlation between the different scales. Parametric and nonparametric tests were used according to the normality of the distribution of the different sample data. The Kruskal-Wallis nonparametric test was used to determine the differences between HY stage and the AMPS motor and process skills, and the U Mann-Whitney correction test was used to compare the different test between HY stages. A significance level of $p < 0.05$ was considered significant for all analyses. Cohen's d was used to estimate the effect size. An effect size of 0.2 was considered small; 0.5 medium; and 0.8 large.

Results

A total of 54 patients were recruited. Finally, 49 patients were included in the study. There were five dropouts: four people dropped out as they refused to continue with the study at the home stage and another participant deceased prior to begin the research. Among the 49 PD patients included in the study, 23 men (46.9%), and 26 women (53.1%), with a mean age of 72.45 (8.60) years old. In this cohort, 20 patients were at stage II of the HY (40.8%), 13 at stage III (26.5%) and 16 at stage IV (32.7%). All of them were treated with levodopa and/or dopamine agonists, and the levodopa equivalent daily dose was 959.27 (398.67) mg. Demographic and clinical variables for the patients are shown in table I.

The average AMPS score was 1.03 (1.07) in the motor section, and 1.03 (0.69) for the process skills. Patients in stage II (HY) had the highest average AMPS scores and patients in stage IV (HY) had the lowest AMPS scores, for motor as well as process skills. Only PD patients in HY IV, were under the cut-off points for the AMPS process skills, however, all the HY stages were under the cut-off

Table I. Demographic data^a.

	Mean \pm SD	Range
Age	72.45 \pm 8.6	47-89
Years since diagnosis	10.58 \pm 6.19	2-30
LEDD	959.27 \pm 398.67	200-1,858
UPDRS III	35.02 \pm 10.76	15-56
S&E	69.58 \pm 13.04	30-80
HY stage II, n (%)	20 (40.8)	
HY stage III, n (%)	13 (26.5)	
HY stage IV, n (%)	16 (32.7)	

HY= Hoehn & Yahr scale; LEDD: levodopa equivalent daily dose; SD: standard deviation; S&E= Schwab and England ADL scale; UPDRS III= motor section of the *Unified Parkinson's Disease Rating Scale*. ^a Data reflected on means \pm SD, except for Hoehn and Yahr stages.

points for the AMPS motor skills (Table II). Based on these data, motor skills were impaired from the HY II stage while process skills assessed by AMPS seem to influence the functionality in more affected stages.

The relationship between the two AMPS sections scale and the scores of the different scales used in this study (HY, UPDRS III, and the Schwab & England ADL scale) was analysed (Table III). A strong correlation between the AMPS scale and the HY scale was found in terms of motor skills ($r = -0.77$; $p = 0.001$), while moderate correlation was found in process skills ($r = -0.55$; $p = 0.001$). Similarly, a strong correlation was found between UPDRS III and motor skills ($r = -0.70$; $p = 0.001$), with a moderate correlation with process skills ($r = -0.53$; $p = 0.001$). When considering the AMPS and the Schwab & England ADL scale, a moderate correlation was found for the motor skills ($r = 0.64$; $p = 0.001$) and a strong correlation with the process skills ($r = 0.73$; $p = 0.001$). Finally, a weak correlation was found between the AMPS scale and disease duration, yet only in the motor section ($r = -0.297$; $p = 0.041$).

The HY stage was significantly associated with the motor skills scores through the AMPS scale ($\chi^2 = 28.71$; $p = 0.001$). Significant differences were found between AMPS motor skills stages II and III ($p = 0.001$), with a moderate effect size ($d = 0.60$), stages II and IV ($p < 0.001$) with a moderate effect

Table II. AMPS differences according HY stages ^a.

AMPS	HY II n = 20	HY III n = 13	HY IV n = 16	Kruskal-Wallis (<i>p</i>)	
Motor skills	1.41 (0.45)	0.91 (0.7)	-0.17 (1.58)	0.001 ^b	
Process skills	1.22 (0.35)	1.05 (0.54)	53 (0.78)	0.001 ^b	
AMPS	II HY vs. III HV		III HY vs. IV HY		II HY vs. IV HY
	<i>p</i>	<i>d</i>	<i>p</i>	<i>d</i>	<i>p</i>
Motor skills	0.001 ^b	0.6	0.002 ^b	0.59	<0.001 ^b
Process skills	0.041 ^b	0.36	0.028 ^b	0.41	<0.001 ^b

AMPS: Assessment of Motor and Process Skills; *d*: Cohen's *d*; HY: Hoehn & Yahr scale. ^aData reflected on median (interquartile range). ^bSignificant with *p* < 0.05.

size ($d = 0.77$), and stages III and IV ($p = 0.002$), with a moderate effect size ($d = 0.59$). Significant differences were found between AMPS process skills stages II and III ($p = 0.041$) with a small effect size ($d = 0.36$), between II and IV ($p < 0.001$), with a moderate effect size ($d = 0.64$), and between stages III and IV ($p = 0.028$), with a small effect size ($d = 0.41$)

Discussion

The results of this study showed a strong correlation between PD severity and the ability to perform ADL tasks assessed by AMPS scale in non-demented PD patients. This relationship is especially strong for motor skills. Regarding this motor skills, our sample showed scores under the cut-off points, indicating that from the initial stages of the PD (HY II), motor skills could be already affected, although process skills assessed by AMPS seem to influence the functionality in more affected stages. In HY IV, the deterioration of process skills might be explained by the existence of attention and execution problems in PD [4]. These are common problems that could begin to be addressed early, although they do not deteriorate below the AMPS scale cut-off point until the later stages, or the AMPS scale may not be sensitive enough to detect such alterations.

AMPS has previously been used in studies on PD patients [16-18]. However, it has not been previously used to assess the loss of occupational performance quality at different stages of the disease.

An increase in dependence has been described as PD progresses, associated with the stage of the disease, and our findings are in this line. This progression is not only associated with a loss of the ability to work and live independently, or less participation in social activities but also, with a more sedentary lifestyle, an increased risk of institutionalization and a deterioration in quality of life [19-21]. The UPDRS section III is strongly related to the loss of motor skills assessed with AMPS. Higher scores in the UPDRS section III are linked to greater disability, need for assistance, and a decrease in the number of ADL performed by PD patients [22,23].

Although the mean motor skills scores of patients in HY stage II were lower than the cut-off point of the AMPS scale, the deterioration in the skills was more pronounced at stage III. These results are consistent with the functional loss reported by other authors, indicating that functional problems in PD undergo greater deterioration in HY stage III [24,25]. The change from stage II to stage III is considered a key step in the disability and the functional mobility loss progression. This threshold appears to be due to the most severe impairment of walking and balance, indicating that the disease levels beyond HY stage III are those where there is the greatest need for assistance with ADL.

In this line, our study reflects significant differences between all HY stages with the motor skills scores through the AMPS scale with a moderate effect size. Significant differences were also found between AMPS process skills stages and all HY stages with a small to moderate effect size. These findings explain how PD patients in more advanced stages of the disease, according to HY scores, experience a greater deterioration in the skills needed to perform ADL, and a greater need for help from their environment. The stage of the disease seems to influence the motor skills of PD patients, with this effect being slightly greater in subjects comparing stages II with III and stages II with IV stages. In terms of process skills, the influence of the stage of the illness was more evident comparing stages II with IV and III with IV stages.

Information on ADL performance by PD patients has been assessed using scales based on a brief interview or the administration of a short self-assessment form to patients and their families [26]. In contrast, functional scales based on observation and analysis of how patients perform their ADL in a real-life situation have not previously been contemplated. There are drawbacks to the

Table III. Correlations between AMPS motor and process skills with PD characteristics.

	AMPS motor skills			AMPS process skills		
	rho	CI	p	rho	CI	p
Years of evolution	-0.297	0.02 a 0.53	0.038 ^a	-0.26	-0.02 a 0.5	0.07
HY stage	-0.773	0.63 a 0.85	<0.001 ^a	-0.558	0.33 a 0.73	<0.001 ^a
UPDRS III	-0.704	0.53 a 0.82	<0.001 ^a	-0.539	0.3 a 0.71	<0.001 ^a
S&E	0.642	0.44 a 0.78	<0.001 ^a	0.737	0.57 a 0.84	<0.001 ^a

AMPS: *Assessment of Motor and Process Skills*; HY= Hoehn & Yahr scale; S&E= Schwab & England ADL scale; UPDRS III= motor section *Unified Parkinson's Disease Rating Scale*. ^a p < 0.05

use of such scales, such as the need for specific training and a longer administration time, but they provide greater sensitivity to changes in the patient's disease and are less likely to be influenced by the patient's cognitive, cultural, educational, and linguistic status [27]. Few authors have previously assessed the functional impact of PD through task observation [16,17]. Discrepancies have been described between what patients manifest in self-questionnaires, and what an external examiner found through observation of task performance, highlighting the need for the use of observational scales of motor performance versus self-questionnaires [28].

In our study we found a strong correlation between the Schwab & England scale and the two sections of the AMPS scale with a stronger correlation with processing skills than motor skills. People with PD present motor problems, but they also present problems in the processing of motor acts, because although the primary motor area is not affected, the connection between the primary motor area and the processing areas, such as the prefrontal area and the supplementary motor area, is altered [29,30].

Finally, the use of a scale for the observation the performance of tasks, such as the AMPS scale, provides valuable information regarding the deterioration in the quality of performance skills. This scale enabled us to rapidly obtain useful clinical information to determine how the PD displayed values below what was expected for their age. Even during the mild to moderate stage of the disease, when great functional limitations are not quite evident, AMPS scale showed an impairment in the performance of motor skills. A stooped posture, difficulty

turning, forced postures, and disruptions in postural control may occur during functional tasks when balance and gait issues are present. The importance of administering this type of scales, in people with PD, lies in the need for a more exhaustive analysis of how ADL are developed, which is not limited exclusively to indicating whether they present difficulties in performing them. The use of task observation in the everyday clinical examination of people in risk of dependency might have a great preventive use, enabling work on specific problematic skills, as the sole use of self-assessment scales does not normally reveal the disability in initial stages of some diseases [31].

Limitations

This study presents several limitations. In the first place, a small sample was recruited, therefore our findings must be interpreted with caution. Furthermore, this study did not explore all stages of PD (I and V), therefore the results may not apply to all the phases of the disease. Future studies should be conducted including all the PD stages, and in a sample of younger patients, due to dexterity could be related with functionality impairments in this population. In addition, we did not perform a more profound examination of the cognitive functions and UPDRS section II were not used, which may have helped understand more about the decline of process skills in individuals without dementia affected by PD. Future studies should take into account these limitations to a better understanding the relationship between severity of PD and functional performance and the patient's functional status.

Conclusion

The severity of PD is closely related to the impairment of functional skills measured with the AMPS scale in PD patients without dementia. This relationship is especially strong for motor skills. A higher PD stage and severity (HY and UPDRS, respectively) contributes markedly to a greater dependence in PD patients assessed by AMPS scale. A moderate correlation was found between Schwab & England ADL scale and AMPS motor skills, while a strong correlation was found with the process skills. Finally, a weak correlation was found between the AMPS motor scale and disease duration. The findings of this study indicate that the AMPS scale might be a useful tool to monitoring the PD progression through the observation of ADL performance and the specific analysis of functional difficulties in these patients.

References

- Capriotti T, Terzakis K. Parkinson disease. *Home Healthc Now* 2016; 34: 300-7.
- Phillips KM, Siwik C, Rodgers A, Salmon P, Litvan I, Sephton SE, et al. Association of stress-health factors among Parkinson's disease patient/caregiving-partner dyads. *Arch Clin Neuropsychol* 2022; 37: 12-8.
- Antonini A, Robieson WZ, Bergmann L, Yegin A, Poewe W. Age/disease duration influence on activities of daily living and quality of life after levodopa-carbidopa intestinal gel in Parkinson's disease. *Neurodegener Dis Manag* 2018; 8: 161-70.
- Armstrong MJ, Okun MS. Diagnosis and treatment of Parkinson disease: a review. *JAMA* 2020; 323: 548-60.
- Radder DL, Sturkenboom IH, van Nimwegen M, Keus SH, Bloem BR, de Vries NM. Physical therapy and occupational therapy in Parkinson's disease. *Int J Neurosci* 2017; 127: 930-43.
- World Health Organization (WHO). International classification of functioning, disability, and health (ICF). Geneva: WHO; 2016.
- McNulty MC, Fisher AG. Validity of using the Assessment of Motor and Process Skills to estimate overall home safety in persons with psychiatric conditions. *Am J Occup Ther* 2001; 55: 649-55.
- Heris TS, Akbarfahimi M, Lajevardi L. Safety predictors in performance of activities of daily living in patients with Parkinson's disease. *Middle East Journal of Rehabilitation and Health Studies* 2018; 5: e14898.
- Hughes AJ, Daniel SE, Kilford L, Lees AJ. Accuracy of clinical diagnosis of idiopathic Parkinson's disease: a clinicopathological study of 100 cases. *J Neurol Neurosurg Psychiatry* 1992; 55: 1814.
- Hoehn MM, Yahr MD. Parkinsonism: onset, progression and mortality. *Neurology* 1967; 17: 427-42.
- Hoops S, Nazem S, Siderowf AD, Duda JE, Xie SX, Weintraub D, et al. Validity of the MoCA and MMSE in the detection of MCI and dementia in Parkinson disease. *Neurology* 2009; 73: 1738-45.
- Fahn S, Elton RL. Members of the UPDRS Development Committee. Unified Parkinson's disease Rating Scale. In Fahn S, Marsden CD, Calne DB, Goldstein M, eds. *Recent developments in Parkinson's disease*. Vol 2. Florham Park, NJ: Macmillan Health Care Information; 1987. p. 153-64.
- Hoehn MM, Yahr MD. Parkinsonism: onset, progression, and mortality. *Neurology* 1998; 50: 318.
- Schwab RS, England AC. Projection techniques for evaluating surgery in Parkinson's Disease. In *Third Symposium on Parkinson's Disease*, Royal College of Surgeons in Edinburgh, May 20-22, 1968. E&S, Livingstone Ltd, 152-7.
- Fisher AG, Merritt BK. Conceptualizing and developing the AMPS within a framework of modern objective measurement. In Fisher AG, Jones KB, eds. *Assessment of motor and process skills*. Vol. 1. Development, standardization, and administration manual (revised 7th ed). Fort Collins, CO: Three Star Press; 2012. p. 1-22.
- Hariz GM, Bergenheim T, Hariz MI, Lindberg M. Assessment of ability/disability in patients treated with chronic thalamic stimulation for tremor. *Mov Disord* 1998; 13: 78-83.
- Sturkenboom IH, Graff MJ, Borm GF, Veenhuizen Y, Bloem BR, Munneke M, et al. The impact of occupational therapy in Parkinson's disease: a randomized controlled feasibility study. *Clin Rehab* 2012; 27: 99-112.
- García-Nevarés A, Fernández-Baizán C, Fernández-García MP, Menéndez-González M, Méndez-López M, Fernández-Artamendi S, et al. Performance on daily life activities and executive functioning in Parkinson disease performance on daily life activities and executive functioning in Parkinson disease. *Topics in Geriatric Rehabilitation* 2020; 36: 252-9.
- Raggi A, Leonardi M, Ajovalasit D, Carella F, Soliveri P, Albanese A, et al. Functioning and disability in Parkinson disease. *Disabil Rehabil* 2010; 32 (Suppl 1): S33-41.
- Jasinska-Myga B, Heckman MG, Wider C, Putzke JD, Wszolek ZK, Uitti RJ. Loss of ability to work and ability to live independently in Parkinson's disease. *Parkinsonism Relat Disord* 2012; 18: 130-5.
- Leonardi M, Raggi A, Pagani M, Carella F, Soliveri P, Albanese A, et al. Relationships between disability, quality of life and prevalence of nonmotor symptoms in Parkinson's disease. *Parkinsonism Relat Disord* 2012; 18: 35-9.
- Shulman LM. Understanding disability in Parkinson disease. *Mov Disord* 2010; 25 (Suppl 1): S131-5.
- Dontje ML, De Greef MHG, Speelman AD, Van Nimwegen M, Krijnen WP, Stolk RP, et al. Quantifying daily physical activity and determinants in sedentary patients with Parkinson's disease. *Parkinsonism Relat Disord* 2013; 19: 878-82.
- Shulman LM, Gruber-Baldini AL, Anderson KE, Vaughan CG, Reich SG, Fishman PS, et al. The evolution of disability of Parkinson disease. *Mov Disord* 2008; 23: 790-6.
- Skidmore FM, Mackman CA, Pav B, Shulman LM, Garvan C, Macko RE, et al. Daily ambulatory activity levels in idiopathic Parkinson disease. *J Rehabil Res Dev* 2008; 45: 1343-8.
- Martínez-Martín P, Cubo E. Scales to measure parkinsonism. *Handb Clin Neurol* 2007; 83: 291-327.
- Kempen GI, Steverink N, Ormel J, Deeg DJ. The assessment of ADL among frail elderly in an interview survey: self-report versus performance-based tests and determinants of discrepancies. *J Gerontol B Psychol Sci Soc Sci* 1996; 51: 254-60.
- Shulman LM, Pretzer-Aboff I, Anderson KE, Stevenson R, Vaughan CG, Gruber-Baldini AL, et al. Subjective report versus objective measurement of activities of daily living in Parkinson's disease. *Mov Disord* 2006; 21: 794-9.
- Wu T, Hallett M, Chan P. Motor automaticity in Parkinson's disease. *Neurobiol Dis* 2015; 82: 226-34.
- Underwood CE, Parr-Brownlie LC. Primary motor cortex in Parkinson's disease: Functional changes and opportunities for neurostimulation. *Neurobiol Dis* 2021; 147: 105159.
- Terhorst L, Holm MB, Toto PE, Rogers JC. Performance-based impairment measures as predictors of early-stage activity limitations in community-dwelling older adults. *J Aging Health* 2017; 29: 880-92.

El impacto de la gravedad de la enfermedad de Parkinson en el desempeño de las actividades de la vida diaria: un estudio observacional

Introducción. La enfermedad de Parkinson (EP) afecta a la capacidad para realizar actividades de la vida diaria (AVD), lo que se incrementa con la progresión de la enfermedad. El estudio de la asociación entre la gravedad de la EP y las habilidades de desempeño ocupacional puede mejorar la comprensión del deterioro funcional asociado a esta patología.

Objetivo. Estudiar la relación entre la gravedad de la EP y la pérdida de rendimiento funcional.

Pacientes y métodos. Se evaluó a 49 pacientes con EP con la escala *Assessment of Motor and Process Skills* (AMPS), la escala Hoehn & Yahr (HY), la sección III de la *Unified Parkinson Disease Rating Scale* (UPDRS) y la escala Schwab & England.

Resultados. La gravedad de la EP se observó correlacionada con la escala AMPS ($p < 0,001$). Hubo una fuerte correlación entre las destrezas motoras de la AMPS y las escalas HY ($p < 0,001$) y UPDRS III ($p < 0,001$), así como entre las destrezas de procesamiento y la escala Schwab & England ($p < 0,001$). Se encontró una correlación moderada entre la escala Schwab & England y las habilidades motoras de la AMPS, mientras que se encontró una correlación fuerte con las habilidades de procesamiento. Por último, se encontró una correlación débil entre la escala AMPS y los años de evolución de la EP, aunque sólo en el apartado motor.

Conclusiones. La gravedad de la EP está estrechamente relacionada con el deterioro de las habilidades funcionales medidas con la escala AMPS en pacientes con EP no dementes. Se encontró una fuerte correlación con las habilidades motoras. Se encontró una fuerte correlación entre la escala AMPS de habilidades de procesamiento y la escala Schwab & England. Se encontró una correlación débil entre la escala motora AMPS y la duración de la enfermedad. La escala AMPS podría ser una herramienta útil para monitorizar la progresión de la EP a través de la observación del desempeño de las AVD.

Palabras clave. Actividades de la vida diaria. Enfermedad de Parkinson. Evaluación de las habilidades motoras y de proceso. Neurología. Rehabilitación neurológica. Rendimiento físico funcional.