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ARTICLE

Determinants of self-efficacy in patients with Parkinson's disease

Determinantes de autoeficacia en pacientes con enfermedad de Parkinson

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ABSTRACT

Background: Self-efficacy is the individual's assessment of his or hers ability to complete a specific task successfully and has been closely related to self-management and quality of life in several diseases. **Objective**: To investigate self-efficacy in a population of Parkinson's disease (PD) patients in Mexico and study the factors that are associated with this measure. **Methods**: We carried out a cross-sectional observational study involving patients with PD in an outpatient neurology clinic in Mexico, using the following instruments: Spanish version of the Chronic Disease Self-Efficacy Scale (CDSES), Quality of Life Questionnaire PDQ-8, Movement Disorders Society-Unified Parkinson's disease Rating Scale (MDS-UPDRS), Montreal Cognitive Assessment (MoCA), and Non-Motor Symptom Scale (NMSS). Clinical and demographic variables were also recorded. **Results**: We included 73 patients with a mean age of 65 years and most patients were male. Patients with lower CDSES scores (<7.75) had worse scores in MDS-UPDRS, NMSS, and PDQ-8 scales. CDSES scores were significantly correlated with MDS-UPDRS Part I (r=-0.497, p=<0.001), Part II (r= -0.271, p=0.020), Part III (r=-0.304, p=<0.001), PDQ-8 (r=-0.472, p=<0.001), and NMSS (r=-0.504, p=<0.001). Furthermore, when assessing the simultaneous effect of covariates associated with CDSES score, only Mood/Apathy domain of NMSS was significant (beta= -0.446, *t*= -3.807, p= 0.012). **Conclusions**: PD patients with lower self-efficacy scores had worse motor and non-motor symptomatology and quality of life. Mood/Apathy disorders were negatively associated with self-efficacy and contributed significantly to this measure.

Keywords: Parkinson Disease; Self Efficacy; Quality of Life; Mood Disorders; Cognition.

RESUMEN

Antecedentes: La autoeficacia es la autoevaluación de un individuo sobre su capacidad para completar una tarea con éxito y se ha relacionado con automanejo y calidad de vida en otras enfermedades. **Objetivo**: Investigar la autoeficacia en una población de pacientes con enfermedad de Parkinson (EP) en México y estudiar factores asociados con esta medida. **Métodos**: Realizamos un estudio observacional transversal con pacientes con EP en una clínica de neurología en México. Se registraron datos demográficos y escalas que evalúan la función motora (MDS-UPDRS), no motora (NMSS) y cognitiva (MoCA), así como la calidad de vida (PDQ-8). Para valorar autoeficacia se utilizó la versión en español de la Escala de autoeficacia de enfermedades crónicas (CDSES). **Resultados**: Se incluyeron 73 pacientes, con una edad media de 65 años y la mayoría eran hombres. Pacientes con puntajes CDSES más bajos (<7.75) tuvieron peores puntajes en las escalas MDS-UPDRS, NMSS y PDQ-8. Las puntuaciones de CDSES se correlacionaron significativamente con la escala MDS-UPDRS Parte I (r=-0.497, p=<0.001), Parte II (r= -0.271, p=0.020), Parte III (r=-0.304, p=<0.001), PDQ-8 (r= -0.472, p=<0.001), y NMSS (r=-0.504, p=<0.001). Al evaluar el efecto simultáneo de covariables asociadas con la escala CDSES, solo el dominio estado de ánimo/apatía del NMSS resultó significativo (Beta = -0.449, t = -3.783, p = <0.001). **Conclusiones**: Los pacientes con menores puntajes de autoeficacia tienen peor calidad de vida y sintomatología motora y no motora. Los trastornos del estado de ánimo contribuyen negativamente a la autoeficacia.

Palabras clave: Enfermedad de Parkinson; Autoeficacia; Calidad de Vida; Trastornos del Humor; Cognición.

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INTRODUCTION

Parkinson's disease (PD) is a multisystem disorder, and besides the classical motor symptoms, patients also suffer from a variety of non-motor symptoms[1]. The burden of PD over patients' daily activities is significant and often contributes to a poor quality of life (QOL). Traditional treatment has focused on ameliorating motor-symptoms, but a more comprehensive approach is often needed to care for patients and their caregivers[2,3]. Self-management offers a way of helping people with chronic and neurodegenerative diseases to play an active role in managing their condition and could have an impact on QOL[4,5].

Self-efficacy is a patient attribute that has received limited attention in PD. It may be defined as an individual's assessment of his or hers ability to complete a specific task successfully[6]. In the context of disease management, it has been able to predict health behaviors in neurological diseases such as Alzheimer's disease and multiple sclerosis[7,8]. A recent study showed that general self-efficacy was independently associated with overall life satisfaction in patients with PD[9], highlighting the importance of this attribute.

Before establishing if self-efficacy in PD could be successfully targeted in interventional studies, there is a need to study the factors that determine self-efficacy levels in this population**.** Determinants of self-efficacy have been studied in other populations, showing that depression and anxiety levels, occupational status, and age were associated with this measure. Moreover, these studies have shown that measurements specific of the disease affect self-efficacy[10-12]. This leads to hypothesize that motor and non-motor symptomatology in PD might contribute to this measure as well. In this study, we evaluated self-efficacy in a population of PD patients in Mexico and studied the factors that are associated with this measure.

METHODS

We conducted a cross-sectional observational study on consecutive patients with PD from our outpatient clinic at the Department of Neurology of the University Hospital Dr. José Eleuterio González, Monterrey, Mexico, recruited from October 2014 to January 2016. Diagnosis of PD was made by a neurologist with competence in movement disorders according to the UK PD Brain Bank Criteria. This study was approved by the ethics committee of our institution and all patients signed informed consent for inclusion in this study; the procedures were all in compliance with the Declaration of Helsinki. Besides standard assessment, a semi structured interview was used to obtain information on disease history and other sociodemographic data and all patients completed the non-motor symptoms scale for PD (NMSS)[13], the Montreal Cognitive Assessment (MoCA)[14], the Parkinson's disease questionnaire-8 (PDQ-8) scale for QOL[15], and the Movement Disorders Society-Unified Parkinson's Disease Rating Scale (MDS-UPDRS)[16]. Disease stage was evaluated per the Hoehn and Yahr (HY) staging. The HY grade was dichotomized as mildly impaired (≤2) and moderately to severely impaired (≥3)[17].

Self-efficacy analysis

For evaluation of self-efficacy in our population, we used the Spanish version of Chronic Disease Self-Efficacy Scale (CDSES), a 4-item scale developed and tested in the Chronic Disease Self-Management study, with an alpha coefficient of 0.85 and a test-retest validity of 0.80[18]. This scale assesses the individual's confidence in managing fatigue (1), pain (2), emotional status (3), and other symptoms (4) related to the disease that interfere with intended activities. The minimum score in each item is 0, which represents no confidence, and 10, which represents total or full confidence. The score for this scale is the mean of the four items. Higher scores indicate higher self-efficacy.

Statistical analysis

All statistical analyses were performed using the SPSS computer program (SPSS version 23.0; SPSS Inc., Chicago, Illinois, United States). Data was tested for normality using the Kolmogorov-Smirnov test, and continuous variables were thus expressed as mean ±standard deviation (SD) or as median (interquartile range, IQR), and categorical variables were expressed as percentages. For the bivariate analysis, CDSES scores were divided into low and high scores based on the median value of the scale for this population, as it followed a non-parametric distribution. Thus, all scores in the CDSES ≥7.75 were considered as high, and scores <7.75 as low. Quantitative data were analyzed using student's T test or Mann-Whitney U-test, as appropriate. Categorical variables (expressed as percentages) were assessed using Chi-square or Fisher exact test.

Simple correlation analysis (using Pearson's or Spearman tests as appropriate) were used to evaluate the direction and strength of the relationship between CDSES and variables that showed significance in bivariate analysis. Multiple linear regression analysis was conducted to assess the simultaneous effect of covariates associated with CDSES scores. Independent variables included in the analysis were those that showed significance in the bivariate analysis. Multicollinearity was assessed using variation inflation factors (VIFs). Covariables with VIFs value >5 were excluded from the analysis. R squared (R^2) was used to assess goodness of fit. A p value < 0.05 was considered as statistically significant.

RESULTS

Population characteristics

We included 73 patients, with a mean age of 65.6±11.6 years. Of this population, 24 patients were female (33%) and 49 (67%) were male. The median years of schooling was 9 (6-12) years, whereas median years with diagnosis was 8 (6-13) years. Regarding comorbidities, frequencies of type 2 diabetes mellitus, hypertension, and dyslipidemia were 11.4%, 19.0%, and 5.7%, respectively. Median total CDSES was 7.75 (6-8.75). Median total MDS-UPRDS score was 60 (39-93) while median NMSS, PDQ-8, and MoCA scores were 37 (14-61), 25 (13-44), and 26 (22-28), respectively.

Bivariate analysis

When comparing patients with low versus high CDSES scores, no significant differences in age, sex, years of schooling, and years with diagnosis were observed. Patients with low CDSES scores had significantly worse scores in MDS-UPDRS, NMSS, and PDQ-8 compared to patients with high CDSES scores. HY stage distribution was different between groups, showing a higher prevalence of lower grades (1-2) in patients with high CDSES values. No difference was observed between groups in MoCA scores (Table 1). Among the non-motor symptomatology, worse scores in Mood/Apathy, Sleep/Fatigue, and Miscellaneous domains were observed in patients with low CDSES scores. No difference in scores was observed among other NMSS domains between groups (Table 2).

Correlation analysis

CDSES scores were significantly correlated with MDS-UPDRS Part I (r= -0.497, p=<0.001), MDS-UPDRS Part II (r= -0.271, p=0.020), MDS-UPDRS Part III (r=-0.304, p=<0.001),

Table 1. Differences between patients by CDSES scores.

	Low CDSES scores (n=35)	High CDSES scores (n=38)	p
Age (mean ± SD)	66.5 ± 10.9	65.1 ± 12.2	0.636
Sex (male,%)	21 (60)	28 (73)	0.565
Years of education, median (IQR)	9 (6-12)	9 (6-12)	0.471
Years since diagnosis, median (IQR)	10 (6-14)	7 (6-11)	0.090
NMSS, median (IQR)	60 (32-99)	20 (10-39)	<0.001
PDQ-8, median (IQR)	38 (20-55)	16 (9-28)	0.012
MoCA, median (IQR)	26 (21-28)	25 (22-28)	0.916
MDS-UPDRS Total, median (IQR)	89 (54-105)	48 (35-65)	0.001
MDS-UPDRS Part I, median (IQR)	15 (8-19)	5 (3-9)	<0.001
MDS-UPDRS Part II (mean ± SD)	16.9 ± 9.3	10.1 ± 8.1	0.008
MDS-UPDRS Part III (mean ± SD)	47.7 ± 20.5	34.2 ± 19.2	0.007
MSD-UPDRS Part IV, median (IQR)	3 (0-7)	0 (0-3)	0.006
HY stage			0.028
1-2 (%)	16 (46)	27 (71)	
3-5 (%)	19(54)	11(29)	

CDSES: Chronic Disease Self-Efficacy Scale; NMSS: Non motor symptoms scale; PDQ-8: Parkinson's disease questionnaire 8; MoCA: Montreal Cognitive Assessment Scale; MDS-UPDRS: Movement Disorders Society Unified Parkinson's Disease Rating Scale; SD: Standard deviation; IQR: Interquartile range.

Table 2. Comparison of NMSS domains between patients by CDSES scores.

Domains	Low CDSES scores (n=35)	High CDSES scores (n=38)	P
Cardiovascular, median (IQR)	2 (0-4)	0 (0-2)	0.122
Sleep/Fatigue, median (IQR)	12 (6-19)	4 (2-9)	0.004
Mood/Apathy, median (IQR)	10 (2-22)	2 (0-4)	0.001
Perceptual Problems, median(IQR)	0 (0-1)	0(0)	0.640
Attention/Memory, median(IQR)	3 (0-8)	1 (0-3)	0.239
Gastrointestinal, median (IQR)	2 (0-9)	1 (0-4)	0.258
Urinary, median (IQR)	2 (0-9)	1 (0-4)	0.640
Sexual function, median (IQR)	0 (0-16)	0 (0-2)	0.813
Miscellaneous, median (IQR)	9 (1-19)	0 (0-2)	0.002

NMSS: Non-motor symptom scale; CDSES: Chronic Disease Self-Efficacy Scale; IQR: interquartile range.

PDQ-8 (r=-0.472, p=<0.001), NMSS total score (r=-0.504, p=<0.001), NMSS Sleep/Fatigue domain (r=-0.380, r=0.001), NMSS Miscellaneous domain (r=-0.351, p=0.002), and NMSS Mood/Apathy domain (r= -0.560, p=<0.001).

Multiple regression analysis

The multiple linear regression analysis adjusted by disease severity stage (HY) showed that only NMSS Mood/Apathy domain remained a significant contributor to CDSES scores (beta= -0.449, *t*= -3.783, p= <0.001). The model (shown in Table 3), which included MDS-UPDRS Part I, II, III, and IV scores, and the NMSS domains Mood/Apathy, Miscellaneous, and Sleep/Fatigue, explained 40% of the variance in CDSES scores, of which NMSS Mood/Apathy domain contributed with 30%.

Table 3. Multivariate analysis of factors affecting CDSES scores in PD patients adjusted by disease stage.

Variable	Beta	t	P
MDS-UPDRS Part I	-0.216	-1.405	0.156
MDS-UPDRS Part II	0.169	1.066	0.290
MDS-UDRS Part III	-0.196	-1.341	0.185
MDS-UPDRS Part IV	-0.024	-0.215	0.831
NMSS Mood/Cognition Domain	-0.449	-3.783	<0.001
NMSS Miscellaneous Domain	-0.134	-1.355	0.180
NMSS Sleep/Fatigue Domain	0.004	0.031	0.895

CDSES: Chronic Disease Self-Efficacy Scale; PS: Parkinson's disease; MDS-UPDRS: Movement Disorder Society Unified Parkinson's Disease Rating Scale; NMSS: Non motor symptoms scale.

DISCUSSION

In this study, we found that patients with lower CDSES scores have worse scores in MDS-UPDRS, NMSS, and PDQ-8 scales. In addition, CDSES scores were significantly and negatively correlated to MDS-UPDRS Part I-III, NMSS Sleep/Fatigue, Miscellaneous, and Mood/Apathy domains, and PDQ-8 scores. Furthermore, when assessing the simultaneous effect of covariates associated with CDSES score, only Mood/Apathy domain of NMSS was significant.

The finding that non-motor symptoms, especially mood/apathy, contribute significantly to self-efficacy compared to motor symptomatology supports other studies that show a greater impact of non-motor symptoms towards health-related outcomes in PD patients[19-21]. These symptoms are highly prevalent and exhibit the involvement of other neurotransmitters aside from dopamine, as well as other systems, based on a caudal-rostral progression hypothesis[22], where non-motor symptoms like hyposmia, constipation, and REM sleep behavior disorders may precede motor symptomatology for several years[23-24], explaining the shift in research focus to the early diagnosis and treatment.

Worse QOL in patients with lower self-efficacy scores in this study might support the idea that these two measurements are closely related, as other studies evaluating self-efficacy and QOL have shown similar results, demonstrating a direct relation exists between these measures[25,26]. This relationship highlights the importance of assessing determinants for self-efficacy in this population, as more focus has been attributed to QOL in PD treatment[27].

Few studies have evaluated self-efficacy in PD. In a study of 251 persons with PD, self-efficacy was found to be positively associated with a high life satisfaction, even after adjusting for disease stage[9]. Another concept that has been associated with this attribute is self-management. Patients with PD who have higher self-efficacy are able to manage better their symptoms and have a greater sense of support from family and others[28]. On the other hand, self-efficacy and psychosocial wellbeing are often positively correlated[8]. This could partly explain why mood/apathy domain from NMSS contributed significantly to self-efficacy scores in this study.

Various studies in other populations have focused on assessing the relationship between mood disorders and self-efficacy, where a correlation between these measures has been demonstrated[29-32]. Interestingly, the approach to understanding this association has been bidirectional, as mood disorders, especially depressive symptoms, might contribute to lower self-efficacy as these are related to greater stress generation and unfulfillment of tasks[33], whereas a lack of self-efficacy might lead to depressive symptoms related to expectations of poor control over ones' life[34]. Our study found a significant negative correlation between these variables, and the importance of this finding lies in potential implementation of therapies that improve self-efficacy and in doing so, decrease the burden of mood disorders. In this manner, interventions aimed at improving self-efficacy could be essential in PD care at all stages of the disease, but more rigorous studies in this area are needed.

This study had some important limitations, commonly associated with a cross-sectional design. Our sample size was

small, and the age and gender characteristics of our population might not be representative of the most common epidemiological characteristics of PD patients in general. Also, we used a single measure of cognitive function. Another important limitation is the lack of a formal evaluation for mood disorders in PD patients, considering the relationship between these and self-efficacy, and the findings of our study. Therfore, studies in larger populations are needed to establish the role self-efficacy has in affecting QOL, where addition of a formal evaluation of mood disorders would further support our findings.

In conclusion, self-efficacy is an attribute that should be further assessed in PD patients, considering its correlation with motor and non-motor symptomatology and quality of life. Mood disorders are important contributors to low self-efficacy, thus representing an opportunity for therapeutic interventions.

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