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Cross-Cultural Validation of the PFS-16 Scale in Moroccan Dialect: Validation Transculturelle De L'échelle PFS-16 En Dialecte Marocain

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Abstract

Original Research Article

***Introduction*:** Parkinson's disease (PD) is the second most common neurodegenerative disorder, fatigue is one of the most prevalent non-motor symptoms associated with PD. The Parkinson Fatigue Scale (PFS-16) is commonly used to assess fatigue in patients with PD, but it is not currently available in Moroccan Arabic. This study aims to adapt the PFS-16 for Moroccan patients. ***Methodology*:** The study employed the Parkinson's Disease Fatigue Scale (PFS-16), which was translated into Moroccan dialectal Arabic through a multi-step process involving expert review and a pilot study for clarity. Conducted at Hassan II University Hospital, it included Arabic-speaking participants both with and without Parkinson's disease. Questionnaires were administered, and participants completed the PFS-16 again after 15 days. Statistical analyses included descriptive statistics, reliability evaluation using Cronbach's alpha, intraclass correlation coefficients for reproducibility, and group comparisons to assess discriminant validity. ***Results*:** The study included 93 participants, predominantly male (52.7%) and averaging 56.78 ± 11.21 years old. The Parkinson's group had an average disease duration of 9.66 years. Fatigue was reported by 36.6%. The Moroccan version of the PFS-16 scale for assessing fatigue showed high reliability (Cronbach's alpha: 0.95) and excellent internal consistency, with no missing data. Discriminant validity analysis indicated significantly higher fatigue scores in controls compared to the Parkinson's group ($P < 0.001$). ***Conclusion*:** In conclusion, the Moroccan version of the PFS-16 scale is a valid and reliable tool for assessing fatigue in Parkinson's disease patients, beneficial for local clinicians and researchers. It enables comparisons with international studies and supports clinical and economic research requiring accurate fatigue evaluation.

Keywords: Parkinson Fatigue Scale, Fatigue, Moroccan Arabic, Transcultural Validation.

INTRODUCTION

La maladie de Parkinson (MP) est le deuxième trouble neurodégénératif le plus courant, et la fatigue est l'un des symptômes non moteurs les plus fréquemment observés chez les patients atteints de cette maladie. L'échelle de fatigue de Parkinson (PFS-16) est couramment utilisée pour évaluer la fatigue chez les patients atteints de la maladie de Parkinson, mais elle n'est actuellement pas disponible en arabe marocain. Cette étude a pour objectif d'adapter la PFS-16 pour les patients marocains.

MÉTHODOLOGIE

L'étude a utilisé l'échelle de fatigue de la maladie de Parkinson (PFS-16), qui a été traduite en arabe dialectal marocain par un processus en plusieurs étapes impliquant un examen par des experts et une étude pilote pour garantir la clarté du questionnaire. Réalisée à l'hôpital universitaire Hassan II, elle a inclus des participants arabophones, atteints ou non de la maladie de Parkinson. Des questionnaires ont été administrés, puis les participants ont complété à nouveau la PFS-16 après 15 jours. Les analyses statistiques comprenaient des statistiques descriptives, une évaluation de la fiabilité à l'aide de l'alpha de Cronbach, l'évaluation de la

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reproductibilité et des comparaisons de groupes pour évaluer la validité discriminante.

Résultats

L'étude a inclus 93 participants, principalement des hommes (52,7 %), avec un âge moyen de 56,78 ± 11,21 ans. Le groupe de patients parkinsoniens présentait une durée moyenne de la maladie de 9,66 ans. La fatigue a été rapportée par 36,6 % des participants. La version marocaine de l'échelle PFS-16 pour évaluer la fatigue a montré une fiabilité élevée (alpha de Cronbach: 0,95) et une excellente cohérence interne, sans données manquantes. L'analyse de validité discriminante a révélé que les témoins présentaient des scores de fatigue significativement plus élevés que les patients parkinsoniens (P < 0,001).

CONCLUSION

En conclusion, la version marocaine de l'échelle PFS-16 est un outil valide et fiable pour évaluer la fatigue chez les patients atteints de la maladie de Parkinson, et elle est bénéfique pour les cliniciens et les chercheurs locaux. Elle permet des comparaisons avec des études internationales et soutient la recherche clinique et économique nécessitant une évaluation précise de la fatigue.

Mots-clés: Échelle de fatigue de Parkinson, Fatigue, Arabe marocain, Validation transculturelle.

INTRODUCTION

Parkinson's disease (PD) is the second most common neurodegenerative disorder after Alzheimer's disease [1], it is characterized by a chronic condition of the nervous system, often related to aging. The prevalence of PD varies significantly, ranging from 100 to 300 per 100,000 in the general population [2], and exceeding 1,000 per 100,000 among individuals over 60 years of age [3]. Globally, the prevalence of PD increases sharply with age, potentially reaching up to 4,000 per 100,000 in people over 80 years old [3]. The highest prevalence has been observed in Argentina, with a rate of 657 per 100,000 [4].

The incidence of PD also varies worldwide, ranging from 10 to 50 new cases per 100,000 people per year [2]. This incidence and prevalence vary according to the ethnic background of the studied population. For instance, the frequency of PD is very low in sub-Saharan Africa (10.2 per 100,000) and Asia (11.3 per 100,000), compared to Caucasian populations (13.6 per 100,000)[5]. The observed variability in PD prevalence and incidence rates mainly depends on the methodological characteristics of each study, such as diagnostic criteria and data collection methods.

Parkinson's disease manifests through a progressive deterioration of motor functions and muscle control, significantly impacting the quality of life of patients. In Morocco, the prevalence of Parkinson's disease is notably increasing [6]. This rise represents a growing public health challenge, particularly among the aging population.

The complications associated with Parkinson's disease are numerous and can severely impair the quality of life of patients. Among these complications, fatigue is one of the most frequent and disabling symptoms [7]. Chronic fatigue in patients with Parkinson's disease negatively impacts their social life, limiting their ability to participate in daily and social activities, and exacerbating their isolation and dependence [8].

Fatigue, as a symptom, is defined as a lack of physical and/or mental energy, perceived by the individual or their caregiver as an obstacle to the voluntary and habitual activities of daily life. Fatigue can be normal or physiological when it occurs after intense or prolonged physical exertion, or after emotional stress [9]. However, in other not uncommon circumstances, fatigue becomes pathological, appearing more rapidly and persisting chronically. It can be related to psychological or physical factors, particularly organic diseases [8].

Patients with chronic diseases often complain of symptoms of fatigue. Assessing fatigue in these patients is crucial for appropriate and effective management, thereby improving their quality of life. Several scales and questionnaires have been developed to assess the degree and severity of fatigue in patients with chronic diseases. Among the most widely used are the Chalder Fatigue Scale (CFQ11), the Fatigue Severity Scale (FSS), and the Parkinson's Disease Fatigue Scale (PFS).

The PFS-16 (Parkinson Fatigue Scale) is widely used to assess fatigue in patients with Parkinson's disease [10]. However, this scale is only available in English, which limits its use in Arabic-speaking populations. To enable accurate assessment of fatigue in Arabic-speaking patients with Parkinson's disease, it is essential to carry out a cross-cultural adaptation of this scale. This adaptation will provide a reliable and valid tool, culturally adapted, for clinicians and researchers working with Arabic-speaking populations.

In Morocco, there is currently no scale adapted to Moroccan culture to assess fatigue in patients with chronic diseases. Therefore, the objective of this study is to conduct a cross-cultural validation of the aforementioned scale : PFS-16.

MATERIALS AND METHODS

Definition of the Parkinson’s Disease Fatigue Scale (PFS-16)

The Parkinson’s Disease Fatigue Scale (PFS-16) [10], is a self-rated scale used to measure fatigue, one of the non-motor symptoms associated with Parkinson’s disease. This scale measures the presence of fatigue through seven items and its impact on daily functioning through nine items. The scale can be used to assess levels of fatigue and to track changes that may result from treatments or lifestyle modifications. Scores are obtained using two methods:

- **Method 1:** Responses are rated from 1 (strongly disagree) to 5 (strongly agree).
- **Method 2:** Responses "strongly disagree," "disagree," and "neither agree nor disagree" are scored 0, while "agree" and "strongly agree" are scored 1.

We used method 1 to calculate the psychometric properties of the scale and method 2 to determine the presence or absence of fatigue.

A total score of 8 or higher indicates the presence of significant fatigue.

The selection of the PFS-16 scale was based on its specificity in measuring fatigue in individuals with Parkinson's disease, its manageable number of items (16 items), which facilitates administration, and the existence of multiple transcultural validations in various languages, which enables comparative analyses.

Cross-Cultural Adaptation Procedure

The cross-cultural adaptation was carried out as follows: First, the questionnaire was independently translated into Moroccan dialectal Arabic by two native Moroccan translators with certified proficiency in English. Second, a preliminary Moroccan version was created during a meeting of experts, based on the two independent translations. Third, this preliminary version was back-translated into English by two professional translators who were not familiar with the original PFS-16 scale. Finally, a second expert group meeting was held to compare and discuss the original and back-translated versions, resulting in the development of a pre-final version.

Subsequently, a pilot study was conducted on a sample of 10 patients with Parkinson's disease to evaluate the clarity of this version, and necessary modifications were made to obtain the final Moroccan version.

Study Population

After obtaining approval from the ethics committee, a study was conducted in the Neurology Department of the Hassan II University Hospital (CHU) in Fes, between January 2023 and January 2024. Two groups of participants were recruited: one group of patients with Parkinson's disease and another control group, free from any Parkinsonian pathology.

All participants whose mother tongue was Arabic were invited to participate in the study, either in the patient group or in the control group.

Data Collection

After obtaining informed consent, participants were asked to complete a questionnaire that included personal and clinical information, as well as various questions from the PFS-16 scale. An interviewer was available, if necessary, to assist with completing the questionnaire. Participants were asked to complete the PFS-16 scale a second time after a minimum period of 15 days [11].

Statistical Analysis

The scores for the two subscales of the Moroccan version of the PFS-16 scale were calculated by summing the responses to the questions within each subscale. Descriptive analysis was first conducted to describe the personal and clinical characteristics of the participants, as well as the scores of the different subscales. Qualitative variables were presented as percentages, while quantitative variables were expressed as mean ± standard deviation (SD).

To ensure comparability between the patient group and the control group, a comparison of baseline measures (age, sex, residence, etc.) was performed. Percentages were compared using the Chi-square ($\chi 2$) test, and means were compared using the Student's t-test. A P-value of ≤ 0.05 was considered significant.

The internal consistency of the entire scale and each subscale was assessed using Cronbach's alpha (α). A coefficient greater than 0.9 was considered excellent, while a value below 0.6 was deemed insufficient.

The reproducibility of the PFS-16 scale, between the first administration and the one conducted 15 days later, was assessed by calculating the intraclass correlation coefficient (ICC) and its 95% confidence interval. ICC values below 0.5, between 0.5 and 0.75, between 0.75 and 0.9, and above 0.9 indicate low, moderate, good, and excellent reliability, respectively.

To evaluate the discriminant validity of the PFS-16 scale, a comparison of each subscale's scores between the two groups (with and without Parkinson's disease) was conducted. A P-value of ≤ 0.05 was considered significant.

The statistical analysis was performed using IBM SPSS Statistics for Windows, Version 26 (IBM Corp., Armonk, NY).

RESULTS

The study comprised a total of 93 participants, evenly distributed into two groups: 47 individuals (50.5%) diagnosed with Parkinson's disease and 46 individuals (49.5%) in the control group. The demographic profile of the participants revealed a slight predominance of males, with 52.7% being men, the age distribution of participants shows an average of 56.78 ± 11.21, In terms of marital status, the majority of participants were married (81.3%), while 5.5% were single, 4.4% were widowed, and 8.8% were either divorced or separated. A substantial proportion of the participants (69.2%) resided in urban areas, with the remaining 30.8% from rural regions.

The duration of disease progression for the group of individuals with Parkinson's disease is 9.66 ± 5.4 years.

Regarding medical history and lifestyle factors, 87.1% of the participants had no history of brain trauma, whereas 12.9% reported such a history. Additionally, 72.3% had no family history of tremors, compared to 27.7% who did. In terms of mental health, 96.7% of participants did not suffer from depression, and 94.6% were free from anxiety disorders. Notably, none of the participants had a history of brain infection.

Concerning lifestyle habits, the majority (82.6%) were non-smokers, while 14.1% smoked occasionally, and 3.3% were regular smokers. Furthermore, 68.5% of participants were not exposed to secondhand smoke, whereas 31.5% were exposed. Regarding alcohol consumption, 89.1% of participants abstained from alcohol, while 10.9% reported alcohol use. In terms of medical interventions, 84.8% had not undergone deep brain stimulation, while 15.2% had received this treatment. Additionally, 36.2% of participants had not received physical therapy, compared to 63.8% who had.

Finally in terms of fatigue, 36.6% of participants suffered from fatigue.

A comparative analysis was carried out between the case and control groups (table 1). The two groups had similar characteristics in terms of gender, medical history (diabetes, cardiovascular disease, arterial hypertension and respiratory pathologies) and smoking status.

Acceptability

The Moroccan version of the PFS-16 scale demonstrated satisfactory acceptability, as no instances of missing data or multiple responses were observed. The time required to complete the questionnaire ranged from 10 to 15 minutes.

Reliability And Internal Consistency

Cronbach's alpha, a measure of the internal consistency of the items, is high for both dimensions and for the scale as a whole (0.95 for the presence of fatigue, 0.95 for the impact on daily functioning, and 0.97 for the scale as a whole).

The Intraclass Correlation Index (ICC) also reflects excellent reliability, with values of 0.95 for each category. (Table 2)

Discriminant Validity

The results of the discriminant validity analysis are presented in Table 3. The scores obtained on all subscales of the Moroccan version of the PFS-16 were found to be statistically significantly higher in the control group than in the case group (P < 0.001 for all dimensions).

Table 1: comparison of socio-demographic and clinical characteristics between cases and controls.

Variables		Total (93)	Cases (47)	Controls (46)	p-value
Sex					
	Men	49 (52.7)	21(42.9%)	28(57.1%)	0.171
	Women	44 (47.3)	19(43%)	25(56%)	
Origin					
	Urban	63 (69.2)	38(60.3%)	25(39.7%)	0.002
	Rural	30 (28.8)	7(25%)	21(75%)	
Diabetes history					
	Yes	15 (16.30)	9(60%)	6(40%)	0.397
	No	77(83.70)	37(48.1%)	40(51.9%)	
Cardiovascular history					
	Yes	3 (3.30)	2(66.7%)	1(33.3%)	0.617
	No	88 (96.70)	43(48.9%)	45(51.1%)	
High blood pressure					
	Yes	9 (9.78)	5(55.6%)	4(44.4%)	0.726
	No	83 (90.22)	41(49.4%)	42(50.6%)	
respiratory tract diseases					
	Yes	2 (2.17)	0(0.00%)	2(100%)	0.495
	No	90 (97.83)	46(51.1)	44(48.9%)	
Neoplasms					
	Yes	10 (10.99)	2(20.0%)	8(80.0%)	0.090
	No	81(89.01)	43(53.1%)	38(46.9%)	
Surgical history					
	Yes	60 (64.52)	24(40%)	36(60%)	0.006
	No	33 (35.	23(69.7%)	10(30.3%)	
Tobacco Smoking					

	Non-Smokers	76 (82.61)	39(51.3)	37(48.7%)	0.793
	Ex-Smokers	13 (14.13)	6(46.2%)	7(53.8%)	
	Smokers	3 (3.26)	1(33.3%)	2(66.7%)	
Age		56.78±11.21	60.11±9.77	53.39±11.66	0.003

Table 2: Internal consistency and reliability.

	Number of items	**Mean score ± SD**	**Cronbach's α**	**Reliability ICC (95% CI)**
Presence of fatigue (seven items)	7	3.03±1.17	0.95	0.95[0.94-0.97]
Impact on daily functioning (nine items)	9	2.81±1.22	0.95	0.95[0.93-0.97]
All items	16	2.91±1.17	0.97	0.97[0.96-0.98]

Table 3: Discriminant validity analysis

Subscales	**Cases (mean ± SD)**	**Controls (mean ± SD)**	**P-value**
Presence of fatigue (seven items)	3.88±0.97	2.17±0.58	<0.001
Impact on daily functioning (nine items)	3.74±0.94	1.86±0.56	<0.001
All items	3.80±0.90	1.99±0.54	<0.001

DISCUSSION

The main objective of this study was to evaluate the internal consistency. reliability. Discriminant validity and factor structure validity of the adapted Moroccan version of the PFS-16 scale. used to measure fatigue in patients with Parkinson's disease. The cross-cultural adaptation of the PFS-16 scale into Moroccan Arabic dialect was carried out smoothly and the results indicate that the Moroccan version of the scale is practical reliable and appropriate for assessing fatigue in this population.

This study included a total of 93 participants. evenly divided between the Parkinson's disease group (50.5%) and the control group (49.5%). This balanced distribution is favorable for evaluating differences between groups. especially regarding the discriminant validity of the PFS-16 scale.

The Moroccan version of the PFS-16 scale showed good acceptability. with no missing data or multiple responses and a reasonable completion time of 10 to 15 minutes. These results are consistent with previous studies. such as those by Brown *et al*., [10], and Kummer *et al*., [12]. Winch also highlighted the scale's acceptability and ease of use.

Internal consistency analyses revealed high Cronbach's alpha coefficients (greater than 0.95) for all subscales. similar to results observed in other validation studies of the PFS-16 scale. such as those by Çilga *et al*., [13], and Fu *et al*., [14]. These findings suggest that the Moroccan version of the scale is highly reliable for assessing fatigue and its impact on daily functioning.

In terms of test-retest reliability. our study found an ICC of 0.95. indicating excellent stability over time. This result is comparable to the ICC of 0.928 reported in the Turkish study by Çilga *et al*., [13], and Dagklis *et al*., [15]. The consistency of these results across different linguistic and cultural versions of the scale underscores the robustness of the PFS-16 tool.

Regarding discriminant validity. our study demonstrated that PFS-16 scores were significantly higher in patients with Parkinson's disease compared to controls across all subscales ($P < 0.001$). These results are in line with those obtained in other studies. such as those by Grace *et al*., [16], and Stocchi *et al*., [17]. Where the PFS-16 scale showed a strong ability to differentiate patients based on their health status. This suggests that the Moroccan version of the scale maintains the discriminative power observed in other versions. making it a valuable tool for clinical assessment.

One of the limitations of this study is that it focuses solely on the trans-cultural adaptation in the Moroccan Arabic dialect. without considering other dialects spoken in Morocco. Although Arabic is widely spoken throughout the country. there are also other regional languages. such as Tarifit. Tamazight and Tachelhit. It is worth noting that the majority of speakers of these languages also speak Arabic. Therefore. additional validation should be conducted specifically in regions where these dialects are prevalent.

One limitation we encountered was the lack of a gold standard for criterion validity. However. utilizing a control group allowed us to conduct construct validation and administering the questionnaire 15 days later enabled us to assess the scale's reliability over time.

It would be beneficial to retest the scale in a larger and more diverse sample to confirm these results and to consider revising certain questions that may pose comprehension issues as observed in other cultural adaptations of the PFS-16 scale.

This scale will serve as a foundation for future studies measuring the prevalence of fatigue in individuals with Parkinson's disease and analyzing the factors associated with fatigue in this population.

CONCLUSION

In conclusion the Moroccan version of the PFS-16 scale is a valid and reliable instrument, essential for Moroccan clinicians and researchers in assessing fatigue in patients with Parkinson's disease. It allows for the comparison of local study results with those from other international research and facilitates the conduct of clinical and economic studies that require precise fatigue assessment.

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