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Evaluating the Psychometric Properties of the Persian version of Parkinson Fatigue Scale (PFS-16) in Patients with Parkinson's Disease

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Abstract

Introduction: Parkinson's disease (PD) is one of the common disorders in the central nervous system. Among non-motor symptoms, fatigue is the most widespread one with prevalence rates of 40-65 that can have an impact on the quality of life of patients. The aim of this study was to evaluate the validity and the reliability of the Persian version of Parkinson Fatigue Scale (PFS-16). **Materials and Methods:** 70 patients with PD (mean age: 62.7±11.6) participated in this study through non-probability and available sampling method. Test-retest reliability and internal consistency were used to measure the reliability and the Fatigue Severity Scale (FSS), Parkinson's disease questionnaire (PDQ-8) and Visual Analogue fatigue Scale (VAS-F) were employed to measure the criteria validity. **Results:** Cronbach's alpha and ICC of the Persian version of PFS-16 were both measured to be 0.97. In addition, Kappa coefficient for each item of the scale was measured to be between 0.76 and 1.00, which indicated a very good level of reliability. Correlations between PFS-16 and FSS, PDQ-8 and VAS-F were estimated to be 0.58, 0.51 and 0.49, respectively. **Conclusion:** Results indicated high reliability and the validity of Persian-version of the mentioned scale. Therefore, its application in related studies is highly recommended.

Key words: Fatigue, Parkinson's disease, Parkinson Fatigue Scale (PFS-16), Reliability, Validity

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Introduction

Parkinson's disease (PD) is recognized as the second most common neurodegenerative disorder after Alzheimer's disease (1). The main symptoms of PD include bradykinesia, resting tremor and rigidity (2). Moreover, patients with PD usually report non-motor symptoms which besides motor problems could prominently affect patients' quality of life (3, 4). Among the non-motor symptoms, fatigue is the most common problem which is present in 40-65% of the patients with PD (5). Fatigue which is an umbrella term for a variety of complex symptoms could occur following the neurological, systematic and cognitive disorders. Fatigue is defined as the subjective feeling of inability, loss of energy and extreme exhaustion that also overlaps with insomnia definition (6). In addition, fatigue is closely associated with depression which is distinct from depression resulting from neurological disorders. This non-motor problem (fatigue) is often considered as an indication in the early stages of the disease and may antedate the development of motor symptoms for several months (7, 8).

It is worth mentioning that, appropriate application of the intervention protocols could facilitate the improvement process of patients with PD and reduce the negative consequences of motor and non-motor problems of patients with PD, their caregivers and the society. In order to apply the intervention protocols, appropriate and accurate tools to measure the symptoms and the outcomes are absolutely essential. Moreover, as fatigue has a significantly negative

impact on the quality of life as well as on functional and cognitive abilities of the patients with PD, accurate tool with good validity and reliability to measure such symptoms is necessary. There is a variety of tools to evaluate fatigue, including Fatigue Severity Scale (FSS), Fatigue Impact Scale (FIS) and Visual Analogue Scale to Evaluate Fatigue Severity (VAS for fatigue) (9). In spite of cross cultural adaptation of the mentioned scales in Iranian culture, the necessity of administrating a fatigue scale specific to patients with PD encouraged us to administer Parkinson Fatigue Scale (PFS-16) in the current project. PFS-16 designed by Brown et.al in 2005 in order to measure the impact of fatigue on daily functions (10) is a valid tool c to quantify fatigue. PFS-16 is a self-report scale consisting of the total number of 16 questions and two sub-scales including physical effects of fatigue experience (7 questions) as well as fatigue impacts on daily functions (9 questions). The patients were supposed to answer the questions based on their feeling and experience of fatigue in the last two weeks (in two previous weeks) and to choose one of the response options for each question. The Likert scoring system consisting of main categories of **agreement-disagreement** ("strongly disagree", "disagree", "do not agree or disagree", "agree" and "strongly agree") was applied to each item (11).

There are different pieces of evidence in order to investigate the application of PFS-16 and it is translated and cross cultural adapted to Sweden and Brazilian languages (12, 13).

Translation, cross-cultural adaptation, face validity and content validity of the Persian version of the PFS-16 have been performed by Baghoori *et.al.* (14). In the current study we administered the Persian version of the PFS-16.

There were two main reasons which motivated us to conduct the current study aiming at assessing the psychometric properties (validity and reliability) of the Persian version the PFS-16 to be administered in PD population in Iran. First of all, there are several linguistic and cultural differences among different countries which might affect the way of filling out the self-report scales and the validity of the scores. Second of all, the related literature lacked the investigation into the administration of the PFS-16 in patients with PD in Iran.

Materials and Methods

Participants

The current study was conducted on the convenience sample of 70 patients with PD (17 females and 53 males; mean age: 62.7±11.6) in Rasoul Akram hospital, Tehran, Iran during three months. To classify the motor functions of the participants, Hoen and Yahr (HY) Scale was used in the current study. HY scale is an effective and useful tool to classify the motor functions of the patients with PD. It classifies the motor function from stage 1 to 5 (15). Based on the modified version of Hoen and Yahr (HY) Scale, there were 23 persons at stage 1, 27 persons at stage 1.5, 11 persons at stage 2, 4 persons at stage 2.5 and 5 persons at stage 3

On the one hand, having the ability to write and read, scoring higher than 23 in Mini-Mental status examination (MMSE) test (16), being fluent in Persian language, not consuming drugs affecting fatigue (e.g. Amantadine), and having the ability to perform the test in the drug "On" phase were considered as the main inclusion criteria. On the other hand, some other factors such as, the presence of other neurological disorders (e.g. stroke), the presence of orthopedic disorders (e.g. low back pain, arthritis), and the presence of diabetes or addiction based on the patient's report or physician's diagnosis were the key exclusion criteria of this study.

We have used the Persian version of FSS, VAS, PDQ-8 and PFS-16 in the drug "On" phase in the present study. The study was approved by the ethics committee of Shahid Beheshti University of medical sciences. The participants completed the informed consent form prior to the study. In order to perform re-test, 50 of the participants were reexamined by PFS-16 in the same place and situation and by the same examiner after 7 to 10 days following the baseline test.

Tools

Fatigue Severity Scale (FSS):

This scale is one of the most common and effective tools to measure fatigue. FSS measures the physical aspect of fatigue and its impact on daily functions. Furthermore, this scale is based on a self-administered questionnaire with 9 items investigating the fatigue during the previous week (s). Scoring of each item ranges from 1 to 7 (1 indicates strong disagreement and 7 strong agreement). Higher total number indicates higher levels of fatigue (3, 17, 18).

Visual analogue scale for fatigue (VAS-F):

The fatigue VAS is comprised of a horizontal line usually 10 centimeters in length. Using the line, respondents can specify their level of the subjective experience of fatigue by indicating a position along the continues line between two end-points (zero: lack of feeling of fatigue and 10: severe fatigue). The number of the marked position is scored (3, 19).

Table 1. Demographic Information (n=70)

Variable	results	Number	%
Gender	Female	17	24.3
	Male	53	75.7
Severity of disease	1	23	32.9
	1.5	27	38.6
	2	11	15.7
	2.5	4	5.7
	3	5	7.1
Family History	Yes	20	28.6
	No	50	71.4
Affected Side	Right	22	31.4
	Left	35	50
	Both Sides	13	18.6
Occupation	Still working	6	8.6
	Unemployed	32	45.7
	Retired	32	45.7
Level of Independence	Independent	48	68.6
	Semi dependent	18	25.7
	Dependent	4	5.7
Use assistive devices	Yes	22	31.4
	No	48	68.6

Table 2. Descriptive statistics of total score of Persian Version of Parkinson's Fatigue Scale

PES-16 total score results	Mean	SD	Min	Max	Range
Test	68.61	12.17	19	80	71
Re-Test	64.6	13.72	20	80	60

Table 3. Test-retest reliability for each item of Persian Version of Parkinson's Fatigue Scale

Item	Kappa	Agreement
1	0.90	very good
2	1.00	very good
3	0.81	very good
4	0.90	very good
5	0.80	very good
6	0.84	very good
7	0.86	very good
8	0.84	very good
9	0.85	very good
10	0.87	very good
11	0.86	very good
12	0.79	very good
13	0.76	very good
14	0.87	very good
15	0.81	very good
16	0.96	very good

Parkinson's disease questionnaire-8 (PDQ-8)

The scale used is the short version of PDQ-39, includes 8 items in which each item reflects one of the sub-scales of PDQ-39. Fereshte Nejad et.al investigated the validity and the reliability of the scale in Persian language in 2014(2).

Statistical Analysis:

In order to assess the internal consistency of the Persian version of PFS-16, Chronbach's alpha coefficient was used in the present study. Internal consistency evaluates the general association of the items on the scale. A Cronbach's alpha of 0.8 or greater indicates a good internal consistency, alpha between 0.7-0.79 illustrates an acceptable internal consistency and alpha of lower than 0.7 means an inacceptable internal consistency(20). We administered intra-class correlation coefficient (ICC) to assess the reliability. ICC of greater than 0.8 is interpreted as a very good coefficient, between 0.6-0.8 as a good one, between 0.2-0.4 as a moderate one and lower than 0.2 is interpreted as a poor coefficient(21). Moreover, in order to evaluate the test-retest reliability of the Persian version of PFS-16, Kappa coefficient was applied. Kappa of greater than 0.75 is interpreted as a very good coefficient, between 0.4-0.75 as a moderate one and lower than 0.4 is interpreted as a poor coefficient on the scale (22). Spearman's rank correlation was calculated for the analysis of the relationship between PFS-16 and FSS as well as PDQ-8 and VAS-F. The correlation result was interpreted according to the Munro's classification. Based on the Munro's classification, the coefficient between 0.9-1 is taken as a very high coefficient, between 0.7-0.89 as a high one, between 0.5-0.69 a moderate one and between 0.26-0.49 is interpreted as a low coefficient. Finally in order to assess the Minimum detectable change (MDC) resulted from the measurement error, we used MDC=1.96×√2×SEM formula with confidence interval of 0.95(23) (for this purpose Standard error of measurement (SEM) is equal to SD√1-ICC).

Results

Seventy patients suffering from PD (53 males and 17 females) with the average age of 62.7±11.6 participated in this study. Regarding the affected side, 22 of the participants had right-sided symptoms, 35 had left-sided symptoms and the 13remaining participants reported symptoms on both sides. Frequency and percentage frequency of the demographic variables are shown in table 1.

The results indicated that Cronbach's alpha coefficient of the PFS-16 was 0.97. Thus, this scale had a very good internal consistency. Moreover, ICC of the Persian version of PFS-16 was measured to be 0.97 which illustrated its good stability. Descriptive statistics of the Persian version of PFS-16 total score are demonstrated in table 2.

Furthermore, in order to assess the test-retest reliability of the scale, Kappa coefficient was employed for each item of the PFS-16. Results showed that Kappa coefficient of 0.76-1 with the mean of 0.85 was obtained. Hence, PFS-16 has also a very good test-retest reliability. Kappa coefficient for each item of the Persian Version of PFS-16 is represented in table 3.

In addition, the correlation between PFS-16 and the total score of FSS was tested in order to assess the validity of the Persian version of PFS-16. The result of the correlation between the total score of the Persian version of PFS-16 and the total score of FSS was significant (r: 0.58, P<0.001). To evaluate the criteria validity, we constructed convergent validity. The results of the correlations between the Persian version of PFS-16 items and the total score of VAS for fatigue (r: 0.49, P<0.001) and PDQ-8(r: 0.51, P<0.001) were significant. Finally, MDC (SEM) for the total score of PFS-16 was measured to be 6.13 (2.21).

Discussion

Fatigue is one of the most common non-motor symptoms of patients with PD which prominently affects the quality of life of this population (24). In this regard, PFS-16 is a specific and valid tool to measure fatigue in patients with PD (9). Thus, the aim of the current study was to assess the psychometric properties of the Persian version of PFS-16. Our results approved a very good internal consistency of the Persian version of PFS-16. This finding confirmed that PFS-16 exactly measured what it was conceptually designed for (*i.e.* fatigue). Moreover, this finding verified the clinical or laboratory usage of the total score of PFS-16 which was in line with the previous studies done by Brown and Grace (10, 11). Additionally, Kummer *et.al.* reported a Cronbach's alpha of 0.93 for the PFS-16 (13). Furthermore, our results showed very good test-retest reliability of the PFS-16 (ICC: 0.97). This was also in line with the previous findings reported by Brown and Hagell (11, 12). Besides, the results of the current study indicated that Kappa coefficient for the Persian version of PFS-16 was between 0.76-1 representing very good reliability. In a similar investigation, Brown also indicated that the Kappa coefficient for the PFS-16 was between 0.4-0.7 (11).

As there is no other valid tool specifically designed to measure fatigue (11) for the patients with PD, in this study we administered the most valid and useful tool to measure the severity of fatigue named FSS in order to test the validity of PFS-16. Fereshte Nejad *et.al.* studied the validity and the reliability of the Persian version of FSS in a Persian PD population (18). Regarding the validity of the scale, our findings showed an association between Persian version of PFS-16 and FSS (r: 0.58) which indicated moderate validity for PFS-16. Moreover, we constructed convergent validity to measure the criteria validity. To do so, the correlation between the Persian version of PFS-16 and VAS for fatigue as well as the correlation between the Persian version of PFS-16 and PDQ-8 were assessed. The findings represented low validity of the PFS-16 compared to VAS and moderate validity of the PFS-16 in comparison with PDQ-8. In the similar investigation, Brown reported a strong correlation (r: 0.68) between the PFS-16 and VAS indicating good validity (11). In addition, Grace showed a strong association between PSF-16 and FSS (r: 0.84) and between PFS-16 and one question fatigue rating (FR) (r: 0.78) (10). **Furthermore**, Okuma investigated the correlation between PFS-16 and PDQ-8 as well as PDSS. They reported a medium (moderate) (r: 0.66) and poor (r:-0.48) correlation respectively (25). Besides, more recently, Hagell evaluated the correlation between PFS and FACIT-F and reported a coefficient correlation of-088 (12).

Regarding MDC (SEM), the total score of PFS-16 was found to be 6.13 (2.21). As far as we know, this is the first study reporting this result for MDC in PFS-16.

Limitations:

The present study had several limitations. Firstly, our study had access to a small sample size because our sample was limited to the patients of just one hospital. Larger sample sizes in future similar investigations will probably enhance and improve the reliability of the findings, will reduce error of measurement and consequently will improve the reliability of the findings.

Secondly, regarding the fatigue pathophysiology in patients with PD, it is considered to have several dimensions, but PFS-16 assesses only the physical dimension of fatigue and fails to evaluate other dimensions. Thirdly, in the present investigation, patients with cognitive impairments were excluded from the study. To add to the literature in this field, it is better to compare fatigue between PD patients with and without cognitive problems. Moreover, our investigation was performed in "On" phase of drug. It could be recommended that future studies investigate fatigue in PD patients in off phase of drug too.

Conclusion

According to the results of this study, ultrasonography method could be considered as an appropriate method to evaluate the morphology of muscles in patients with FSHD. Furthermore, we might suggest this method as a suitable one in order to compare or to determine the effectiveness of different treatment methods.

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Conflict of interest:

The authors declare no conflict of interest in this study.

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Authors' contributions:

All authors made substantial contributions to conception, design, acquisition, analysis and interpretation of data.

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