Research Article

Construct Validity and Test-Retest Reliability of Survey of Activities and Fear of Falling in the Elderly Among Iranian Patients With Parkinson Disease

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Abstract

Background: Fear of falling (FOF) is highly common in people with Parkinson disease (PD). Fear of frequent falling arises from risk factors in PD.

Objectives: One of the most common tools used to measure FOF in patients with PD is the survey of activities and fear of falling in the elderly (SAFFE), but no studies have been conducted on its reliability and validity in Iran. The current study attempted to examine the construct validity and test-retest reliability of SAFFE among Iranian patients with PD.

Patients and Methods: The study included a total of 71 patients with PD, among whom 61 (55.4%) were male and 10 were female. The construct validity was evaluated through the Persian version of SAFFE self-report scale using activities-specific balance confidence (ABC) scale where the correlation between the two scales was assessed using the Pearson test. The test-retest reliability was evaluated through intra-class correlation (ICC), standard errors of measurement (SEM) and minimum detectable change (MDC).

Results: The correlation between ABC scale and Persian version of SAFFE scale was desirable (r = -0.87 and P < 0.0001). According to the statistical results, it can be argued that the correlation between SAFFE scale test-retest scores with those of relative and absolute correlation coefficients were ICC = 0.96 and SEM = 0.16 respectively, which represent great reliability of the scale.

Conclusions: The Persian version of SAFFE has adequate construct validity and test-retest reliability and is an ideal tool to measure FOF in the patients.

Keywords: Neurodegenerative Disease, Independent Living, Data Accuracy, Validity

1. Background

Parkinson disease (PD) is a neurodegenerative disorder characterized by symptoms such as bradykinesia (slowness of movement), resting tremor and muscle rigidity and balance disorders. It is assumed that the lack of dopamine causes dysfunction in the basal ganglia-thalamo-cortical pathway (1). A study in 2015 intended to estimate the prevalence of PD in Tehran, Iran, and it understood that the prevalence was 2229 per 100000 people. Male to female ratio was 1.62 (2). People with PD have difficulty to carry out tasks such as walking. Hence, PD leads to abnormalities in two components of postural control: orientation (maintaining a normal direction) and stability (balance) (3). Postural instability is a debilitating disorder that causes sudden fall, usually observed in terminal levels of the disease and responds poorly to medications as opposed to gait disorders (4).

Falls are common in people with PD (5). Falling refers to an unintentional event where a person collapses accidentally in resting position on the floor or other lower levels, unable to bear weight on his legs (6). People with PD often experience falls and injuries related to falling. The subjects are three times more likely to fall compared with healthy individuals in the same age range (5). Falling can cause problems for the individuals, including various injuries, reduced mobility and loss of independence and intensified pressures on caregivers (7, 8). The risks conducive to falling involve polypharmacy, cognitive disorders, motor impairments, lower limb problems, chronic illness, poor balance, decreased body mass index (BMI), reduction of physical activity, functional impairments and visual problems (9).

Recent studies found that fear of frequent falling arises from risk factors in patients with Parkinson disease (10). Fear of falling (FOF) is described as a continuing concern about falling that ultimately restricts performance and daily activities (11). Among people with PD, 70% reported FOF, which often led to restrictions on the activities and social isolation (12).

2. Objectives

There are different scales to measure FOF, including activities-specific balance confidence (ABC). ABC self-reporting scale was developed by Paul et al. for the elderly, containing 16 items assessing balance confidence in carrying out different activities without falling. Each item is scored from zero (no confidence) to 100% (highest confidence)[13]. It was translated into Persian by Azad et al. They found that Cronbach's alpha coefficient for this scale was 0.97 which indicates the excellent internal consistency of this scale[14].

Another scale is falling efficiency scale I (FES-I), which is a 16-item scale where questions 1 to 10 are main items of falling efficiency while 6 items include walking on slippery surfaces, visiting friends and family, going somewhere together, walking on a non-flat place, going up and down a slope and attending a ceremony. Each item measures the level of concern or FOF when doing each activity on a 4-point scale[15]. Achieving a higher score on this scale implies having more FOF. This scale entails a good level of internal validity and test-retest reliability (Cronbach's alpha = 0.96 and internal consistency (IC) = 0.96, respectively). Compared to the previous version, the new desired scale can better identify risk factors of falling, such as chronic diseases, dizziness or sedative effects and drug interactions[16].

The self-report survey of activities and fear of falling in the elderly (SAFFE) were developed by Margine et al. This tool assesses FOF during 11 activities, mostly focusing on the negative aspects in FOF such as avoiding activities. Previous studies showed that this tool had good internal consistency and great correlation with other scales of FOF. Moreover, it can well make distinction among those who have a FOF and those who do not[17].

Since the FOF among people with PD has a high prevalence, the reliability and validity of the test should be examined specifically for each patient. Since construct validity and test-retest reliability of the test in patients with PD had not been calculated exclusively in Persian, the current study attempted to determine the construct validity and Test-retest reliability of SAFFE in measuring the FOF and restrictions on activities among people with PD.

3. Patients and Methods

After the permission from the developer of the original scale, the English version was translated into Persian according to the international quality of life assessment (IQOLA) approach. The method is based on forward and backward translation and review of the translation by the experts. For forward translation, the original English version was translated into Persian by two skilled translators. Then a group of experts gave their opinions about the quality of translations and after summing up the opinions, two translators who were fluent in both English and Persian, translated the original scale into Persian. The parts that did not correspond with the English version were changed after discussed with the experts[18].

It was a non-experimental study including methodological tools, where the construct validity and test-retest reliability of the Persian version of SAFFE were calculated.

The research project was initially approved by the ethics committee of Iran University of Medical Sciences upon obtaining a written consent from all participants.

Sample size was determined according to the following formula:

Equation 1.

$$n = \frac{(Z(1 - \frac{\alpha}{2}) + Z(1 - \beta))^2}{(C(r))^2} + 3 \tag{1}$$

$$C(r) = 0.5\ln\frac{1 + r}{1 - r} \tag{2}$$

α = confidence coefficient; β = power test; r = correlation coefficient.

Samples were selected through a non-probability procedure conveniently through visiting Rasoul Akram hospital, Tehran, Iran. The diagnoses were essentially based on DSM-IV criteria to develop PD in subjects. In this respect, 71 patients were diagnosed with PD given the inclusion and exclusion criteria. Inclusion criteria were as follows:

1, Having at least cognitive level of 23 in the mini-mental status examination (MMSE); 2, no history of diseases such as stroke, dementia, multiple sclerosis and orthopedic problems, impaired balance and fear of falling (information was collected through interviews and those living around the patient); 3, ability to read and write; 4, perfect fluency in Persian.

Exclusion criteria were as follows: Uncooperative patient during assessment.

Patients were evaluated in terms of cognitive level using MMSE, which is a tool to assess cognitive levels[18]. The maximum score on this scale is 30 and the score of 23 and below indicate cognitive pathology[19].

The level of motor function was calculated through Hoehn and Yahr scale. This measure is widely used as a clinical tool providing classification of motor function in people with PD. This entails a common pattern of motor disorder progression in PD. The scale divides motor function into five levels. In the revised version, levels 1.5 and 2.5 were added[20].

In the next stage, participants completed the SAFFE questionnaire. Self-reporting scale SAFFE assesses FOF in 11 activities. Activities are scored on a 2-point scale, where 1 implies activity accomplishment and 0 implies failure. Scoring in this scale for FOF covers 3 points, where 3 indicates maximum FOF. Within the limited activity, scoring is on a 2-point scale; 2 implies a person did not perform the activity because of FOF.

The construct validity was evaluated through the Persian version of SAFFE self-report scale using ABC scale where the correlation between them was assessed using the Pearson test. The test-retest reliability was evaluated through intra-class correlation (ICC) and time interval between tests and retests was two weeks. All data were analyzed using SPSS ver. 18. In all tests, P-value less than 0.05 were considered as level of significance.

4. Results

The study included a total of 71 patients with PD, among whom 61 (85.9%) were male and 10 were female. Moreover, 20 patients were at level 2 (28.2%), 15 were at level 1.5 (21.1%), 15 were at level 2.5 (21.1%), 14 were at level 3 (19.7%) and 7 were at level 1 (9.9%) (Table 1).

Table 1. Demographic Data (n = 71)

Variable Results	Frequency	Frequency Percentage
Gender		
Female	10	14.1
Male	61	85.9
Education level		
Diploma and lower	51	71.8
College associate and bachelor's degree	12	16.9
Master's degree and above	8	11.3
Medication intake		
Positive	69	97.2
Negative	2	2.8
Disease progress level		
Level 1	7	9.9
Level 1.5	15	21.1
Level 2	20	28.2
Level 2.5	15	21.1
Level 3	14	19.7
Level 4	0	0
Level 5	0	0

The age range of population was 23-88 years. Moreover, the mean age and SD of participants was 59.41 ± 11.405.

The correlation between ABC and Persian version of SAFFE scale was desirable (r = -0.87 and P < 0.0001). Furthermore, the correlation between ABC scale and levels of activity, fear of falling and activity limitations were 0.75, 0.87 and 0.76 respectively, representing the desirable reliability (Table 2).

The test-retest reliability was evaluated through ICC. According to the statistical results, it can be argued that the correlation between SAFFE scale test-retest scores with relative and absolute correlation coefficients ICC = 0.96 and SEM = 0.16, respectively, represent great reliability of the scale. The test-retest scores in activity, FOF and restrictions on activity were indicative of good reliability (Table 3).

5. Discussion

In addition to measuring the FOF that involves an easy-to-implement 4-point scale, this tool assesses how activities are performed and why activities fail, which may be due to FOF or other reasons. FOF is a useful variable when it reflects differences in the intensity of fear among the patients. Certain activities such as going outdoors when the ground is slippery, picking up something from the top of head and going to crowded places can cause excessive FOF. This tool provides information that may be useful in clinics, e g, how the FOF affects the restrictions on each activity. Moreover, this tool assesses FOF in various activities.

If a scale has a suitable repeatability (reliability), it means that it can be used in clinical research since it provides an appropriate confidence coefficient in the course of patient assessment. To measure the reliability of results, SAFFE scale was filled again after two weeks.

According to the statistical results, it can be argued that the correlation between SAFFE scale test-retest scores with those of relative and absolute correlation coefficients ICC = 0.96 and SEM = 0.16 represent great reliability of the scale. Nilson et al. aimed to determine the validity and reliability of FES and SAFFE in patients with PD through evaluation of 79 patients with PD. The results showed that SAFFE scale test-retest scores with relative correlation coefficients of ICC = 0.87 represented great reliability of the scale.

Brendon Stubbs et al. investigated the avoidance of activities due to fear of falling by modified version of the survey of activities and FOF in the elderly scale to determine avoidance of activities due to FOF and stated that the scale was a valid and reliable measure (21).

A study examined heterogeneity in response patterns of the participants of SAFFE and their relationships to falls, functional ability, quality of life, and activity restriction

Table 2. Correlation Between SAFFE and ABC Scores

	ABC	Activity	FOF	Restriction	SAFFE. Score
ABC					
Pearson Correlation	1	0.756**	-0.875**	-0.767**	0.873**
Sig. (2-tailed)		0.000	0.000	0.000	0.000
N	30	30	30	30	30
Activity					
Pearson correlation	0.756**	1	-0.758**	-0.713**	0.830**
Sig. (2-tailed)	0.000		0.000	0.000	0.000
N	30	71	71	71	71
FOF					
Pearson correlation	-0.875**	-0.758**	1	0.878**	-0.982**
Sig. (2-tailed)	0.000	.000		0.000	0.000
N	30	71	71	71	71
Restriction					
Pearson correlation	-0.767**	-0.713**	0.878**	1	-0.935**
Sig. (2-tailed)	0.000	0.000	0.000		0.000
N	30	71	71	71	71
SAFFE. Score					
Pearson correlation	0.873**	0.830**	-0.982**	-0.935**	1
Sig. (2-tailed)	0.000	0.000	0.000	0.000	
N	30	71	71	71	71

Abbreviations: ABC: activities-specific balance confidence; FOF, fear of falling; SAFFE, survey of activities and fear of falling in the elderly.

Table 3. Evaluation of Test-Retest Reliability of SAFFE

	ICC	SD	SEM	MDC95
Activity	0.991	1.79	0.1698	0.4707
FOF	0.94	6.58	1.6109	4.4651
Restriction	0.94	2.655	0.6503	1.8026
SAFFE	0.967	10.479	1.9036	5.2765

Abbreviations: FOF, fear of falling; ICC, intra-class correlation coefficient; MDC95, minimal detectable changes at the 95% confidence level; SAFFE, survey of activities and fear of falling in the elderly; SD, standard deviation; SEM, standard error of measurement.

measures in a cohort of 256 cases. In this study, SAFFE was considered as a valid instrument (22).

In the current study, the correlation between SAFFE and ABC was at a desirable level. The negative correlation between FOF and restrictions on the activity through ABC reflected the fact that greater ABC scores lead to lower scores achieved by those levels.

It should be noted that due to lack of access to all the participants in the open test stage, the number of samples was reduced to 21 and 30 in the assessing phase due to poor cooperation by some of the participants in completing the ABC questionnaire.

5.1. Limitations of the Study

A large number of subjects had orthopedic problems and other cases interfered with the inclusion criteria. Hence, they had to be excluded from the study. Others scored less than 23 on the MMSE scale due to cognitive impairments, which were then eliminated from the study. Other limitations included the lack of space and facilities

when completing the questionnaires by patients with PD and lack of full cooperation by the subjects.

5.2. Conclusion

Given the lack of valid and reliable instruments in Persian, especially in the context of a full-scale such as SAFFE assessing the fear of falling and limitations in activities, the results of the current study indicated that the Persian version of SAFFE can provide a valid tool in the Iranian society.

Acknowledgments

Footnotes

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