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Validity and Reliability of the Persian Version of Lawton Instrumental Activities of Daily Living Scale in Patients with Dementia

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Abstract

Background: Appropriate information about the functional capacity of patients with dementia disease plays an important role in assessment of their health status and functional independence. The purpose of the present study is to investigate the reliability and validity of the Lawton IADL Persian version in patients with dementia.

Method: International Quality Of Life Assessment (IQOLA) approach was used for translation process and then content validity was assessed by five experts. To evaluate the reliability of the scale, test-retest, inter-rater reliability and items' internal consistency methods were used. To analyze the construct validity, the Functional Assessment Staging Test (FAST) was used. The results were reported based on the data collected from the Iranian Alzheimer Associations of 60 patients with dementia. (53.3% female, 46.7% male, Mean age=75.91 (SD=7.72))

Results: No significant statistically differences were observed in the distribution of the experts' opinions ($p>0.05$). The correlations between first and second administrations of the test (SEM=0. 238, r=0.993, CI: 0.988-0.996) and first and second raters (r=0. 961, $p<0.001$) were very high. Internal consistency between items and the total score ($0.606 >r>0.427$) had almost an average power. There was a significant negative relationship between the participants' score in IADL and FAST ($p<0.001$).

Conclusion: These results confirm that the Persian version of the Lawton IADL Scale has excellent reliability and validity for dementia patients. And it can be used as clinical and research tool for assessment IADL and determine disease progression by professionals.

Keywords: Content Validity, Construct Validity, Reliability, Lawton Instrumental Activities of Daily Living Scale, Instrumental Activities of Daily Living Scale, Dementia.

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Introduction

One of the problems during aging process is cognitive impairment that causes significant functional limitations for older people. A group of neurodegenerative disorders is called dementia that leads to cognitive impairments followed by a significant decline in people's functional abilities (1).The most common cognitive ability that is affected by dementia is memory. 10% of people over 70 years and 20-40% of people over 85 years old show memory disorders in their clinical assessments. In addition to memory loss, other functions such as lan-

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guage, visual-spatial, calculation, judgment, and problem-solving at risk of damage in patients with dementia (2). Alzheimer Disease (AD) is the most prevalence type of dementia. In 2005, Alzheimer Disease International was estimated that there were 24.3 million people with dementia worldwide and it was expected that this state be doubled every 20 years (3). Accordingly, the population of people with dementia will be 40 million in 2020 and 81.1 million in 2040(4). Functional abilities in dementia stages are affected differently. In the early stages, a person may experience some sorts of cognitive deficiencies, but s/he can independently perform his/her daily activities. As the disease progresses, clear changes occur in the individual's functional abilities. In mild cases of dementia, memory, orientation, judgment, and problem-solving skills are affected. At the same time, the patient needs help with a variety of functional activities such as work-related activities in the community or the housekeeping activities. Some recent investigations have found memory (5), verbal learning (6), motor skills (7), and psychomotor speed (8) to be associated with IADL (Instrumental Activities of Daily Living). In fact, early cognitive changes lead to changes in IADL, especially those activities such as financial or medication managements or use of the transportation system that require more complex cognitive skills (controlled processing, procedural memory and executive function) (9). According to Bullock and Hammond study in the second stage or moderate dementia, a person needs help with judgment related activities. In severe cognitive impairment performing IADL and also basic ADL (Activities of Daily Living) are difficult (10). The researchers categorize the functional abilities, include Basic Activities of Daily Living (BADL) and Instrumental Activities of Daily Living (IADL) (11) and in performing IADL, a person needs to have enough mobility and coordination of sensory and cognitive functioning; therefore it requires the ability to accomplish more complex activities that are fundamentally and undeniably necessary for an independent living. Consequently, the first abilities that are affected by dementia are IADL skills that gradually make the person dependent on others (12). Among health professionals, the occupational therapists are key members for assessment and intervention of daily living activities. Occupational therapy services are based on areas including daily living activities, play, work, and leisure. Instrumental ADL are part of the daily living activities, which are assessed by occupational therapists to enhance the independence at the home and community related activities (13). The IADL assessment scales that utilized in dementia patients are Alzheimer Disease Cooperative Study Activities of Daily Living Inventory (ADCS-ADL), the Blessed Dementia Rating Scale (Blessed DS), Cleveland Scale for Activities of Daily Living (CSADL), Disability Assessment for Dementia (DAD), Interview for Deterioration in Daily Living Activities in Dementia (IDDD), and the Lawton IADL Scale (14). The factor that makes the Lawton scale distinct from other assessment tools is its specialized assessments of IADL domains (15).

The Lawton IADL Scale was designed in 1969 for assessment of essentials of living in community (16). Competence in skills such as shopping, meal preparation, and money management is essential for an independent living. Since patients with cognitive or physical disorders lose their IADL abilities sooner than their BADL functions such as bathing, eating, and toileting, the evaluation of IADL in the early diagnosis stages of cognitive, physical, or mixed impairments are so important in the elderly (17). Furthermore this scale translated and evaluate in different languages and cultures (13.15.17).

Regarding the importance of IADL in early diagnosis and intervention of dementia and also importance of ADL assessments in occupational therapy services as

well as lack of valid and reliable IADL scales for Iranian population, the need for IADL assessment is essential. Considering the long history and widespread use of the Lawton scale in patients with dementia (16), and that the IADL abilities are affected sooner than the other functional capabilities, Lawton IADL Scale plays an important role in checking progression of dementia over time. Despite the prevalent use of this scale, its validity has not been determined yet by Iranian population. Thus objective of this study was to determine the validity and reliability of the Persian version of the Lawton IADL Scale in patients with dementia.

The Lawton IADL-PV (Persian Version) Scale was developed in four steps:

Linguistic validity.

Content validity.

The reliability study that covered inter-rater and test-retest reliability as well as internal consistency.

Construct validity to determine the relationship between Lawton IADL and FAST (Functional Assessment Staging Test) scores.

Methods

This study examined the validity and reliability of the Lawton IADL Scale. In this investigation, convenience sample of 60 demented patients aged 60 referred to Iranian's Alzheimer Association during the August to October 2012 participated. None of the participants suffered from any interfering condition such a severe visual and auditory and musculoskeletal impairments according to physician's exams. All the caregivers completed informed consents according to research committee of Iran University of Medical Sciences and Health Services guidelines. The official permission for translation of Lawton IADL scale was taken from Oxford University Press (License Date: Jan 6, 2012, License Number: 2823200988596).

Step one- Linguistic Validity

Lawton IADL Scale contains 8 items of IADL including use of telephone, shopping, meal preparation, housekeeping, and laundry, mode of transportation, medication management, and money management, in a short time about 10 to 15 minutes. Each item is scored either 0 (lower ability) or 1 (higher ability), while the total score is 8 that indicates a complete independent functioning (16).

For guiding Translation process, the International Quality of Life Assessment (IQOLA) approach was used (18). The scale was first translated for cultural equivalence. In the first step of the translation process, forward translation of the scale (from English to Persian) was done by two fluent Persian translators. Then, the expert panel was formed to discuss translation qualities. Two bilingual translators, fluent in both English and Persian languages, performed forward translation (from English to Persian). Regarding the meanings and concepts, items that did not meet the original scale's quality, were discussed by experts and necessary modifications were carried out.

Step two- Content Validity

In order to determine the content validity of the scale, five expert occupational therapists stated the appropriateness, quality, and quantity of Lawton IADL Scale items.

To determining the content validity, Kruskal-Wallis agreement table and calculating χ^2 (for all items) and Fisher exact test (for individual items) were used.

Step three- Reliability

To investigate the reliability of Lawton IADL Scale, the test-retest and inter-rater and items' internal consistency methods were used.

The present scale consisted of 8 items, each of which was scored either 0 or 1 based on the patient's abilities. Before performing the Lawton IADL Scale, the patients' medical records were reviewed first and accordingly, some of the patients who received the entry criteria were randomly

selected. After explaining the procedure to the patients and their caregivers, Lawton IADL questionnaire and FAST scale were completed by the first examiner through direct interview with caregivers (family members). The FAST Scale determines stages of dementia by assessment of functional abilities and it contains seven levels (1=normal ageing, 7=severe dementia). After a short time interval, the scale was completed by a second examiner on the same day and in other room. Both of raters were MSc students of occupational therapy. To perform the retest process, one week later, the scale was completed again by the first examiner via a phone call to the same person. One week duration was chosen because it was far enough to avoid memory effects, but close enough to avoid genuine changes in the instrument function (19).

In order to assess the internal consistency of the items, Cronbach's alpha was used; and to check both test-retest and inter-rater reliabilities, the Intraclass Correlation Coefficient (ICC) for the total score was chosen.

Step four- Construct Validity

To check the construct validity of the scale, the association between Lawton ADL and FAST scores was evaluated. The FAST is well validated measure of the course of AD in the published and scientific literature (20). For examining the construct validity, the correlation between Lawton IADL and FAST scores was calculated using Pearson's correlation coefficient. In all statistical tests, $p<0.05$ was considered statistically significant and all data were analyzed by SPSS version 16.

Results

In this study, a total of 60 elderly demented patients with mean age of 75.91 (SD = 7.72), including 28 female (46.7%) and 32 male (53.3%) participated. The duration of dementia, for 26 patients (43.3%) was less than one year, for 19 patients (31.7%) were one to three years, and for 15 patients (25%) was over three years (Table 1).

Step One- Content Validity

To check the content validity of the questions, 5 experts were requested to rate the appropriateness of each question using a four point Likert scale (from very good to poor) (Table 2). Experts' agreement regarding the questions was calculated by Kruskal-Wallis agreement table and χ^2 values were 19.02427. Since $p<0.05$, the experts' agreement were consistent that indicated the content validity of the total questions.

Based on Table 2, regarding the appropriateness of item, 60% of the experts stated item 1 as very good and 40% as good, 60% stated item 2 and 4 as very good, 20% as good, and 20% as average, and 80% mentioned items 3, 5, 6, and 8 as very good and 20% as good. The only item that the experts were unanimously considered as very good was item 7.

Table1. Demographics information (n=60)

Variable	Results	N	%
Sex	Male	32	53.3
	Female	28	46.7
Marital Status	Single	0	0.0
	Married	40	66.7
	Widowed	20	33.3
Educational Rate	Illiterate	13	21.7
	Primary school	29	48.4
	Diploma	7	11.7
	University degree	11	18.3
Living Status	With spouse	40	66.7
	With her/his children	17	28.3
	With nurse	3	5.0
	Nursing home	0	0.0

Table 2. Content validity of the items based on experts' opinion (n=60)

Scale	Fisher test	Very Good		Good		Average		Weak	
Items	Probability	Number	%	Num-ber	%	Number	%	Number	%
Using of telephone	0.999	3	60.0	2	40.0	0	0.0	0	0.0
Shopping	0.630	3	60.0	1	20.0	1	20.0	0	0.0
Meal preparation	0.375	4	80.0	1	20.0	0	0.0	0	0.0
House keeping	0.630	3	60.0	1	20.0	1	20.0	0	0.0
Laundry	0.375	4	80.0	1	20.0	0	0.0	0	0.0
Mode of transportation	0.375	4	80.0	1	20.0	0	0.0	0	0.0
Medication management	-	5	100.0	-	0.0	0	0.0	0	0.0
Money management	0.375	4	80.0	1	20.0	0	0.0	0	0.0

*Since over 20% of homes in the expected frequency were less than 5, the Fisher exact test was used. In this test, only the probabilities are reported.

Table 3. Reliability of test-retest using ICC (n=60)

	First Time					Second Time					ICC			
Lawton IADL items	SEM	S	M	Min	Max	SEM	S	M	Min	MAX	Lower limit	Upper limit	p	r
Total items	0.242	1.87	2.282	0.0	7.0	0.283	1.85	2.21	0.0	7.0	0.996	0.988	<0.001	0.993

SEM: Standard Error of Measurement, S: Standard Deviation, M: Mean

As the figures in Table 2 indicates, the experts stated that 1 item was excellent (medication management), 5 items were good or very good (use of telephone, meal preparation, laundry, mode of transportation and money management), and 2 items (shopping and housekeeping) were above the average. Moreover, no significant statistically differences were observed in the distribution of the experts' opinions ($p<0.05$).

Step Two- Reliability

The test-retest reliability showed, the total test correlation between the first and second administrations (using ICC) was very high ($p<0.001$, $r=0.993$) (Table 3).

Table 4, shows the correlation between the items and the total scores in the first administration of the test.

Based on Table 4, there was an average correlation between the items and the total scores ($0.427<r<0.606$).

To check the inter-rater reliability, the total test correlation between the first and second raters (using ICC) was also very high ($p<0.001$, $r=0.961$) indicating excellent reliability of the test (Table 5).

Step Three- Construct Validity

To study the construct validity of the test, using Pearson's correlation coefficient, the correlation between the total IADLS and FAST scores was tested.

According to Table 6, there was a significant relationship between Lawton IADL and FAST scores ($p<0.001$). Since this relationship was negative, by increase of IADLS scores the FAST scores decreased. However, considering the Pearson correlation coefficient, the strength of this association was moderate ($r = -0.688$).

Table 4. Internal consistency (correlation between test items and total scores in the first examination) (n=60)

Lawton IADL items	Cronbach's alpha after item deletion	Correlation between items and the total score
Using of telephone	0.756	0.488
Shopping	0.768	0.427
Meal preparation	0.748	0.571
Housekeeping	0.750	0.541
Laundry	0.728	0.606
Mode of transportation	0.753	0.504
Money management	0.748	0.571

*Since the answers to the item of medication management were 0 in all cases, this factor is excluded from the analysis.

Table 5. Inter-rater reliability using ICC (n=60)

	First examiner				Second examiner				ICC			
Lawton IADL items	S	M	Min	Max	S	M	Min	MAX	Lower limit	Upper limit	p	r
Total items	1.87	2.28	0.0	7.0	1.84	2.21	0.0	7.0	0.977	0.936	<0.001	0.961

S: Standard Deviation, M: Mean

Table 6. Correlation between Lawton IADL and FAST using Pearson coefficient (n=60)

Lawton IADL Scale					FAST Scale					Pearson correlation	
SEM	S	M	Min	Max	SEM	S	M	Min	MAX	p	R
0.242	1.87	2.282	0.0	7.0	0.357	2.76	7.56	4.0	14..0	<0.001	-0.688

S: Standard Deviation, M: Mean

Discussion

In this study, the validity and reliability of 8-item scale of the Lawton Instrumental Activities of Daily Living Scale were examined.

Step One- Content Validity

One of the key features of all tests is their validity. Regarding the content validity of this scale it shows the value of a test according to experts' opinions as well as their agreements on the appropriateness of the items. The overall experts' opinions analysis showed that there was a high agreement and homogeneity among Lawton IADL Scale items and most of the items were judged as good or very good by the experts. Two items (shopping and housekeeping) were judged as average by some experts that could be explained by the partial overlap and similarity of the options. This finding was consistent with the Hong Kong Chinese version of Lawton IADL (13).

Step Two- Reliability

In an analysis of the internal consistency of the items, the correlations between items were in the range of very low to above moderate. Regarding to the Lawton IADL items assess different IADL functional areas, this relatively weak correlations were expected. On the other hand, the correlation between each item and the total score was above moderate, indicating that the test's internal consistency was good. In addition, the exclusion of each item increased the internal consistency of the scale that again specified that each item measured different areas. In the study of Vergara in exploring psychometric properties of the Lawton Spanish version they found Cronbach alpha coefficient equals to 0.94. The exploratory factor analysis showed factors' loadings in the range of 0.67 to 0.90 and the confirmatory factor analysis suggested homogeneity of the construct (15). To determine the reliability of the test, test-retest method and correlation coefficient between test scores obtained in different administrations of the test by the first and second examiners, were used. The results of the present study, regarding the total score and all items' scores, showed a very high correlation between the two administrations indicating the reliability and duplicability of this tool for different administrations. Despite using telephone for second test, test-retest reliability was high and didn't show any significant difference. Accordingly, in Hong Kong version of Lawton scale, Cronbach alpha coefficient and ICC were reported as 0.86 and 0.99 respectively (13). In addition, regarding the total score, there was a high correlation between the two raters that was indicative of a remarkable reliability and duplicability of Lawton IADL Scale in different administrations. In Lawton IADL Scale, while the values of the options are not similar, different options are proposed to measure a particular domain. Therefore, in the present study, it was decided to analyze the inter-rater reliability based on the raters' choices in each specific domain. Moreover, based on an item analysis an acceptable inter-rater reliability was found.

Step Three- Construct Validity

The initial hypothesis of this study was

that as the dementia progresses, patient's IADL abilities reduce and s/he becomes more and more dependent on others to perform those functions. To assess this relationship, in addition to IADLS scores, FAST scores were recorded for each participant by the first examiner and divergent method of construct validity analysis was applied. Research results reinforced the initial hypothesis and revealed that the higher the IADLS scores, the lower the FAST scores. However, applying the Pearson correlation coefficient analysis, shows relationship was average.

Compared to the present study, the researchers were looking for different results in other studies that applied factor analysis to examine the construct validity. In a study in Hong Kong, the construct validity of the Lawton scale was studied through factor analysis. The factor analysis of 111 participants' scores was conducted and the results indicated high internal consistency as well as one dimensionality of the scale. In terms of clinical issues, being one-dimensional is so important because IADL items examine only the instrumental activities while this quality makes it possible to add up all items scores (13). Another study shows that the construct validity of this scale as well as its relationship with 4 scales including Physical Classification (6-point rating of physical health), Mental Status Questionnaire (10-point test of orientation and memory), Behavior and Adjustment rating scales (4-6-point measure of intellectual, person, behavioral and social adjustment), and the PSMS (Physical Self-Maintenance Scale) include 6-item ADLs. Despite the participants of that study were 108 individuals, only for a few of them all 5 scales were analyzed. However, the results specified an average construct validity of the Lawton scale (21). In a study, conducted in Spain in 2012, the Barthel index, SF-12, short form of the WOMAC, and Quick DASH questionnaires were used to study the construct validity of the Lawton IADLS. The results indicated high construct validity of the scales. Significant differences were found according to different groups, supporting known-groups validity. Responsiveness parameters showed moderate to large changes (effect sizes 0.79 and 0.84 among patients classified as worsened) (15). The original version of this test was evaluated in 1969 through a concurrent validity assessment with the Physical Self-Maintenance Scale (PSMS). All correlations were significant at the .01 or .05 level (16).

Similar to these studies, the present study shows that Lawton IADL Scale in valid and reliable tool for using in Iranian dementia patients.

The limitation of this study is use of phone call for performing test-retest, because of caregiver's problem for transportation.

Conclusion

The findings of this study confirm that the Persian (Farsi) version of the Lawton IADL Scale has excellent reliability and validity. According to the experts, the designed test had appropriate validity and is cultural valid among Iranian demented elderly. Lawton IADL-PV (Persian Version) is a reliable tool and can be used by different assessors and across different times. This scale can be used as an appropriate tool for assessment and clinical implication of the instrumental activities of daily living by occupational therapist and determine disease progression by other professionals. Moreover, it can be available to researchers, clinicians, and treatment centers to use it along with other tests, to have more accurate and comprehensive evaluations of these patients' conditions.

Limitations

Limitation of this study is lack of homogeneity in sample for duration of dementia, and level of education. Further researches with large samples and considering variations of these factors are recommended. Sampling from one center in Tehran is another limitation.

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