RESEARCH ARTICLE

Translation and Validation of the Activities of Daily Living Scale with Iranian Elderly Cancer Patients Treated in an Oncology Unit

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Abstract

Background: This study evaluated the validity and reliability of applying the Katz's Activities of Daily Living (ADL) scale in an Iranian sample of elderly oncologic patients following initial cancer treatment. Materials and Methods: The scale was translated with the forward-backward procedure to give an Iranian version. The ADL scale was then applied in a random sample of 400 oncologic patients aged 60 and older following initial cancer treatment. Assessment of the scale stability was twice, with a 14-days (two weeks) interval, to 30 (of the 400) eligible elderly cancer patients in March 2012. To measure treatment effects, the index was run with 150 patients in a three month recall, following oncology processing. Exploratory and confirmatory factor analysis was performed for assessment of construct validity of the Katz's ADL. Reliability was measured with internal consistency (Cronbach's alpha co-efficient), and test/retest (Spearman's r value) of the instrument. Criterion validity was evaluated by comparing the Katz with Physical Function (PF) subscale of SF 36. Known-group validity was approved by comparing of Katz' ADL between quartile groups of PF subscale of SF 36. Results: In our study the ADL demonstrated a high degree of internal homogeneity (Cronbach's alpha 0.923). There was a high correlation between scores of two time measurement of Katz's ADL (*p* value of two- related- samples test was 0.3). Construct validity showed a correlation coefficient of 0.572 between the ADL and PF scores. In factor analysis, 2 factors were extracted. Evidence for the reliability of the questionnaire was good and known group validity was approved by significant differences of ADL score between quartiles of the PF subscale of SF36. Conclusions: The results suggest that the Iranian version of ADL applied for oncologic older adult patients following initial cancer treatment is a reliable and a valid clinical instrument and comparable to those reported in other studies.

Keywords: Activities of Daily Living scale - elderly - cancer patients - validity - reliability - Iran

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Introduction

Age is the greatest risk factor for the progress of cancer. However, cancer can arise at any age, the chance of developing cancer increases with age (Wilkins, 1991).

Aging is related to increasing functional decline and several commodities, in addition, elderly cancer patients are more at risk to physical impairment (Stafford et al., 1997).

Geriatric cancer patients have more comorbidity conditions and physical functional limitations (Repetto et al., 1998; Aapro et al., 2000). In the assessment of elderly cancer patients, the comprehensive geriatric assessment (CGA) has been useful to demonstrate views of elderly cancer patients concerning with their functional status and quality of life. Besides, elderly cancer patients may be concerned with declining of their quality of life in undertaking cancer treatments (Balducci and Extermann, 2000; Ingram et al., 2002; Repetto et al., 2002).

Functional status refers to the ability of the patient in doing daily functions. Functional status of elderly patients was measured by ADL and IADL scores. Assessment of performance status is commonly used functional score in oncology process, however, it has been recommended that this score might underestimate the level of elderly patients' functional impairment (Inouye et al., 1998).

The Katz index is a useful tool in assessing morbidity, mortality, length of hospitalization, and to determine effectiveness of treatment in older people and also as a rehabilitation guide (Katz et al., 1968; Hamrin et al.,

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1988). The scale of the ADL is widely used and is an essential part of patients' functional status for avoiding the underestimation of the disability levels in terms of acting everyday activities (Katz et al., 1970).

Initially, this index was tested by clinicians in hospitals to rated the patients' ability to perform six tasks and now it is usually utilized to measure the functional status of community dwelling, non-institutionalized, elderly people as a self report measure even though as an assessment tool for clinicians (Law et al., 2005). Self-reported limitations in ADL index are often used to assess functional performance, both in research and in daily care (Katz et al., 1963).

Although there is no unique definition of the concept of the ADL, and also based on the aim assessments, there is no agreement in which activities in the ADL assessments should contain to be valid for clinical or research use (Frick et al., 1993; Cohen and Marino, 2000; Jette and Haley, 2005).

There are several new published tools to assess the ability of elderly patients' ADL acting and to find out the fitting methods to assess independence in the elderly such as the International Classification of Functioning Disability and Health (WHO, 2001), Australian Therapy Outcome Measures (Unsworth and Duncombe, 2004) and the Personal Care Participation and Resource Tool (Darzin, 2004). While each tool, have a strong point to their apply, in general, they still do not effectively underline the existing needs for assessment tools that are applicable to elderly in a range of differing abilities (Sainsbury et al., 2005; Gilbertson et al., 2011).

Evidence on the Katz index cross-cultural validity is limited. The diversity of the global population recommends the needs for cross-culturally validated research instruments or scales (Reuben et al., 1995). There are some versions to compare in diverse ethnicities, such as, Greek (Mystakidou et al., 2012) white and African Americans (Cummings et al., 2003), Turkish immigrants (Lewinter et al., 1993), and also among Spanish patients (Álvarez et al., 1992).

ADL scale applied in advanced cancer patients to compare the prognostic clinical variables and quality of life measures in cancer patients (Yancik, 1998), and also in another study in elderly treatment patients with advanced cancer compared with an elderly healthy control group, in order to describe the predictors of multiple symptoms; and the associations (Zustovich et al., 2009).

Due to cultural effects some problems might be raised when an assessment standardized for one language is applied in another. The norms of a specific culture influence in many aspects of the assessing process, such as rater scoring, an expected level of performance, an individual manner of performing tasks that needs to perform. Consequently, North American norms might lead to misinterpretations of results when assessments are applied in Asian nations as a cross-cultural phenomena (Jitapunkul et al., 1994).

For that reasons researchers and clinicians must have access to reliable and valid measures of clinical concepts in their own cultures and languages. The medical relevance of measuring functional status in the elderly cancer patients, and its usefulness is still controversial. Therefore, studies are recommended to clarify the accurate evaluation that provided by the ADL, which has proven useful in predicting mortality and disability in Geriatric clinical settings to better treatment plan (katz et al., 1970; kempen and Surmeijer, 1990; portney and Watkins, 2009).

Therefore, The purpose of this study is to examine the reliability and validity of self-reported limitations in activities of daily living as assessed by the Katz's ADL index, among Iranian elderly oncology patients following initial cancer treatment.

Materials and Methods

Iranian elderly oncology patients following initial cancer treatment were accrued from March 2012 through May 2012. The study included adult older people 60 years old and over, due to a rise limitations in ADL mostly in old people. The sample consisted of 400 elderly patients with known malignancy was judged eligible to participate in the study.The inclusion criteria were: histological confirmed cancer diagnosis, no known cognitive disorder, and started oncology treatments (radiotherapy or chimoteraphy) for at least 2-3 sections. Data was recorded by nurses. The functional status modified version: the Medical Outcome Study-SF36 (Stewart et al., 1981). The SF-36 is a 36 item, self-reporting multi-item scale measuring each of eight health care concepts (Ware and Sherburne, 1992). The health concepts included in the survey focused on mobility and the ability to perform certain tasks. Nine items of the SF-36 were used as a modified physical functioning subscale in this study. The nine items measured how cancer may have interfered with aspects of vigorous functioning, such as climbing stairs, transferring in and out of bed, ability to run, lift heavy objects, bend and stoop, climb one flight of stairs, and walk a block unassisted were used for this study (Given et al., 1994). Since the physical function subscale evaluates body deteriorations, this subscale appears more appropriate for cancer patients receiving initial treatment. For these reasons, the physical function subscale was chosen for hypothesis testing. Total sore of the physical function subscale was calculated by summation of scores of each 9 items (each item had scored from 1-3, 1 for dependency in a function and 3 for independence in physical function). Low scores on the physical function subscale of the SF-36 indicated a limitation in the area; high scores indicated that no problems were noted (Ware and Sherbourne, 1992). Psychometric evaluation and factor analysis of these components were performed by (Stewart et al., 1981). And the validation of the Persian version SF-36 was conducted in an Iranian older population (Eshaghi et al., 2006).

Translation of ADL instrument

The Katz's index of Activities of Daily Living (ADL) summarizes over-all performance in six functions that are necessary for self-care. It consisted of counting the number of dependencies in ADL includes bathing, dressing, using the bathroom, continence, getting up and being able to move around the house, and feeding (Katz, 1983; Given et al., 1994). It determines whether someone assisted

the patient's elderly or whether the elderly functioned without help, defining assistance as active personal assistance, direct assistance, or supervision. Elderly participants are scored yes/no for independence in each of the six functions. A score of 6 indicates full function, 4 indicate moderate impairment, and 2 or less indicates severe functional impairment. The Katz index's use of dichotomous scoring ("dependent" or "independent") arisen from wide field testing of the index, including testing of a version that permitted degrees in scores of each ADL (Katz et al., 1963; Katz et al., 1970). The 6-item ADL index (Katz et al., 1963) was used in this study for assessing the functional ability in elderly cancer patients. Two independent health professionals translated the items and consolidated as a forward vision. This questionnaire then was backward translated into English by two professional translators to check for differences between the Iranian version and the original questionnaire.

Reliability: Informed by the factor analysis as well as the theoretical concept behind the ADL, we derived estimated internal reliability for each of the clusters of variables identified in the factor matrix. Internal reliability was estimated using Cronbach's alpha coefficient (Fisher, 1995). For assessment of external reliability, the questionnaires were administered two weeks after the first time evaluation and test-retest analysis was performed.

Validity: Face validity of the ADL instrument was not assessed in this study, because it had been approved in several studies previously. Construct validity of the ADL instrument was evaluated using of exploratory and confirmatory factor analysis. Differential validity which is one of a kind of the construct validity was assessed by comparison of the ADL scores between the quartile groups of the physical function subscale of SF-36. Criterion validity was assessed using the correlation between the ADL scores and the scores of a physical function subclass of SF-36.

Ethical considerations: This study was constrained to the Helsinki declaration ethics. The Shahid Beheshti ethical committee approved the study, and the adult older patients signed an informed consent after that the aims and methods of study was clarified by a trained nurse. The data gathered throughout the participants keep in a secure place that merely the main researcher could access them.

Statistical analysis

Normality of data was evaluated by using the Kolmogorov–Smirnov test and P–P plots. The parametric data were compared to independent and dependent t-test, univariate and multivariate ANOVA and the data were represented by the mean and Standard Deviation (SD). The non-parametric data were analyzed by the Mann-Whitney U and Wilcoxon's tests. The construct validity of Katz's instrument was assessed by performing Exploratory Factor Analysis (EFA) with varimax rotation and Confirmatory Factor Analysis (CFA). The fitness of indices was approved by i) Comparative fit indices >0.90, ii) Root mean square error of approximation <0.08 and, iii) Goodness of fit index.

Criterion validity was approved by the high correlation between the scores of Katz' ADL instrument and physical function scores of SF-36. Discriminated validity was assessed using comparison between Katz's ADL scores in before treatments and 3 months after starting treatment of cancer processing using the Mann-Whitney U test.

Internal reliability was determined by the cronbach's alpha coefficient and interclass correlation coefficient >0.6. External reliability was assessed by the correlation between the the ADL Katz's scores in test –retest within 2 weeks interval.

The levels of statistical significance were considered at P<0.05. SPSS software, version 19; SPSS Inc., Chicago, IL, USA and Lisrel 8 Scientific Software International, Inc. applied to data analyses.

Results

Descriptive

Four hundred participants who admitted to the oncology day center to treat of malignancies and had age ≥60 years old enrolled in this study if they consented to participate. The mean age of the participants was 67.50, SD 5.86 and 44.9% (179 persons) of them were female. Other characteristics of the participants were shown (Table 1). The greater part of the elderly individuals had Gastrointestinal cancer diagnosis (31.5%) followed by breast cancer (17.2%). A total of 54.4% had three types of oncology treatment and 26.8% had both chemotherapy

Table 1. Elderly Cancer Patient Characteristics

		No.	%
Age:	Mean (SD)	67.50	(5.86)
Gender:	Female	179	44.8
Diagnosis:	Breast	69	17.2
	Lung	29	7.3
	Prostate	49	12.2
	Gastrointestinal	126	31.5
	Urinary/ Genital	44	11.0
	Skin	3	0.8
	Brain	35	8.8
	Bone and skeletal	8	2.0
	Lymphoma	9	2.2
	Nasopharyngeal \Thyroid	28	7.0
Education:	Illiterate	70	17.5
	Primary	161	40.3
	High school	44	11.0
	Diploma	81	20.3
	University	44	11.0
Family status:	Married	297	74.3
	Unmarried	4	0.8
	Widow, separate	99	24.8
Living with whom:	Alone	28	7.0
	With others	372	93.0
Type of treatment:			
Chemotherapy		15	3.8
Radiotherapy		30	7.5
Surgery & chemotherapy		37	9.3
Surgery & radiotherapy		33	8.3
Chemotherapy & radiotherapy		107	26.8
Surgery& chemotherapy& radiotherapy		178	54.4

and radiotherapy, respectively, while 7.5% of the elderly patients were receiving only radiotherapy treatment.

There was a strong correlation between the scores of the ADL Katz's instrument and the physical function subscale of the SF 36 (Spearman's correlation coefficient=0.572).

Factor analysis

In an exploratory factor analysis there is a strong correlation between item and based on eigenvalue ≥0.5 two components was extracted (self care components such as clothing, ability to feeding, toileing), and transferring components included walking, going to the toilet and bed, and also come back. These components could explain 73.15% of total variance. In confirmatory factor analysis Root Mean Square Error of Approximation (RMSEA)=0.182; [Confidence interval (CI) 90%: 0.150-0.210], Expected Cross-Validation Index (ECVI)=0.35 and chi-square-freedom ratio=other global goodness fit statistics were: Goodness of Fit Index (GFI)=0.9, Adjusted Goodness of Fit Index (AGFI)=0.7, Comparative Fit Index (CFI)=0.98, Incremental Fit Index (IFI)=0.98, Root Mean Square Residual (RMR)=0.02. These results show that although the two component solution is not strong model fit but in comparison to one component solution and tree component solution it has the best fattiness.

The scores of Katz's ADL and physical function of SF 36 were not different between female and male (P values were 0.17 and 0.83), respectively.

Internal consistency

To determine the internal consistency, the inter-class correlation coefficient and cronbach's alpha of Katz's ADL scale were calculated. The Cronbach's alpha coefficient of 6 items ADL KATZ's for pre-treatment and on-treatment was indicated in (Table 2). The Cronbach's alpha coefficient for all of items in pre-treatment measurement was 0.923 and in the on-treatment measurement of Katz's ADL was 0.918. Also all of items have high correlation with the total score. Cronbach's alpha if each item will be deleted and also on-treatment subjects has been shown in (Table 2). Interclass Correlation Coefficient (ICC) of ADL Katz's scale in pre-treated subjects for single measures was 0.666 (0.629-0.702) and for average measures was 0.923 (0.910-0.934).

Table 2. Internal Reliability of ADL Scale in Pre-Treatment and On-treatment Elderly Cancer Patients' Assessment

Components	Pre-treatment		On-treatment	
	Cronbach's alpha If item deleted	Correlation item to total	Cronbach's alpha If item deleted	Correlation item to total
Clothing	0.900	0.840	0.902	0.772
Food	0.912	0.769	0.918	0.650
Bathing	0.909	0.797	0.901	0.792
Walk	0.911	0.762	0.901	0.782
Toileting	0.906	0.800	0.896	0.811
Transfer in bed	0.913	0.754	0.897	0.826
Total	0.923 (0.910-0.934)		0.918 (0.904-0.929)	

Table 3. Differences of ADL Scores between Quartiles of Physical Function Subscle of SF 36 On-treatment

	n	Mean (SD)	P Value
Physical function subscle of SF 36			
1	102	6.66 (1.82)	
2	121	8.07 (2.25)	
3	76	9.00 (3.19)	<0.01
4	101	13.40 (5.43)	

*P Value 1-2=0.01, P value 1-3≤0.01, P Value 1-4≤0.01, P Value 2-3=0.25, P Value 2-4≤0.01 and P value 3-4≤0.01

External reliability

For evaluation of external reliability, elderly cancer patients (N=32) were evaluated after 14 days. The scores of all of the items was strongly associated with analog items score within two weeks and have a Spearman's correlation coefficient higher than 0.90. Spearman's rho correlation coefficient of total scores for test-retest of Katz's ADL was 0.831. Also non-parametric two related sample tests (Wilcoxon's test) were carried out about all of the Katz's ADL score and there was not significant differences between two scores (p value=0.3).

Criterion validity

For assessment of concurrent validity, we compare the scores of the physical function subscle of SF 36 with the scores of Katz's ADL among the participants. There was a moderate to strong correlation between the scores of the ADL Katz's instrument and the physical function subscale of the SF 36 (Spearman's correlation coefficient=0.572).

Known-groups validity was assessed by comparison of ADL Katz's scores between quartiles of physical function of SF 36. The ADL index was examined in terms of its ability to distinguish between subgroups of patients formed on the basis of their disease severity, which is expressed in terms of physical function performance status. The ADL discriminated well between subgroups of the patients, indicating that functioning was significantly higher in patients with a moderate performance status compared with a poor performance status in post hoc test (Turkey test); mean scores were 6.66 (1.82) and 13.40 (5.430) in the first and fourth quartiles respectively (p<0.01) (Table 3).

Discussion

This study evaluated the psychometric properties of Katz's ADL instrument among Iranian older people with a known cancer. In this study we found that the Iranian version of the ADL index has relatively good criterion validity because the scores of Katz's ADL were correlated with scores of physical function of SF 36. The validity and reliability of SF 36 among the Iranian elderly population was approved previously (Eshaghi et al., 2006). The Katz ADL is an effective tool that applied in older adults (Wallace and Shelkey, 2008). Changes in the functional status of the elderly due to causes are common that could effect of diseases; therefore, applying the assessment tools is important to assist clinical oncologist and aged care services (Wade, 1992).

The most commonly used functional impairment

geriatric scales are Katz's basic ADL and Lawton's Instrumental Activities of Daily Living (Lawton and Brody, 1969; Katz, 1983). ADLs and IADLs are both necessary for elderly patients' self-care in daily activity living. There are studies that have used both ADL and IADL in the definition of functional decline (Sands et al., 2003; Sands et al., 2005); however, there are no studies investigating their relationship. Bronson and Asberg (1984) reported a satisfactory ADL coefficient of scalability, a measure of construct validity, of 0.74-0.88 (Brorsson and Asberg, 1984).

Those geriatric scales might be made other information on the functional assessment of elderly cancer patients, although their prognostic role in adult old patients with some types of cancers is anonymous (Maione et al., 2005). Meanwhile, there are some weaknesses with the present assessment tools such as the time consuming to complete available tests, the biasing effects of data sources, and the sensitivity of the assessments to range of ability levels (Sainsbury et al., 2005; Gilbertson et al., 2011).

Oncology process such as chemotherapy, radiotherapy and surgery to treat cancer can be standardized around countries, the values about life are not the same and the meaning of cancer stage and its treatment regarding quality of life is different in societies (Kagawa-singer and Blackhall, 2001).

The factor structure of the Iranian version differed from the model resulted from the analysis carried out by Katz (katz et al., 1970). The model still contains six items, while forming two factors in exploratory factor analysis, first factor included the movement items (walking, toileting and transferring on the bed). The second factor contained the self care items (clothing, feeding and bathing). In confirmatory factor analyses of these components had the best indices of fitness of modeling. However, it is not consistent with the (kempen and Surrmeijer, 1990; spector and Fleischman, 1998; Mystakidou et al., 2012). Other studies have reported one factor, while another three factor explanation (Fitzgerald et al., 1993; Cummings et al., 2003). Although our finding about the factors of the ADL were dissimilar with other studies but it was steady with the conceptual framework about this instrument.

Internal consistency of Katz's ADL was very good with high level interclass correlation coefficient, as well as all of the items had good correlation with total score of this instrument. The Katz index reported good reliability, as evidenced by reliability coefficients ranging from 0.87-0.94 (Ciesla et al., 1993). Hamrin and Lindmark in the study of functional ability in stroke patients stated a reliability coefficient of 0.94 (Hamrin and Lindmark, 1988).

The interesting notice was that the crombach's alpha coefficient decreased with deletion of each item. In other words all of the items needed for construction of this instrument. The mean scores of Katz's ADL were different significantly between the physical function quartile group of SF 36. It could indicate that the Katz's ADL tool could differentiate the groups with different ability to perform daily function. This competence to diversity was more prominent after initial cancer treatment than before it. Brorsson and Asberg (1984) stated a satisfactory ADL coefficient of scalability, a measure of construct validity, of 0.74-0.88 (Brorsson and Asberg, 1984). External reliability of Katz's ADL tool in the test - retest analysis was high for total scores of ADL measurements too.

Some studies revealed that the frequencies of the ADL items are different for women and men (Extermann et al., 2005), and household tasks are associated with traditional gender roles. For men, the list of such activities is unimportant. In other words, the sex-related content of these three items probably makes a difference (Lawton and Brody, 1969; Allen et al., 1993).

In our study there was not any differentiation between male and female about scores of ADL. However, the influence of gender roles in household activities was great in elderly Greek people. They reported sex-related content items made a difference for old men than elderly women cancer patients'. For elderly female doing the tasks such as shopping, cooking, and laundry were means of assessing general skills; however, for elderly male those such tasks were not as much of the activity (Mystakidou et al., 2012) .

There is limited in the Katz index to evaluate small increases of changes in the rehabilitation of older patients with malignancy, however, the ADL is sensitive scale to changes in declining physical function performance (Wallace and Shelkey, 2008). The Katz index has established accuracy in predicting functional effects over time among older patients in short-term care, and hospitalization (Brorsson and Asberg, 1984). Therefore, a comprehensive functional assessment should be used by sharing with the clinical team (Wallace and Shelkey, 2008).

To expand predictive information about functional outcomes related to specific diseases such as cancers and treatments and also contributing to the ability to describe the stages and severity of disabling chronic diseases, the ADL index has been applied (Spector et al., 1987).

On the other hand, the power of this study is the quite large sample, in view of the aged specific range of the older population as well as the severity and types of their cancers. Another strong point of the present study is that there were no missing data due to face to face interviews.

This study was conducted among elderly with known malignancy. Based on the results the Katz Index of Independence in ADL can be used for assessing elderly patients with cancer. The Katz index is easy to use to the most clinical sites, as in the sensitive elderly cancer patients. Older people are at risk of decreased of function and the elderly with malignancy this risk increase several times as a result assessment of ability to perform daily function has more importance in these groups of the aged population. For this reason developing and approving of the validation a tool for assessment of function is reasonable.

In conclusion, based on the results the Iranian version of ADL applied in oncology older adult patients following initial cancer treatment is a reliable and a valid clinical instrument for evaluation of the activity of daily living among of elderly cancer on-treated patients and compared to those reported in other studies.

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