



## Original Article

## Psychometric Properties of the Persian Version of the Burden Scale for Family Caregivers-short Version in Patients with Stroke

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### ABSTRACT

**Background:** Considering the prevalence of stroke, an economical and reliable questionnaire is needed for use in research and rehabilitation to measure the amount of burden on caregivers of stroke patients. True to our knowledge, there is no exclusive Persian language instrument for assessing the burden of stroke caregivers. The current study investigated the validity and reliability of the Burden Scale for Family Caregivers-short version (BSFC-s) for stroke patients' caregivers.

**Methods:** In this cross-sectional study, 51 stroke patients and their caregivers were studied using the above-named questionnaire translated from English into Persian. Construct validity of the questionnaire was evaluated by Spearman and Eta correlation. Cronbach's Alfa was used to assess internal consistency. Factorial structure was evaluated by exploratory analysis.

**Results:** The test-retest reliability of the questionnaire was calculated to be 0.93, and the questionnaire's internal consistency was 0.93. The construct validity of the questionnaire was acceptable.

**Conclusion:** In general, it can be said that this questionnaire has a good structure for assessing the burden of caregivers. In addition, by 10 items we can consider this questionnaire as an economically viable option in research and practice.

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### Introduction

Caregiver burden is a subjective state that reflects a caregiver's impressions of caregiving. It is psychological, physical, and financial stress which physically or emotionally affects family members, friends, and other people outside the treatment system because of the illness of a family member (someone whom they love) [1, 2]. Many caregivers experience negative health consequences because of being concerned about a stroke patient [3]. Caregiving has been linked to higher rates of depression [3], anxiety [4], cardiovascular disease, general ill-health, and mortality [5]. Caregivers, in general, have poorer quality of life and greater restraints

on their social activities [6, 7].

Stroke is one of the main causes of long-term inability, and it is among 18 diseases that lead to prolonged life with disability [8]. Studies have reported stroke as one of the main reasons for the need for care. Stroke patients have a variety of problems, such as hemiplegia, vision problems, dysphagia, dysarthria, and difficulties in performing activities of daily living [9].

In recent years, most policymakers have thought long-term care was provided most often in nursing homes and long-term care centers. However, statistics contradict this common belief. It has been shown that 80% of patients are exclusively dependent on informal caregivers (someone who cares for another person without receiving money or other resources) [10]. Family support is one of the most important factors in the recovery of people with stroke. Caregivers provide a wide range of activities, including coordinating care, activities of daily living, and complex

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medical tasks [11].

Various tools are designed to evaluate the burden of care, such as the Caregiver Strain Index (CSI) [12], Caregivers Burden Scale (CB) [13], and the Sense of Competence Questionnaire (SCQ) [14].

Our review suggests that the Burden scale for family caregivers-short version is an efficient tool for assessing the burden of caregivers of chronic patients, especially stroke patients. The short version of this scale consists of 10 items and is based on Folkman and Lazarus's transferable stress model [15] which was created in Germany in 1993. To date, it has been translated and validated in languages like Turkish and Danish [16, 17]. In 2018, Pendergrass et al. introduced a classification system for interpreting scores on the Burden Scale for Family Caregivers-short version (BSFC-s), so the practitioner can evaluate caregivers' burden accordingly [18]. The BSFC-s version with scoring instructions is available in 20 European languages on the Internet at [www.caregiver-burden.eu](http://www.caregiver-burden.eu).

Considering the absence of an approved instrument to gauge the burden of informal Persian-speaking caregivers exclusively, the BSFC-s seems like an economical and reliable tool for this purpose. With a reliable scoring method along these lines, the present investigation was conducted to validate BSFC-s in Persian.

## Methods

This cross-sectional study received ethical confirmation from the Iran University of Medical Sciences Ethics Committee (ethical code is 50182), and then began the process of validating the questionnaire. Permission to validate the questionnaire was granted by the test developer.

### Participants

The questionnaire was given to 51 stroke patients and their caregivers in Tehran province to complete. In one of the methods of sample size estimation for reliability and validity of questionnaires, sample size can be estimated by subject-to-item ratio. Anthoine et al. reported that about 91% of articles on this subject displayed a subject-to-item ratio  $\geq 2$  [19]. A subject-to-item ratio  $\geq 5$  was used in this study. Based on the number of items in the BSFC questionnaire (10), our sample size was 51 subjects. Participants were recruited from rehabilitation clinics and hospitals in different areas of Tehran province by convenient sampling. The inclusion criteria for participation in the study was that caregivers should be relatives of patients and at least six months should have passed from the stroke. In addition, caregivers should be at least 18 years of age and be fluent in reading, writing, and speaking Persian. Participants provided informed consent, and any patient or caregiver unwilling to participate was excluded.

The processes of translation into Farsi and confirming face and content validity were conducted with 15 participants [20] based on the WHO method and according to the original developer's recommendation. In that study, no changes were made to the questionnaire items.

In this study, construct validity, internal consistency, and the test-retest reliability were measured.

### Measurements

#### *Burden Scale for Family Caregivers-short Version, BSFC-s/BSFC-short Version*

BSFC-s consists of 10 items, each one rated on a scale from 0 to 3 with zero indicating strongly disagree, 1 indicating disagree, 2 meaning agree, and 3 indicating strongly agree. The score scale ranges from 0 to 30. In this classification, a score of 0-4 total points shows that the burden of care is none to mild, meaning that the caregiver does not have an increased risk of physical discomfort that is above the usual level of complaints in the caregiver's age group. Scores of 4-14 points indicate a moderate burden of care. In other words, the caregiver has an increased risk of physical discomfort that is above the usual level of complaints in the caregiver's age group. Scores of 15 to 30 indicate a severe to very severe burden for the caregiver and is related to increased risk of physical discomfort that is above the usual level of complaints in the caregiver's age group.

To assess construct validity, other instruments were used which are discussed further.

#### *Barthel Index*

The Barthel Index is an instrument used to measure the performance of a person in everyday life activities. This scale was introduced in 1965 and is scored between 0 and 100, with higher scores indicating higher performance in activities of daily living. This scale is widely used to measure patient performance and is particularly useful in assessing the functional status of stroke patients [21]. The ICC and internal consistency of this scale were 0.92 and 0.94, respectively, in stroke patients [22].

#### *Motricity Index*

The Motricity Index is a tool that measures a patient's ability to use a muscle group. This scale has a high internal consistency of 0.96 and is a valid tool for measuring the performance of the upper extremities, lower extremities, and trunk control of the patient after stroke [23]. The test-retest reliability for this scale was found to be 0.93 [24].

#### *Beck Depression Scale*

The Beck Depression Scale, first established in 1979, is one of the most used tests for measuring the severity of depression. It is a self-report scale. In this research, the short version of this depression scale was used. This version contains 13 items, and its score ranges from 0 to 39. The internal consistency for this scale was found to be 0.83 [25, 26].

#### *Other Variables*

In this research, caregivers were asked whether the patient's need for care had led to their sleep being disturbed during the prior month. In addition, the amount of communication with others was measured through the question: Has your relationship with your relatives and friends diminished since you have been in charge of caring for the patient? The answers to these questions were "yes"

or “no.” These two questions were used to assess construct validity and were based on the assumption that increased burden leads to reduced communication with the family and increased sleep problems in caregivers [27].

### Statistical Analysis

#### Construct Validity

Spearman’s correlation was used to calculate the correlation between the BSFC-s score and the scores of each of the other variables and scales. To examine the convergent validity of the BSFC-s, we calculated the correlations between the BSFC-s, the BDI-short, the Barthel Index, and the Motricity Index. It was also assumed that if a caregiver suffers from sleep problems because of providing care, the burden would be greater. In addition, we assumed that reduced relations between the caregiver and other friends and people would increase the burden. These two hypotheses were assessed by eta square correlation, as one item is a scale and the other is a nominal value [28]. Thus, the following hypotheses were assessed during this study.

H1: Caregiver burden will be positively correlated with the depression symptoms of the caregiver assessed by the BDI-short version.

H2: Caregiver burden will be negatively correlated with the patient’s motor function score measured by the Motricity Index.

H3: Caregiver burden will be negatively correlated with the patient’s function in activities of daily living, measured by the Barthel Index.

H4: The higher the levels of burden are, the fewer will be the caregiver’s interactions with family and friends, and more sleep disturbance for the caregiver leads to increased burden.

#### Test-retest Reliability

To assess the repeatability of the BSFC-scale, the questionnaire was completed by 20 caregivers in two stages with a 10-day interval.

The test-retest reliability score of BSFC-s questionnaire was determined using ICC (Intraclass correlation). According to Gayland, Portney, and Watkins, an ICC value less than 0.5 indicates poor reliability. Values between 0.5 and 0.75 indicate average reliability, and values between 0.75 and 0.9 show good reliability. Values greater than 0.9 indicate excellent reliability [29].

#### Internal Consistency

Internal consistency expresses the extent to which items of a test measure a common concept. Internal consistency is important, because it is an indicator of the homogeneity between items on a test or their subsets. Cronbach’s alpha was used to assess the internal reliability of the instrument used herein. Bortz and Döring recommend that the internal stability of an acceptable scale should be higher than 0.8 [30].

#### Factor Analysis

The factorial structure of BSFC-s was evaluated by conducting an exploratory factor analysis. In the process of conducting the EFA, the Kaiser-Meyer-Olkin measure

of sampling adequacy and Bartlett’s test of sphericity (X<sup>2</sup>) were also performed. Principal factor analysis was used for factor extraction, and varimax rotation was also conducted.

## Results

### Demographic Information of Caregivers and Patients

The present study included 51 stroke patients and their caregivers. Demographic characteristics of patients and caregivers are presented in Table 1. As can be seen, the average rate of burden in the families of patients with stroke was 15.47 with a standard deviation of 7.89. Scores ranged from 0 to 30.

**Table 1:** Demographic characteristics of 51 stroke patients and their caregivers

Variables	Scores
Caregivers	
Age, mean (SD)	49.8 (15.4)
Male gender, n (%)	19 (37.3)
Relation	
Child n (%)	26 (51)
Spouse n (%)	19 (37.3)
Parent n (%)	3 (5.9)
Sibling n (%)	1 (2)
Nephew n (%)	1 (2)
Grandchild n (%)	1 (2)
Patients	
Age, mean (SD)	66.41 (12.2)
Male gender, n (%)	27 (52.9)
Marital status, married or widow n (%)	46 (90.2)
Marital status, Not married n (%)	5 (9.8)

#### Translation

In this stage, two translators who were fluent in Persian translated the questionnaire from English to Persian. They had a history of translating questionnaires but were not familiar with the one used in this research. In the next step, a bilingual (in English and Persian) expert panel was convened, and the experts questioned some phrases and words and suggested some alternatives. Inadequate expressions of the translation and deviations between the translation and the original text were resolved.

#### Factor Analysis

The KMO measure of sampling adequacy was determined to be 0.885, indicating that it was appropriate to use EFA to analyze the data. Like the original version, all items are loaded in the one factor. This concept has been shown in Figure 1 and Table 2.

#### Construct Validity

Based on the results of the statistical test, caregivers who had higher scores on the Beck depression scale had a heavier burden of care, and the correlation between the two tests was high. Higher levels of caregiver burden were found more frequently with patients who scored lower on the Barthel scale, so with patients who have less autonomy in daily activities, the burden will be heavier. Based on the research results, the Motricity index score had a moderate correlation with caregiver burden.

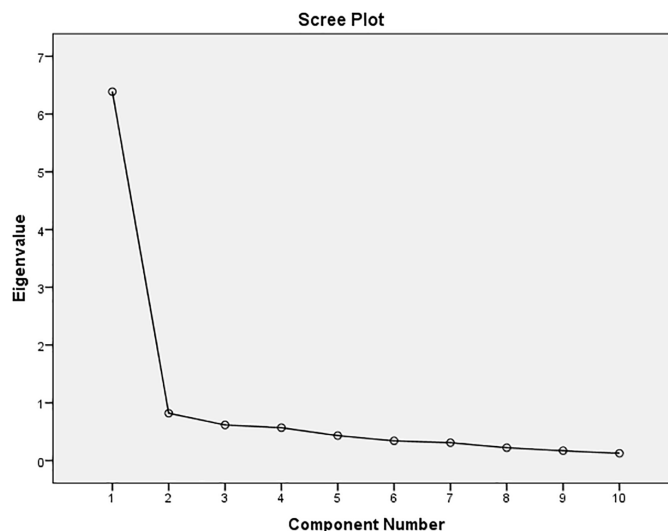


Figure 1: Factor analysis scree plot

Table 2: Kaiser-Meyer-Olkin (KMO) and Bartlett’s Test

Approx. Chi-Square	314.99
Sig.	0.000

Caregivers of patients with higher scores in the Motricity Index and, consequently, a higher body function tolerated less burden. The amount of burden of caregivers who reported sleep disturbance or reduced relationships with other family members was higher (Tables 3, 4).

The correlation coefficient in all tests was statistically significant ( $P < 0.05$ ), and thus, all assumptions about the construct validity of this scale were true.

*Test-retest Reliability*

Based on the statistical analysis, the test-retest reliability of the questionnaire was 0.93.

*Cronbach’s Alpha*

The Cronbach’s Alpha coefficient was 0.931 for 10

items of the Burden Scale for Family Caregivers. Based on Table 5, the Cronbach’s alpha value was lower than the total Cronbach’s alpha value in case of removal of any item.

**Discussion**

The current study purposed to evaluate the construct validity, internal consistency, test-retest reliability, and factorial structure of the Persian version of the BSFC-s questionnaire. All hypotheses were approved from the assumptions examined. Therefore, it can be assumed that the Persian version of this questionnaire has a proper structure and validity for assessing the caregiver burden of families of stroke patients. Our research has shown

Table 3: Correlations between tests

		BI	MI	BDI
Spearman’s rho	Correlation Coefficient	-0.61	-0.45	0.68
BSFC-s	Sig	0.000	0.001	0.000

BSFC-s: Burden Scale for Family Caregivers-short; BI: Barthel Index; MI: Motricity Index; BDI: Beck Depression Inventory

Table 4: Correlation by Eta

Variable	Correlation	P value
Sleep disturbance	0.38	0.006
Decreased relationship	0.26	0.059

Table 5: Item-Total Statistics

	Scale Mean if Item Deleted	Cronbach’s Alpha if Item Deleted
Q1	22.74	0.919
Q2	22.74	0.923
Q3	22.62	0.919
Q4	22.72	0.923
Q5	22.62	0.925
Q6	22.70	0.918
Q7	22.76	0.915
Q8	22.70	0.926
Q9	22.74	0.920
Q10	22.82	0.918

Q: Question

that this tool can effectively measure the caregiver burden for informal caregivers of stroke patients. This tool has just 10 items, so it is an economic instrument [31] for measuring burden levels.

Feasibility is related to the average time needed to complete the questionnaire, the extent of effort, burden, and the ratio of unanswered questions-to-answered questions. BSFC-s has few items; therefore, it can be considered a feasible questionnaire [32].

Test-retest reliability can be an important factor in evaluating patient-reported outcome measures [33], such as BSFC-s. The current research was the first to measure the test-retest reliability of the BSFC-short version, and the results revealed its good test-retest reliability.

Cronbach's alpha coefficient for BSFC-s was 0.93. It can be concluded that the Persian version of the BSFC-s questionnaire has a good level of internal consistency. Cronbach's alpha coefficient was 0.93 in a study the developers conducted on patients with dementia in Germany [31]. In a 2018 study by Pendergrass et al. on outpatient caregivers of elderly people, the test showed an internal consistency of 0.92 [18]. The high Cronbach's alpha coefficient in this study and similar values in other studies can be indicators of the items' homogeneity across different cultures.

Regarding the high Cronbach's alpha coefficient, it can be said that the Persian version has been able to maintain the alignment of previous studies, because the questionnaire items are easy for therapists and caregivers alike to understand. Furthermore, the questionnaire consists of 10 items that have the highest discriminatory power among the 28 main items, which can increase internal consistency.

Construct validity implies that the results obtained from the test are compatible with the theory that the test has been designed based on them. As regards construct validity, the results of this study's hypotheses were acceptable. The developers assessed the questionnaire's construct validity by some hypotheses, such as the questionnaire's correlation with the Nurses' Observation Scale for Geriatric Patients (NOSGER) scale, the Resource Utilization in Dementia – short version questionnaire, the Barthel Index questionnaire, and the correlation between BSFC-s and the number of interruptions to caregivers' sleep during the night by eta correlation. BSFC-s showed a correlation with those hypotheses, and the results were statistically significant [31].

In 2018, Pendergrass et al. assessed the construct validity of the BSFC-s questionnaire by measuring the correlation of the scores obtained on the Caregiver Strain Index, Care-related Quality of Life instrument, Depression Module of the Patient Health Questionnaire, and Giessen Subjective Complaints List (short form). This research was conducted on elderly people in need of care. All the results showed good construct validity [32].

Interestingly, among the factors considered in assessing the construct validity of the questionnaire, factors such as the severity of caregiver depression, which is related to the characteristics of the caregiver, showed a higher correlation with the questionnaire than factors such as MI score, which are related to severity of the disease.

The current study had some limitations. The results may not be conclusive because of the sampling of people who came to the rehabilitation centers and hospitals. Families of patients who were less likely to visit hospitals and rehabilitation centers may have different characteristics.

Burden is a universal phenomenon felt by many caregivers of rehabilitation clients. Assessing and addressing this phenomenon paves the way for enhancing holistic approaches in rehabilitation. The questionnaire used in this study was considered for its economic advantages and feasibility. In other words, with ten items, it can assess the burden of the caregivers well and efficiently, making it a great choice for the rapid assessment of caregivers in clinics.

## Conclusion

This article demonstrates that speculations related to the validity and reliability of BSFC-s are true. According to the study, it seems that BSFC-s is a valid, reliable tool for assessing burden among Persian-speaking stroke families.

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**Conflict of Interest:** None declared.

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