

The psychometric properties of the Turkish Stroke and Aphasia Quality Of Life Scale-39

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The Stroke and Aphasia Quality Of Life Scale (SAQOL-39) is a widely used instrument in assessing the quality of life in aphasic patients. Our purpose was to translate the SAQOL-39 into the Turkish language (SAQOL-39/TR) and assess its reliability and validity in patients who had aphasia. SAQOL-39/TR was obtained using the 'translation-backward translation' method and administered to 40 patients with aphasia. The reliability studies were performed by means of internal consistency and test-retest reliability. The validation studies were carried out by means of construct validity using within-scale analyses and analyses against the external criteria. Correlation analysis was performed between scales and the Ege Aphasia Test, the Barthel index, the 12-item General Health Questionnaire and the Brunnstrom recovery stages (BRS) of the arm, hand, and lower extremity. In the results, the scores of the SAQOL-39 were not different between groups. Cronbach's α variables were good for all domains (0.80, 0.88, 0.89, 0.82, and 0.83). Test-retest reliability was also high (0.96, 0.97, 0.91, 0.70, and 0.96). There were significant correlations with coefficients ranging from 0.36 to 0.60 among the domains of scale and other measures.

Introduction

Communication disorders are among the most common problems arising after stroke, with a reported prevalence ranging from 33 to 52% (Wade *et al.*, 1986; Engelter *et al.*, 2006). 'Aphasia', the prototype of the communication disorders, varies in terms of severity and predominant symptoms resulting in depression, social isolation, and deterioration in the quality of life. Health-related quality of life (HRQOL) is a particularly significant issue in these patients because the relationship between cost and value raises complex problems owing to enormous personal and societal impact from stroke. Recently, there has been a growing field of research concerned with developing, evaluating, and applying quality-of-life measures within health-related research in aphasic patients. Thereby, validated HRQOL questionnaires can become an integral part of clinical trials in determining the value of the rehabilitation program.

Although several questionnaires have been designed and developed for these purposes over the past decade, most of them have proved to be reliable and valid for assessing HRQOL in patients with stroke who had no aphasia

Moderate-high correlations were also seen with BRS-arm, BRS-hand, and BRS-lower extremity (r , 0.27–0.58). It was found that all domains were highly related with all domains of Ege aphasia test, except praxia ($P < 0.001$). This study showed that the SAQOL-39/TR has acceptable validity and reliability in assessing the quality of life. However, similar results of the scale in patients with dysarthria suggest that the SAQOL-39 may not be specific to only aphasic patients. *International Journal of Rehabilitation Research* 39:140–144 Copyright © 2016 Wolters Kluwer Health, Inc. All rights reserved.

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(Duncan *et al.*, 1999; Williams *et al.*, 1999; Engelter *et al.*, 2006). However, considering the fact that high-level depression and social isolation with impaired HRQOL are more severe in patients with aphasia, the need of an instrument in patients who had aphasia can obviously be addressed. Hilari *et al.* (2003) adapted the Stroke-Specific Quality of Life Scale for use in people with aphasia, producing the Stroke and Aphasia Quality Of Life Scale (SAQOL). The authors then reported the results from the psychometric evaluation of the initial 53-item SAQOL and the item-reduced SAQOL-39 (Hilari *et al.*, 2009). Subsequent studies have also validated its translated versions in populations with different sociocultural status in many countries (Posteraro *et al.*, 2004; Kartsona and Hilari, 2007; Lata-Caneda *et al.*, 2009; Kamiya *et al.*, 2015; Mitra and Krishnan, 2015; Raju and Krishnan, 2015).

Because the psychometric properties of a questionnaire can vary across cultures, and the development of a new instrument is a time-consuming process, we believe that translated scales can serve as important complementary tools. Therefore, this study was carried out to meet the

need for an instrument for the assessment of HRQOL in Turkish aphasic patients. The main objectives were to assess the psychometric properties of the SAQOL-39 in Turkish stroke survivors who had aphasia, and to evaluate whether it was compatible in the sociocultural context of Turkey.

Materials and methods

Turkish adaptation of SAQOL-39

The SAQOL-39 includes 39 items related to four domains – physical, psychosocial, communication, and energy – evaluated over the previous past week. The physical domain contains 17 items related to self-care, mobility, work, upper-extremity functions, and impact of physical condition on social life. In the psychosocial domain, 11 questions assess thought, personality, mood, family, and social life. The communication domain consists of seven items that assess language function and impact of language difficulties on family and social life. The energy domain contains four items. Each item is graded from 1 ('could not do it at all' or 'definitely yes') to 5 ('no trouble at all' or 'definitely no') on a Likert scale. Scores for each domain as well as a 'total score' can be calculated by summing the items and then dividing by the number of items, with high scores indicating better HRQOL.

Translation of the SAQOL-39 into Turkish was carried out in three steps by the forward and backward procedure (Beaton *et al.*, 2000). First, two Turkish bilingual volunteers who were fluent in the English language translated the original questionnaire. They met as a group to review the translations and to make cultural and vocabulary adaptations. In the second step, two independent bilingual volunteers back-translated the reviewed version of the questionnaire into English. Language discrepancies between the back-translated SAQOL-39 and the original SAQOL-39 were discussed by all translators and a pre-final version of the questionnaire was produced. In the pilot testing, 10 individuals with good health and 10 patients with aphasia completed this version of the SAQOL-39 to make a final adaptation. Compared with the English language, the verb is never expressed solely in Turkish, because all verbs have a suffix that determines the subject. Further, the verbs are placed at the end of the sentence. The question format was altered on the basis of these differences to reflect the peculiarities of the language in the translation and adaptation. In the original SAQOL-39, some questions start with 'How much trouble did you have' and the items then continue with activities like 'preparing food'. Instead, we changed this format to 'when you prepare food how much trouble did you have' to convey the correct meaning.

Subjects

Forty outpatients over 18 years of age with long-term aphasia resulting from stroke of at least 1-year duration

were screened in the study. The control group consisted of 22 patients with dysarthria over 18 years of age. The exclusion criteria were as follows: a history of severe cognitive decline or mental health problems before the current stroke, and the presence of other diseases affecting the quality of life (e.g. cancer, moderate to severe chronic renal insufficiency, chronic respiratory diseases, cardiovascular diseases including uncontrolled hypertension, diabetes). All participants were native speakers of Turkish.

Study design and statistics

The study protocol was approved by the local Ethical Review Boards.

After all the patients or their caregivers had given their informed consent for the study, baseline sociocultural characteristics (including age, sex, education level, marriage, profession, and disease duration) were recorded.

The scores of all scales were in the form of quantitative data. All answers were checked and evaluated for missing responses and multiple responses before the statistical analyses.

The reliability studies were performed on the basis of internal consistency and test–retest reliability. Internal consistency expressed by the coefficient alpha (α) or Cronbach's coefficient (Chronback, 1951) was used for each domain of the questionnaire, and if the Cronbach coefficient was greater than 0.7 it was considered an acceptable internal consistency (Shout and Fleiss, 1979; DeVellis, 1991). For the test–retest reliability, the SAQOL-39/TR was administered by 20 patients within a 7–10 day interval. The second administration was carried out by the same therapist at the same place without any therapy.

The validation studies were based on the initial administration of the scales by construct validity using within-scale analyses and analyses against the external criteria (Nunnally and Bernstein, 1994). For the within-scale analyses, data were assessed on the basis of evidence of good internal consistency. In the analysis against external criteria, the ability of a scale to differentiate known groups was assessed by comparing the mean test scores of aphasic patients and dysarthric patients by using the independent *t*-test. In this step, convergent validity was also assessed by the correlation studies used between scales and the clinical measures described below.

Aphasia was evaluated by the Ege Aphasia Test (EAT) (Calis *et al.*, 2013). It was developed to measure all aspects of language abilities, including praxia, spontaneous language, auditory and verbal comprehension, repetition, naming, reading, writing, and calculating for Turkish patients. Scores for each subtest can be calculated by summing up the items, with a score ranging from 0 to 100, where 100 indicates the highest degree of

impairment and 0 the lowest degree of impairment in communication skills. In the evaluation of the patients' daily functioning, specifically daily activities and mobility, the Barthel index was used (Mahoney and Barthel, 1965). The scores for each of the items were summed to create a total score. The 12-item General Health Questionnaire (GHQ-12) was also applied to all patients to measure psychological distress (Goldberg, 1972). It is an unidimensional scale and composed of 12 questions related to anxiety, depression, social dysfunction, and loss of confidence. Each item is rated on a four-point scale (less than usual, no more than usual, rather more than usual, or much more than usual) as per the Likert scoring system (0–1–2–3). The total score is 36, based on the selected scoring methods (Goldberg, 1972). The Turkish translation of the GHQ-12 has also been shown to be valid and reliable (Kilic *et al.*, 1997).

Furthermore, the Brunnstrom recovery stage (BRS) was used to assess motor recovery. BRS of the arm, hand, and lower extremity was separately classified into six levels (Wade *et al.*, 1986; Williams *et al.*, 1999).

Correlation analyses were performed using Pearson's rank correlation coefficients. SPSS 15.0 (SPSS Inc., Chicago, Illinois, USA) for Windows was used for data management and statistical analyses.

Table 1 The patients' demographic and clinical characteristics

	Patients with aphasia (n = 40)	Patients with dysarthria (n = 22)	P
Age (years) (mean ± SD)	55.5 ± 12.8	57.9 ± 11.8	NS
Sex [n (%)]			
Female	13 (32.5)	7 (31.8)	NS
Male	27 (67.5)	15 (68.2)	
Education level [n (%)]			
Low	20 (50.0)	10 (45.5)	NS
Mid	8 (20.0)	6 (27.3)	
High	12 (30.0)	6 (27.3)	
Marital status [n (%)]			
Married	33 (82.5)	17 (77.3)	NS
Single	1 (2.5)	–	
Divorced or widowed	6 (15.0)	5 (22.7)	
Time since stroke (months) (mean ± SD)	21.8 ± 15.2	25.3 ± 17.3	NS
Stroke type [n (%)]			
Ischemic	27 (67.5)		
Hemorrhagic	13 (32.5)		
Aphasia type [n (%)]			
Broca's	23 (57.5)		
Anomic	9 (22.5)		
Transcortical mixed	2 (5.0)		
Transcortical motor	5 (12.5)		
Conduction	1 (2.5)		
SAQOL-39/TR			
Physical	2.8 ± 1.1	3.0 ± 1.0	NS
Psychosocial	2.9 ± 1.1	2.9 ± 1.1	NS
Communication	3.0 ± 1.0	3.3 ± 1.0	NS
Energy	3.5 ± 0.7	3.3 ± 0.6	NS
Total score	2.9 ± 0.9	3.1 ± 0.9	NS

NS, nonsignificant, SAQOL-39/TR, Stroke and Aphasia Quality Of Life Scale.

Results

Table 1 shows the demographic and clinical characteristics of the patients. There was no significant difference between the two groups with regard to demographic characteristics. The total score of the SAQOL-39/TR and the results of the four domains were also not different between groups.

The results of reliability analyses are presented in Table 2. Cronbach's α variables were good for all domains, with values higher than 0.80 (0.80, 0.88, 0.89, 0.82, and 0.83 for physical, psychosocial, communication, energy, and total score, respectively). The test–retest reliability was high for physical, psychosocial, communication, and total score (0.96, 0.97, 0.91, and 0.96, respectively). Intraclass correlation coefficient value was also acceptable for the energy domain (0.70).

The results of the correlation analysis are shown in Tables 3 and 4. There were significant correlations from moderate to high, with coefficients ranging from 0.36 to 0.60 among the domains of scale and other measures (the Barthel index and the GHQ-12). Similarly, moderate–high correlations were seen between the domains of scale and BRS-arm, BRS-hand, and BRS-lower extremity ($r=0.27$ – 0.58). When correlation analyses were performed between the domains and EAT, it was found that all domains were highly related with all domains of EAT, except praxia ($P<0.001$). Praxia was the only one correlated with energy domain ($r=-0.36$).

No substantial correlations were found between demographic parameters and scale scores.

Discussion

This is the first study that has reported the psychometric properties of the SAQOL-39 in Turkish patients with aphasia. The result showed that the SAQOL-39 has acceptable validity and reliability in assessing the HRQOL.

Quality-of-life measures have gained increasing attention as clinically relevant patient-centered endpoints in stroke patients in order to improve the quality of care and optimize resource allocation. Considering the substantial effects of aphasia on the HRQOL in these patients, quality of life cannot be measured successfully in aphasia

Table 2 Internal consistency and test–retest reliability of the SAQOL-39/TR

Test domains	ICC ^a	Cronbach's α ^b
Physical	0.96	0.80
Psychosocial	0.97	0.88
Communication	0.91	0.89
Energy	0.70	0.82
Total score	0.96	0.83

SAQOL-39/TR, Stroke and Aphasia Quality Of Life Scale.

^aIntraclass correlation coefficient between scores of visit 1 and visit 2.

^bInternal consistency.

Table 3 Correlation analyses between the results of the SAQOL-39/TR and other clinical measurements

	SAQOL-39/TR domains				
	Physical	Psychosocial	Communication	Energy	Total score
Barthel index	0.54**	0.35*	0.36*	0.40**	0.50**
GSC-12	-0.60**	-0.34*	-0.49**	-0.47**	-0.54**
BRS-arm	0.49**	0.58**	0.50**	0.37*	0.56**
BRS-hand	0.35*	0.37*	0.32*	0.27	0.37*
BRS-lower extremity	0.43**	0.49**	0.40*	0.31*	0.47**

BRS, Brunnstrom recovery stage; SAQOL-39/TR, Stroke and Aphasia Quality Of Life Scale.

**P* < 0.05.

***P* < 0.01.

patients. Thus, disease-specific scales for aphasia have gained importance worldwide (Duncan *et al.*, 1999; Williams *et al.*, 1999; Buck *et al.*, 2004). The SAQOL-39 is one of the most widely used and accepted instruments for this purpose. Therefore, we aimed to assess its psychometric properties in Turkish patients with aphasia. Thus, an attempt has been made to meet the need for an instrument to assess HRQOL in our patients. This issue is extremely important as aphasia rehabilitation is a developing area in Turkey. Until recently, one of the greatest difficulties faced by physicians and therapists dealing with aphasic patients was the absence of an assessment tool standardized for the Turkish language, creating a series of difficulties in the diagnosis and treatment of aphasia syndromes. The EAT was developed to handle these difficulties with acceptable validity and reliability (Calis *et al.*, 2013). For this reason, we used the EAT to assess validity by applying correlation analyses to demonstrate whether the SAQOL-39 was correlated with measures of similar construct. Whereas the Boston Diagnostic Aphasia Examination was used to validate the Spanish version of the scale (Lata-Caneda *et al.*, 2009), the Standard Language Test of Aphasia, which was the standardized test battery for their country, was used to screen aphasia in the Japanese adaptation of the scale (Kamiya *et al.*, 2015). This result showed that the aphasia battery may be different from those used by Hilari *et al.* (2009) in different countries. Finally,

construct validity was highly satisfactory and was nearly identical for all domains in our study. There were also strong correlations between the SAQOL-39/TR and other clinical measurements, in accordance with previous data (Hilari *et al.*, 2009). As expected, the same strong correlations were also seen between the scale scores and the examination findings, including BRS-arm, BRS-hand, and BRS-lower extremity.

Another way of measuring the construct validity is the analysis against external criteria such as known group differences (Nunnally and Bernstein, 1994). To show the ability of the scale to differentiate known groups, the scores were compared between aphasic and dysarthric patients. However, we could not find any difference regarding the scale results. Hilari *et al.* (2009) reported known group differences in two ways: the severity of stroke based on the National Institute for Health Stroke Scale scores and the level of HRQOL on visual analog scale scores. They found better HRQOL in people with less severe stroke as expected. However, stroke survivors may have other forms of communication impairments, such as dysarthria and apraxia of speech. In this respect, our study is the first in which the SAQOL-39/TR is studied in patients with language problems rather than aphasia. According to our results, it can be suggested that the SAQOL-39/TR has failed to differentiate the other stroke survivors with language impairments other than aphasia. However, this result should be confirmed by other studies on several populations.

The results of reliability analysis in terms of internal consistency were satisfactory as Cronbach's coefficient was greater than 0.7 for each scale as recommended (Cronbach, 1951; DeVellis, 1991). In addition, test-retest reliability results were similar to this, indicating that the scale has high reliability. The somewhat lower intraclass correlation coefficient values of energy domain may be due to the lower numbers of items in this domain. This result was similar to previous validation studies of the SAQOL-39 (Posteraro *et al.*, 2004; Lata-Caneda *et al.*, 2009; Kamiya *et al.*, 2015; Raju and Krishnan, 2015).

Table 4 Correlation analyses between the results of the SAQOL-39 and the Ege Aphasia Test

Ege Aphasia Test	SAQOL-39 domains				
	Physical	Psychosocial	Communication	Energy	Total score
Praxia	-0.35*	-0.16	-0.15	-0.36**	-0.28
Auditory and verbal comprehension	-0.43**	-0.48**	-0.41**	-0.15	-0.48**
Repetition	-0.43**	-0.40**	-0.51**	-0.31*	-0.47**
Naming	-0.67**	-0.61**	-0.61**	-0.58**	-0.67**
Reading	-0.67**	-0.58**	-0.61**	-0.57**	-0.68**
Writing	-0.66**	-0.61**	-0.58**	-0.50**	-0.67**
Calculating	-0.48**	-0.54**	-0.60**	-0.54**	-0.54**

SAQOL-39, Stroke and Aphasia Quality Of Life Scale.

**P* < 0.05.

***P* < 0.01.

At the same time, the possible effects of the demographic variables on the scale were examined because it is important to understand the factors that contribute to HRQOL. However, none of these had any effect in our study. This may be because of the small number of patients with long-term aphasia in our study.

Our study has several limitations. First, it is debatable whether our sample size is adequate to generate meaningful estimates of reliability and validity. However, there is a lack of consensus on the most appropriate sample size needed for psychometric evaluations. In previous data, it has been reported that reliability and validity testing consists of numerous analyses, which are heterogeneous in nature, each of which produces a piece of unique statistical evidence (Hobart *et al.*, 2012). For this reason, the sample size recommendations are based on judgments from authors' experiences in the articles rather than on statistical evidence. Although some authors suggest that samples should exceed 300 (Ware *et al.*, 1997), others posit that much smaller samples – as few as 30 patients (Rea and Parker, 1992) – may suffice. Indeed, some of the previous validity and reliability studies of the SAQOL-39 were conducted on small samples (Lata-Caneda *et al.*, 2009). Therefore, it seems that we had a sufficient sample size in our study. Second, because there was no comparison of the results according to aphasia type, we cannot conclude that aphasia type had any impact on the scale results. However, the determination of this was made difficult because of our relatively small sample size. We recommend further analyses of the SAQOL-39/TR in other samples in order to generalize the findings.

In summary, this study showed satisfactory psychometric properties of the SAQOL-39/TR in Turkish patients with aphasia. It is a potentially useful measure for patients and clinicians, and it meets the needs and criteria of a scale to understand the influence of aphasia on daily life. Although high correlations between the SAQOL-39/TR and other clinical parameters support its construct validity, similar results of the scale in patients with dysarthria suggest that it may not be specific to only aphasic patients. Nevertheless, these results have to be confirmed by other studies.

The SAQOL-39/TR is available upon request from Dr Funda Atamaz Calis, Ege University Medical Faculty, Department of Physical Medicine and Rehabilitation, Bornova, Izmir, Turkey (e-mail: atamaz_02@yahoo.com).

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Conflicts of interest

There are no conflicts of interest.

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