Original Article
DOI: 10.5152/tftrd.2015.80090
Turk J Phys Med Rehab 2015;61:148-54

Determining Quality of Life and Associated Factors in Patients with Stroke

Serda EM[1], Mehtap BOZKURT[1], Mehmet KARAKOÇ[1], Mehmet ÇAĞLAYAN[1], Dicle AKDENİZ[1], Pelin OKTAYOĞLU[1], Sefer VAROL[2], Kemal NAS[1]

[1]*Department of Physical Medicine and Rehabilitation, Dicle University Faculty of Medicine, Diyarbakır, Turkey*
[2]*Department of Neurology, Dicle University Faculty of Medicine, Diyarbakır, Turkey*

Abstract

Objective: This study aims to examine the overall and domain-specific quality of life in patients with stroke and to identify variables predicting quality of life after stroke.
Material and Methods: A total of 104 patients with sufficient cognitive functions having hemiplegia because of cerebrovascular accident and 108 controls were included in this study. Demographic and clinical features were recorded. The Barthel Index (BI) and Functional Ambulation Category scale were employed to assess the functional state of patients. Quality of life was evaluated by the Short Form 36 (SF-36) health survey, whereas the emotional state of the patients was evaluated by the Hospital Anxiety and Depression Scale (HADS). Functional status, motor impairment, and emotional state were determined as independent variables, and multiple regression analysis was used to predict quality of life.
Results: Patients had significantly lower scores in the quality of life subscores and total scores in comparison with the controls ($p<0.001$). The mean anxiety and depression rates in the patients were significantly higher than those in controls ($p<0.001$). The sum of subscores and physical composite score of SF-36 were significantly lower in female and illiterate patients than in male and educated patients. Multiple regression analyses indicated that HADS depression was associated with mental health ($p<0.001$), whereas BI was independently associated with the physical health total score ($p<0.05$). The power of the statistical analysis for study population was 100% according to the given effect size ($\alpha=0.01$).
Conclusion: Present results demonstrated that patients with stroke have a significantly poor quality of life than the general population. The reduced quality of life after stroke appears to be related the emotional state, physical disability, and demographic properties such as gender and education. Therefore, prevention of disability and early diagnosis and treatment of depression are vital in improving the quality of life of patients with stroke.
Keywords: Stroke, quality of life, anxiety, depression, disability

Introduction

Stroke is a disorder characterized by focal neurologic deficit (1). It has influences on the quality of life (QOL) of patients because of its associated physical and cognitive sequela, such as limitations in mobility and physical functioning, and depression (2,3). Although it causes major significant functional sequela, objective assessment approaches often fail to evaluate the subjective impact of these impairments (4).

Health-related QOL (HRQOL) usually reflects the patients' subjective and personal evaluation of their own health status (5). Therefore, HRQOL refers to the difference between idealized functions and the functions that emerged because of the disease (6). Increasing HRQOL of patients has become the current medical target because it is the most important evaluation criteria before, during, and after the implementation of the rehabilitation program (7). Many studies have evaluated HRQOL

Address for Correspondence: Serda Em, MD, Dicle Üniversitesi Tıp Fakültesi, Fiziksel Tıp ve Rehabilitasyon Anabilim Dalı, Diyarbakır, Türkiye.
Phone: +90 412 248 80 30 E-mail: serdaem@hotmail.com

Received: April 2014 Accepted: August 2014

Cite this article as:
Em S, Bozkurt M, Karakoç M, Çağlayan M, Akdeniz D, Oktayoğlu P, Varol S, Nas K. Determining of Life Quality and Associated Factors in Stroke Patients. Turk J Phys Med Rehab 2015;61:148-54.

of patients with stroke and have also investigated the factors affecting HRQOL (2,8-11). Some of them have reported disruption in HRQOL (8-10,12), whereas others have not reported significant changes in HRQOL (2,13).

Emotional alterations are often observed after stroke (14,15) that are generally associated with reduced QOL in stroke survivors (10,16-18). Earlier studies have also indicated that the functional status and depression are significant predictors of HRQOL (3,19).

The previous studies largely consider limited factors to evaluate the relationship between QOL and stroke with controversial outcomes (2,8-10,12,13). For example, there are a limited number of studies investigating the effect of emotional status, functional health, and demographic properties on the QOL of patients with stroke (2,8-11). On the basis of previous reports of impairments in life quality of patients with stroke, we speculate that a variety of factors, such as sociodemographic, functional state, disability level, and emotional state, would have a significant influence on HRQOL of patients with stroke. This study aims to assess the QOL of patients with stroke and identify a relatively larger number of factors affecting the QOL of patients. This may provide a broader perspective in evaluating these patients and also guide to improve their QOL and rehabilitation process.

Material and Methods

Study Group

A total of 104 patients (60 males and 44 females) with hemiplegia who were either admitted to the Neurology and our outpatient clinic or stayed in our in-patient rehabilitation clinic between January 2014 and March 2014 and 108 healthy controls were included in this cross-sectional study. The patient group comprised patients with sufficient cognitive functions and physical disabilities who had a stroke for at least 4 weeks, and all patients have received rehabilitation in the same unit and at similar times. The control group was randomly selected from subjects with no physical or psychological disease-causing disability who are age and gender matched with patients. Exclusion criteria included extracerebral or subarachnoid hemorrhage or transient ischemic attack, brain tumor or other accompanying severe diseases, mental disease or loss of consciousness, language disorder, a lack of comprehension ability (motor–sensory aphasia), and with treatment for emotional disorder.

The individual rehabilitation physician managing the patient conducted the screening of patients for this study. Demographic information gathered from the patients included age, gender, educational state, income, and marital status. The patients were classified in terms of their incomes: those with income of <1000 TL salary per month were classified as low and those with income of >1000 TL salary per month were classified as high. Stroke time, laterization of stroke, and type of stroke, such as ischemic (thrombotic, embolic) and hemorrhagic (hypertensive intracerebral), were recorded.

The study was approved by the Ethics Committee of the Faculty, and it was conducted in accordance with the Declaration of Helsinki and the French Good Clinical Practices. Prior to the initiation of this study, the patients and controls provided their informed consent for the study in the written form after obtaining the required information regarding the study.

Measurements

The cognitive function of patients was assessed by the Mini Mental State Evaluation, disability level of patients was evaluated by the Barthel Index (BI), and their ambulatory capacity was evaluated by Functional Ambulation Category (FAC). Motor state was assessed in the upper and lower extremity using the Brunnstrom motor evaluation scale. Spasticity was evaluated using the Ashworth scale. The Short Form 36 Health Survey (SF-36) was used to determine the QOL of patients and controls, whereas their emotional state was assessed by the Hospital Anxiety and Depression Scale (HADS).

Mini Mental State Evaluation

Mini Mental State Evaluation is a measurement that is frequently used to evaluate cognitive function and is a reliable and validated method (20,21). It has a cut-off score of 24 for cognitive dysfunction (20).

Barthel Index

Barthel Index is used to measure the disability experienced by the patient in performing activities of daily living. The BI comprises 10 items regarding activities of daily living and mobility and assesses feeding, transfer from wheelchair to bed and back, self-care, bathing, walking, climbing stairs, dressing, and bladder and bowel continence. Scoring is based on whether the patient requires help or not in performing any of the above mentioned activities where scores between 21–61 mean severely dependent; between 62–90 mean moderately dependent; between 91–99 mean mildly dependent; and 100 means completely independent (22). The Turkish validity and reliability of this scale was verified by Küçükdeveci et al. (23).

Functional Ambulation Category

The FAC is a scale that measures the ambulation ability of the patient. It comprises six categories ranging from 0 to 5, where 0 means non-functional ambulation and 5 means independent ambulation (24).

Brunnstrom Motor Evaluation Scale

Brunnstrom scale is a measurement that is used to assess the recovery in motor functions. The lowest stage (flaccid stage and no voluntary movement) is stage I, and the highest stage (isolated joint movement) is stage VI. Validity and reliability have been previously demonstrated (25).

Ashworth Scale

Spasticity was measured using the following 5-point Ashworth scale: 0 is no increase in muscle tone; 1 is slight increase in muscle tone that is demonstrated by a catch at the end range of motion (ROM); 2 is the noticeable increase in muscle tone through most ROM, such that the affected limb is easily movable; 3 is the considerable increase in muscle tone but difficult passive movement of the affected limb; and 4 is the rigid affected limb (26).

Short Form-36 Health Survey

The SF-36 is a generic, subjective measure of HRQOL. It allows assessment across eight health domains: physical functioning (PF), role limitations due to physical problems (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role limitations due to emotional problems (RE), and mental health (MH). The scores of these eight domains can also be summated in two major categories: physical composite score (PCS) and mental composite score (MCS) to reflect the overall physical and mental health, respectively. Scores of 100 for PF, RP, BP, SF, and RE domains and scores of 50 in the remaining three domains, GH, VT, and MH, indicate an absence of problems in those areas. For example, a score of 100 in physical functioning indicates an ability to perform all activities without limitations due to health; a score of 50 in mental health indicates an ability to function without personal or emotional problems. To obtain scores. The score of 50 for GH, VT, and MH, health must be positively evaluated. For example, a score of 100 in the mental health domain indicates that the respondent feels peaceful and happy and is calm all the time. The Turkish version of this scale was verified in terms of its validity and reliability by Koçyiğit et al. (27). The SF-36 has been validated for use among people with stroke and is considered suitable through a face-to-face interview (13).

Hospital Anxiety and Depression Scale

The HADS is a simple and reliable test that is used in medical practice. Its Turkish version has been demonstrated to be valid and reliable (28). It comprises 14 questions, half of which constitutes the anxiety subscale, whereas the other half constitutes the depression subscale. Response options include "not at all," "occasionally," "quite often," and "very often," which is scored from 0 to 3. Items of the depression and anxiety subscales are scored between 0–21, where 0–7 indicates normal, 8–10 indicates mild, 11–14 indicates moderate, and 15–21 indicates severe mood disorders (29).

Statistical Analysis

The calculations were performed using the Statistical Package for Social Sciences software version 16.0 (IBM SPSS Inc., Chicago, IL, USA) for Windows. Measurement variables were expressed in mean±standard deviation, whereas categorical

Table 1. Sociodemographic characteristic of patients and controls

	Patients n=104	Controls n=108	p
Mean age±SD (year)	57.40±12.50	56.03±10.81	0.87
Gender, n (%)			0.24
Male	60 (57.7)	50 (46.3)	
Female	44 (42.3)	48 (53.7)	
Marital status, n (%)			0.67
Married	98 (94.2)	96 (88.9)	
Single	6 (5.8)	12 (11.1)	
Education year, n (%)			0.973
Illiterate	68 (65.4)	71 (65.7)	
Primary school	20 (19.2)	22 (20.4)	
High school	12 (11.5)	12 (11.1)	
University	4 (3.9)	3 (2.8)	
Income status n (%)			0.75
Higher income	22 (21.1)	36 (33.3)	
Lower income	82 (78.9)	72 (66.7)	

SD: standard deviation

Table 2. Characteristics of patients related to hemiplegia

Characteristics	
Disease duration (month)	16.86±12.23
Mean±SD	
Nature of lesion n (%)	
Infarct	76 (73)
Hemorrhage	28 (27)
Side of lesion (%)	
Right	60 (57.7)
Left	40 (38.5)
Bilateral	4 (3.5)
Barthel Index Score mean±SD	50.96±27.31
FAC median	1.00
Min	0.00
Max	5.00

FAC: Functional Ambulation Category; SD: standard deviation

Table 3. Quality of life and emotional state of patients with stroke and the controls

	Patients n=104	Controls n=108	p
PF	11.07±16.86	80.31±18.21	<0.001
RP	10.92±8.35	76.06±32.53	<0.001
BP	41.63±25.08	65.97±25.49	<0.001
GH	25.69±15.94	58.95±22.16	<0.001
VT	31.73±20.24	59.25±20.87	<0.001
SF	30.52±20.02	74.46±18.04	<0.001
RE	21.45±21.21	70.21±40.67	<0.001
MH	41.46±19.41	65.53±21.83	<0.001
PCS	25.00±5.74	47.45±8.61	<0.001
MCS	35.58±7.57	45.80±10.51	<0.001
HADS			
Anxiety	11.11±5.41	6.00±3.72	<0.001
Depression	11.19±5.16	6.82±4.26	<0.001

PF: Physical Functioning; RP: role limitations because of physical problems; BP: bodily pain; GH: general health; VT: vitality; SF: social functioning; RE: role limitations because of emotional problems; MH: mental health; PCS: Physical Component Summary; MCS: Mental Component Summary; HADS: Hospital Anxiety and Depression Scale. P<0.05 is statistically significant

Table 4. Comparison of the patients' quality of life according to some of demographics and clinical characteristic

	Gender		Education level		Income status	
	Female n=44	Male n=60	Illiterate n=68	Literate n=36	Lower n=22	Higher n=82
PF	43.5±18.2**	49.1±15.1	46.2±13.8**	64.8±29.7	51.9±23.7	54.0±24.8
RP	51.9±21.1	52.9±17.6	34.7±12.2	32.5±17.8	52.8±18.3	51.3±11.9
BP	48.6±18.2	55.3±23.3	34.3±11.9**	35.5±9.6	52.0±8.9	53.8±17.4
GH	47.0±15.7	56.5±11.6	33.9±14.7**	38.5±13.1	50.0±11.6	59.5±12.5
VT	44.0±20.7**	58.7±19.8	31.4±21.0*	57.2±24.4	50.9±12.5	57.0±23.6
SF	44.0±24.0**	58.6±12.5	31.9±8.0**	54.0±12.5	50.6±10.0	57.8±14.2
RE	56.3±10.0	49.7±14.2	36.1±11.7	22.5±5.0	51.0±25.5	56.6±7.7
MH	49.6±8.0	54.6±31.1	32.5±7.0*	49.0±14.2	50.8±23.6	57.1±12.5
PCS	46.0±12.3*	57.2±18.4	33.0±9.1***	45.5±13.8	52.3±14.2	53.0±25.5
MCS	49.2±13.8	54.8±19.2	32.2±14.2	51.2±23.2	50.6±12.5	57.8±23.8

PF: Physical Functioning; RP: role limitations because of physical problems; BP: bodily pain; GH: general health; VT: vitality; SF: social functioning; RE: role limitations because of emotional problems; MH: mental health; PCS: Physical Component Summary; MCS: Mental Component Summary; HADS: Hospital Anxiety and Depression Scale, *** p<0.001, ** p<0.01, *p<0.05

Table 5. Correlation between the SF-36 domains with age, emotional state, functional state and clinical parameters in patients with stroke

	Age	Stroke duration	HADS-A	HADS-D	Barthel	FAC upper	Brunnstrom lower	Brunnstrom upper	Ashworth lower	Ashworth
PF	-.007	-.050	-.499**	-.535**	.692**	.717**	.384**	.630**	-.119	-.364**
RP	.012	.085	-.502**	-.488**	-.005	.059	.033	.137	.104	-.028
BP	.014	.188	-.496**	-.575**	.456**	.402**	.212*	344**	.123	.005
GH	-.051	.097	-.671**	-.639**	.446**	.344*	.356**	275**	-.001	.091
VT	-.107	.082	-.663**	-.680**	.454**	.420**	.244*	.346**	-.011	-.02
SF	.058	.198	-.522**	-.534**	.543**	.578**	.430**	.570**	-.279**	-.294**
RE	-.109	.075	-.330**	-.398**	-.305*	-.159	.084	.207*	.057	.085
MH	.001	.062	-.687**	-.727**	.472**	.341*	.325**	.317**	-.066	.007
PCS	.005	.012	-.517**	-.528**	.612**	.602**	.253**	.591**	.009	-.152
MCS	-.058	.219	-.635**	-.693**	.366**	.314*	.292**	.285**	-.089	.034

PF: Physical Functioning; RP: role limitations because of physical problems; BP: bodily pain; GH: general health; VT: vitality; SF: social functioning; RE: role limitations because of emotional problems; MH: mental health; PCS: Physical Component Summary; MCS: Mental Component Summary; FAC: Functional Ambulation Category; HADS: Hospital Anxiety and Depression Scale.<0.05 is statistically significant. *Correlation is significant at the p<0.05, ** correlation is significant at the p<0.01, *** correlation is significant at the p<0.001

variables were presented in numbers and percentages (%). Kolmogorow–Smirnow test was used to analyze the compliance of datasets with the normal distribution. Student's t-test was used to compare the mean values of the group that displayed a normal distribution, and Mann–Whitney U test was used for the group that did not display a normal distribution. Varying frequencies among the categorical groups were evaluated by Chi-square test. Spearman's correlation test was for correlation analysis. Multiple regression analysis was used to predict the QOL. A enter method was used to construct the multiple regression analyze with respect to various dependent variables. Statistical significance was based on a value of p<0.05 with a 95% confidence interval.

Results

Sociodemographic characteristics of patients and controls are presented in Table 1. The mean age of patients with stroke was found to be 57.40±12.50, 57.7% patients were male, 94.2% were married, 65.4% were illiterate, and 78.9% had a low income. A significant difference was not found between the patients and controls in terms of age, gender, marital status, education, and income. The patients' clinical features are demonstrated in Table 2, and the patients' QOL and emotional state-related data are demonstrated in Table 3. The mean stroke time was found as 16.86±12.23 month (min= 3 month, max= 60 month). Infarct was the major type of stroke (73%).

The patients had disabilities with a mean BI score of 50.96±27.3. Total scores and sub-scores of SF-36 were sig-

Table 6. Multiple linear regression analyses in patients with stroke

	MCS			PCS		
Variables	**B**	**t**	**p**	**B**	**t**	**p**
HADS anxiety	-.392	-1.853	.067	.030	.351	.194
HADS depression	-.643	-8.48	<0.001	-.113	-1. 307	.194
Barthel	.105	1.299	.197	.577	7.141	<0.001
FAC	.099	1.260	.210	.173a	1.124	.264

MCS: Mental Component Summary; PCS: Physical Component Summary; HADS: Hospital Anxiety and Depression Scale; FAC: Functional Ambulation Category. MCS, PCS as dependent variable, HADS anxiety, HADS depression, Barthel and FAC as independent variables. p<0.001 statistically significant

nificantly lower (p<0.001) in patients. Patients with stroke had significantly higher levels of anxiety and depression than the control subjects. The relationship between demographic and clinical characteristics of patients and the SF-36 domains are demonstrated in Table 4. Patients were separated in two groups for stroke duration as acute–subacute (<6 months) and chronic stroke (>6 months). Furthermore, they were classified in terms of their incomes. It was found that there was no significant difference in the QOL in these groups (Table 4). Some sub- and total scores of SF-36 were significantly different in patients who were grouped with regard to their gender and education. A significant negative correlation was found between SF-36 sub- and total scores and emotional state scores, whereas a significant positive correlation was found between SF-36 sub- and total scores and BI scores (Table 5). The Brunnstrom scores of the lower and upper extremity and FAC were significantly correlated with PCS and MCS total scores of the SF-36 health survey. The multiple regression analyses indicated that BI was independently associated with PCS total score (R^2=0.33; p<0.001) and HADS depression score associated with MCS (R^2=0.414; p<0.001) (Table 6).

Discussion

In stroke rehabilitation, accurately constructed, valid, and reliable measures are required to categorize patients, to predict future conditions, and to evaluate patient outcomes or the effectiveness of interventions (30). The present study underlines the general health status of the patients with stroke. Furthermore, the study examines the emotional state of patients and identifies the factors affecting the QOL.

The HRQOL is a recognized and important outcome after stroke (19), and it is the most important evaluation criteria during the implementation of the rehabilitation program (31). Therefore, information gained from HRQOL are useful in recognizing the patients' problems, determining treatment priorities, managing interventions, monitoring disease period, and for health economics, and identifying new ideas and solutions to the revealed problems (7).

The present study demonstrates that all the parameters of the SF-36 scores of the patients have a significantly higher level of disruption compared with those of controls. These results are consistent with the results of previous studies (7,12,13,25,32-35), although they include a heterogeneous population and employ HRQOL with a wider variety of scales, including studies conducted on Turkish population. In contrast, a study reports a slight change in HRQOL of patients with stroke (8). This study has a rather older patient population (72±12) and half of them had a stroke history before. Therefore, this slight change may be associated with the fact that these patients have already limited social activities before stroke.

The other objective of this study was to observe whether there exists a relationship between HRQOL and the emotional state, physical state, and demographic characteristics of patients. Earlier studies have also indicated that the most significant predictors of HRQOL are functional status and depression (3,4,10,16-19,25,36), although a study demonstrated a more generalized adverse effect on HRQOL than functional disabilities (37), and some who have demonstrated disability alone explained little regarding the variance in the QOL (2,38). The results produced from the current study demonstrated that the anxiety and depression scores in patients were significantly higher compared with those in controls. The major finding of the present study is that the depressive moods of patients are independently associated with MCS in the multiple regression analysis. Moreover, disability as independent variables was found to affect the physical health of patients. The Barthel score was positively correlated with PCS and MCS, whereas HADS anxiety and depression were negatively correlated with these variables. Hence, this may suggest that patients should be more closely monitored, and they should be provided with psychological support.

There are studies indicating the association of motor recovery and the QOL (7,10). Ones et al. (7) revealed that upper extremity Brunnstrom scores of the patients were positively correlated with the Nottingham Health Profile scores, whereas lower extremity Brunnstrom scores were not correlated with the Nottingham Health Profile scores. Nevertheless, we have found that the lower extremity and ambulation function are associated with the QOL as much as the upper extremity. Moreover, this study demonstrated that patients with severe disability had lower SF-36 scores and higher HADS scores compared with patients with mild–moderate disability. The difference in the population and diversity in methodologies employed in Ones et al. (7) study may be the cause of the controversial results.

The results of this study indicated that there was no significant relationship between the level of spasticity and HRQOL that may suggest that the presence or the absence of spasticity has no important contribution to the functional improvement. Ones et al. (7) revealed that there was no significant relationship between spasticity level and QOL.

In this study, 57% of 104 patients were males, 65.4% illiterate, and 78.9% had low income. Some studies report different association between the level of education, age, gender, and HRQOL. There are a number of studies that demonstrate that female patients with stroke have lower HRQOL compared with males (10,25,39), although a study has reported no significant differences (33). Kranciukaite et al. (33) demonstrated that HRQOL is correlated with education and employment. Further-

more, Gokkaya et al. (25) indicated that HRQOL is associated with the income of patients with stroke. In contrast, Carod-Artal et al. (10) reported that HRQOL is not poorly correlated with these parameters. In the current study, there was a significant difference between female and male patients with stroke in terms of HRQOL, and illiterate patients had significantly lower physical health total scores and some subscores (PF, BP, GH,VT, SF, and MH) compared with literate patients. The social, cultural, and regional diversities in the patient population employed in different studies may be the cause of the controversial results in the literature. Females are more heavily involved in housekeeping compared with males in our region; thus, this may influence the physical health of females. The results demonstrated that gender and educational level may have a considerable influence on HRQOL, whereas it is not influenced by income. According to these results, we suggest that female patients and patients with lower income should be considered in a well-designed rehabilitation protocol to enhance their QOL.

Our findings demonstrated that there was no association between HRQOL and age as previously reported (7,10,25); although some studies demonstrated a negative association between HRQOL and age (11,32,40), another study demonstrated a positive correlation (2). These controversial results may be ascribed to the different methodologies employed in each study.

There are a few limitations in this study that should be mentioned. The study group is relatively small for more objective outcomes, and it does not cover all the categories of the society. The other limitation of this study is the lack of patients' emotional state and QOL at the beginning of the study.

Conclusion

Results of this study indicated that patients with stroke have a significantly poor QOL than the general population. The reduced QOL after stroke appears to be related not only to the emotional state and physical disability but also to some demographic properties, such as gender and education. Because the disability level and depressive mood after the stroke are important factors in the prediction of physical and mental healths of patients, the prevention of disability and early diagnosis and treatment of depression is vital in the improvement of HRQOL of patients with stroke.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Dicle University Faculty of Medicine.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - S.E.; Design - S.E., M.B.; Supervision - S.E., M.K., K.N.; Resource - S.E., P.O.; Materials - S.E., M.C., M.K.; Data Collection and/or Processing - S.E., D.A., S.V.; Analysis and/or Interpretation - S.E., M.B.; Literature Review - S.E., M.B.; Writer - S.E.; Critical Review - K.N.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

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