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Factors Associated with Health-related Quality of Life of Patients with Stroke

İnmeli Hastaların Sağlıkla İlişkili Yaşam Kalitesiyle İlgili Faktörler

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ABSTRACT Objective: Stroke is the most common neurological disease worldwide. Stroke survivors have difficulties in activities of daily living. Health-related quality of life (HRQOL) is adversely affected due to the impact of stroke. This study aims to examine HRQOL in stroke patients and identify variables predicting post-stroke quality of life. **Material and Methods:** Mini Mental Test was used to evaluate the cognitive status of patients. Functional status and activities of daily living were assessed with Barthel Index, Rivermead Mobility Index, and Stroke Impact Scale 3.0 (SIS 3.0). The patient's mood status was questioned with Beck Depression Scale. Pearson correlation, independent sample t-test, one-way analysis of variance, and regression analysis were used to identify the factors associated with quality of life. **Results:** A total of 150 stroke patients, 71 (47.3%) women and 79 (52.7%) men, with a mean age of 62.33±10.47 (37-80) years participated in the study. Duration after stroke was positively correlated with memory, mood, communication, daily living activities, mobility, social participation, improvement, and total scores of SIS (p=0.033, p=0.020, p=0.043, p=0.007, p=0.004, p=0.020, p=0.016, and p=0.11), respectively. A significant difference was detected in the SIS-communication subheading in patients with left hemiplegia (p=0.031). The SIS-mood subheading was positively associated with employment status (p=0.035). **Conclusion:** HRQOL increases with the increase in functional independence and mobility level in stroke patients, and HRQOL decreases in depression. Severe addiction, severe language impairment, advanced age, hemorrhagic stroke, and left-sided lesions were associated with lower HRQOL. Higher education level was associated with higher quality of life.

Keywords: Stroke; quality of life; rehabilitation; outcome; disability

ÖZET Amaç: İnme, dünya çapında en sık görülen nörolojik hastalıktır. İnme geçirenler günlük yaşam aktivitelerinde güçlük çekerler. Sağlıkla ilişkili yaşam kalitesi (SİYK) inmenin etkisiyle olumsuz etkilenmektedir. Bu çalışma, inmeli hastalarda sağlıkla ilgili yaşam kalitesini incelemeyi ve inme sonrası yaşam kalitesini öngören değişkenleri belirlemeyi amaçlamaktadır. **Gereç ve Yöntemler:** Hastaların kognitif durumlarını değerlendirmek için Mini Mental Test kullanıldı. Fonksiyonel durum ve günlük yaşam aktiviteleri Barthel İndeksi, Rivermead Mobilite İndeksi ve İnme Etki Ölçeği 3.0 (İEÖ 3.0) ile değerlendirildi. Hastanın duygudurumu Beck Depresyon Ölçeği ile sorgulandı. Yaşam kalitesi ile ilişkili faktörleri belirlemek için Pearson korelasyonu, bağımsız örneklem t-testi, tek yönlü varyans analizi ve regresyon analizi kullanıldı. **Bulgular:** Çalışmaya yaş ortalaması 62,33±10,47 (37-80) yıl olan 71 (%47,3) kadın, 79 (%52,7) erkek olmak üzere toplam 150 inme hastası katıldı. İnme sonrası süre ile İEÖ alt başlıkları (hafıza, ruh hâli, iletişim, günlük yaşam aktivitesi, mobilite, sosyal katılım, iyileşme) ve toplam skorları arasında pozitif korelasyon vardı (sırasıyla p=0,033, p=0,020, p=0,043, p=0,007, p=0,004, p=0,020, p=0,016 ve p=0,11). Sol hemiplejili hastalarda İEÖ-iletişim alt başlığında anlamlı fark saptandı (p=0,031). İEÖ-ruh hâli alt başlığı, çalışma durumuyla pozitif olarak ilişkiliydi (p=0,035). **Sonuç:** İnmeli hastalarda fonksiyonel bağımsızlık ve mobilite düzeyinin artmasıyla SİYK artmakta, depresyonda SİYK azalmaktadır. Şiddetli bağımlılık, dil bozukluğu, ileri yaş, hemorajik inme ve sol taraflı lezyonlar daha düşük SİYK ile ilişkilendirildi. Daha yüksek eğitim seviyesi daha yüksek yaşam kalitesi ile ilişkilendirildi.

Anahtar Kelimeler: İnme; yaşam kalitesi; rehabilitasyon; sonuç; özürlülük

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Stroke is the most common neurological disease worldwide and one of the leading causes of disability.[1] Stroke is a disease that requires lifelong care, affecting many areas such as walking, speaking, toilet, bathing, and self-care activities. Each of these activities is a burden for stroke patients.[2] Stroke patients face various physical, psychological, and social problems, reducing their health-related quality of life (HRQOL).

HRQOL generally refers to patients' subjective and personal evaluations of their health status.[3] Therefore, HRQOL describes the difference between functions expected to occur and functional disorders that arise due to the disease. Patients need comprehensive rehabilitation to achieve active recovery and minimize the physical and psychosocial burden.

Some studies have evaluated the HRQOL of stroke patients and investigated the influencing factors.[4-6] There are a limited number of studies evaluating the HRQOL after stroke multi-dimensionally. For example, limited studies examine the effects of emotional status, mobility, functionality, and demographic and clinical characteristics on the HRQOL of stroke patients. Based on previous data on the impact on HRQOL after stroke, we predict that various factors such as sociodemographic characteristics, level of mobility, and emotional status will significantly affect the HRQOL of stroke patients.[7,8]

This study aimed to evaluate the HRQOL of stroke patients and determine the factors affecting the HRQOL of patients. This study may offer a more comprehensive perspective to assess stroke patients more comprehensively and to improve the factors affecting HRQOL during the rehabilitation process.

MATERIAL AND METHODS

This cross-sectional study included patients receiving rehabilitation at a tertiary hospital in the southeast region of Türkiye between November 2022 and February 2023. The study evaluated 150 stroke patients. Inclusion criteria were: 1) Patients age 40-80 years, 2) Diagnosed with stroke clinically and by imaging according to the diagnostic criteria of the World Health Organization, 3) Had a stroke at least 3 months ago, 4) Had an average cognitive level [Mini Mental Test (MMT)>23], 5) Willingness to participate in the study. Exclusion criteria were: 1) Communication difficulties due to dysphasia or dysarthria, 2) Patients who had a stroke for a reason other than a cerebrovascular accident, 3) Any of the comorbid neuropsychiatric conditions: dementia, Parkinson's disease, brain tumor, epilepsy, psychoses. Written informed consent was obtained from the patients who agreed to participate in the study, and the relevant forms were applied face-to-face.

Sociodemographic data such as age, gender, marital status, educational status, body mass index, occupation, and clinical data such as hemiplegic side, dominant side, lesion type, smoking, and disease duration were recorded. Informed consent was obtained from each participant.

MMT was used to evaluate the cognitive status of patients. Functional status and activities of daily living were assessed with Barthel Index (BI), Rivermead Mobility Index (RMI), and Stroke Impact Scale 3.0 (SIS 3.0). The patient's mood status was questioned with Beck Depression Scale (BDS).

The approval was obtained from Harran University Ethics Committee with date and number of October 31, 2022 and 22.21.38 and followed all relevant dictates of the Helsinki Declaration.

EVALUATION SCALES

RMI

It is a one-dimensional index that focuses on measuring mobility and includes basic mobility activities.[9] One point is given for each "yes" answer, and the final score can be obtained between 0-15 points. A score of 15 indicates no problem in mobility, and a score of 14 and below indicates a mobility problem. The Turkish validity and reliability were performed by Akın and Emiroğlu.[10]

BI

The activity daily living (ADL) was calculated by using the BI. It consists of 10 subheadings: eating, bathing, self-care, dressing, bladder control, bowel control, toilet use, chair/bed transfer, mobility, and use of stairs. An increase in the total score indicates that the patient's level of independence is improving

and better performance in ADLs. The Turkish validity and reliability study of the scale was performed by Küçükdeveci et al.[11]

FUNCTIONAL INDEPENDENCE MEASURE

It consists of 6 subsections: self-care, sphincter control, mobility, locomotor function, communication, and social perception, and evaluates the functional levels of patients. The first four subheadings constitute the Functional Independence Measure (FIM)-motor score, and the two include the FIM-cognitive score. The increase in the total score is directly proportional to the patient's functional independence. Turkish validity and reliability study was performed by Küçükdeveci et al.[12]

BDS

It is a 21-item scale developed to evaluate the mood and depression levels of patients. In this scale, each question is scored between 0-3. As the scale score increases, the level of depression increases. Turkish validity and reliability were demonstrated by Hisli.[13,14]

SIS 3.0

A stroke-specific HLQOL scale evaluates the quality of life after stroke. This scale is a comprehensive test that assesses the level of recovery after a stroke. It consists of 8 sections (strength, hand function, activities of daily living, mobility, communication, emotion, memory, and social participation) containing 59 questions. Turkish validity and reliability of the SIS 3.0 were performed by Özmaden Hantal et al.[15]

STATISTICAL ANALYSIS

All analyses were carried out using SPSS version 21.0 software (IBM Corp., Armonk, NY, USA). Mean and standard deviation are used to represent quantitative data. A statistical significance threshold of $p<0.05$ is considered significant. Numerical data between the two groups was analyzed with student t-test. Numerical data between more than two groups was analyzed with one-way analysis of variance if conditions were appropriate; otherwise, Kruskal-Wallis analysis was used. For the analysis of correlation of two numeric variables. Pearson correlation was used. For ordinal data or small sample size, Spearman correlation analysis was carried out. To determine factors associated with SIS 3.0, further research was made using multilinear logistic regression analysis.

RESULTS

A total of 150 stroke patients, 71 (47.3%) women and 79 (52.7%) men participated in the study. The mean age of the patients was 62.33±10.47 years, and the mean stroke duration was 26.44±28.92 months. The sociodemographic and clinical data of the patients are given in Table 1.

Almost all of the patients were married, homemakers, and retired. More than half of the patients were illiterate and primary school graduates. 77.3% of the patients were living with their spouses. Almost half of the patients had left hemiplegia, and half had right hemiplegia. The lesion type was ischemic in 78.7% of the patients. In terms of mobility, half of the patients can walk 10 meters outside without support. While patients are ambulated, 24% need a tripod, 26% need a cane, and 28% can ambulate without support. When we look at the need for orthosis use, 64% of the patients did not use orthoses. Alcohol and cigarette use were absent in most of the patients.

The correlation analysis between the demographic and clinical characteristics of the patients and the SIS 3.0 is given in Table 2. Duration after stroke was positively correlated with memory, mood, communication, daily living activities (DLA), mobility, social participation, recovery, and total scores of SIS 3.0 ($p=0.033$, $p=0.020$, $p=0.043$, $p=0.007$, $p=0.004$, $p=0.020$, $p=0.016$, and $p=0.11$), respectively. SIS-communication level was statistically significantly successful in patients with left hemiplegia ($p=0.031$). SIS mood was positively related to work status; SIS mood level was more significant in the positive direction in working patients ($p=0.035$). As the ambulatory supportive device was complicated, all SIS scores were negatively correlated ($p=0.000$).

A correlation analysis between BI, RMI, BDS, and SIS 3.0 is given. BI, RMI, and BDS were significantly positively correlated with all SIS 3.0 subscales and total scores ($p=0.000$) (Table 3). As the patient's mood improves and his/her mobility level and independence in DLA increase, the person's quality of life changes positively.

TABLE 1: The demographic and clinical characteristics of stroke survivors.

Characteristics of stroke survivors	n=150	%	X̄±SD
Age (year)			62.33±10.47
Gender			
Male	79	52.7	
Female	71	47.3	
Marital status			
Married	121	80.7	
Single	2	1.3	
Widow	27	18.0	
Occupation			
Housewife	63	42.0	
Retired	64	42.7	
Officer	10	6.7	
Private sector	13	8.7	
Education			
Iliterate	25	16.7	
Primary school	70	46.7	
Secondary school	26	17.3	
High school	23	15.3	
University	6	4.0	
Living with			
Spouse	116	77.3	
Single	10	6.7	
Relatives	3	2.0	
Children	21	14.0	
Caregiver			
Spouse	110	73.3	
Children	28	18.7	
Relatives	9	6.0	
Wage-caregiver	3	2.0	
Smoking			
Smoker	60	40.0	
Non-smoker	90	60.0	
Alcohol use			
User	12	8.0	
Non-user	138	92.0	
Side of hemiplegia			
Right	74	49.3	
Left	76	50.7	
Type of lesion			
Ischemic	118	78.7	
Hemoragic	31	20.7	
Lacuner	1	0.6	
Mobility			
10 m walking outdoor without support	75	50.0	
10 m walking outdoor with personal support	45	30.0	
Cannot walk 10 m outdoor	30	20.0	
Ambulatory support at outdoor			
Wheel-chair	29	19.3	
Walker	2	1.3	
Tripod	36	24.0	
Cane	40	26.7	
None	43	28.7	
Orthosis			
AFO	41	27.3	
Foot-up	13	8.6	
None	96	64	
Barthel interpretation			
Total dependent	22	14.7	
Very dependent	39	26.0	
Partially dependent	45	30.0	
Minimally dependent	21	14.0	
Independent	23	15.3	

SD: Standard deviation; AFO: Ankle foot orthosis.

The multivariate logistic regression analysis showed that Barthel group, RMI, and duration after stroke were positively correlated and BDS was negatively correlated with the SIS 3.0 total score (Table 4). Quality of life is positively affected by the improvement in daily life activity level, mobility, and increase in time after stroke. In mood assessment, depression negatively affects the quality of life.

DISCUSSION

Well-structured, valid, and reliable measures are required in stroke rehabilitation to categorize patients, predict future conditions, and evaluate patient outcomes or the effectiveness of interventions. The quality of life, activity levels, and moods of stroke patients should be evaluated with a multidisciplinary approach. In this study, demographic and clinical data affecting the quality of life after stroke were examined, and the importance of HRQOL was emphasized.

The HRQOL after stroke is the most essential evaluation criterion during the rehabilitation program. The information obtained from the HRQOL is therefore helpful in recognizing patients' problems, determining treatment priorities, managing interventions, monitor disease duration, and identifying new ideas and solutions to emerging issues in terms of health economics.[16]

In our study, a significant decrease was found in both generic and specific HRQOL scales. The time elapsed after the stroke, the level of addiction, and the use of assistive devices negatively affected the patient's HRQOL level. Increasing time after stroke and not working in any job decreased the HRQOL of patients.

Our study found no significant difference in the HRQOL between the two genders. Similarly, there are no significant differences in studies examining the effect of gender distribution on HRQOL after stroke.[17-20] Although men and women are affected in different areas of life, they can appear equally when we look at the total scores. However, studies also emphasize that the HRQOL is higher in women.[16,21,22]

In our study, it was determined that age did not affect the HRQOL. Although studies show that the HRQOL decreases with increasing age in stroke pa-

TABLE 2: Correlation between demographic and clinic features and SIS.

	SIS-strength	SIS-memory	SIS-mood	SIS-communication	SIS-DLA	SIS-mobility	SIS-hand function	SIS-social participation	SIS-recovery	SIS-total
Age p value	0.943	0.959	0.629	0.671	0.643	0.876	0.314	0.805	0.266	0.991
Gender	0.207	0.099	0.359	0.148	0.067	0.034	0.162	0.483	0.437	0.150
Marital status	0.702	0.530	0.673	0.199	0.869	0.825	0.466	0.889	0.604	0.934
Duration after stroke (months)	0.145	**0.033**	**0.020**	**0.043**	**0.007**	**0.004**	0.214	**0.020**	**0.016**	**0.011**
Side of hemiplegia	0.141	0.060	0.199	**0.031**	0.276	0.061	0.691	0.187	0.078	0.121
Working status	0.208	0.058	0.035	0.071	0.067	0.126	0.200	0.054	0.340	0.050
Ambulatory support outdoor	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Educational status	0.187	0.324	0.209	0.181	0.063	0.090	0.256	0.434	0.566	0.245

SIS: Stroke Impact Scale; DLA: Daily living activities.

TABLE 3: Correlation between BI, RMI, BDS, and SIS.

Pearson correlation	SIS-strength	SIS-memory	SIS-mood	SIS-communication	SIS-DLA	SIS-mobility	SIS hand function	SIS-social participation	SIS-recovery	SIS-total
BI	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
RMI	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
BDS	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

BI: Barthel Index; RMI: Rivermead Mobility Index; BDS: Beck Depression Scale; SIS: Stroke Impact Scale; DLA: Daily living activities.

TABLE 4: Multivariate logistic regression analysis of variables for SIS.3.0.

	Unstandardized coefficients		Standardized coefficients			Correlations			Collinearity statistics	
Model	B	SE	Beta	t value	Signification	Zero-order	Partial	Part	Tolerance	VIF
(Constant)	40.909	5.436		7.526	0.000					
Age	0.076	0.190	0.039	0.399	0.690	-0.001	0.033	0.033	0.704	1.420
Gender	2.999	3.829	0.074	0.783	0.435	0.118	0.065	0.064	0.755	1.325
Marital status	-0.047	2.235	-0.002	-0.021	0.983	-0.016	-0.002	-0.002	0.929	1.076
Educational status	1.961	1.981	0.103	0.990	0.324	0.116	-0.113	-0.041	0.955	1.047
Duration after stroke	0.146	0.056	0.208	2.588	**0.011**	0.208	0.208	0.208	1.000	1.000
Side of stroke	-1.705	1.238	-0.042	-1.377	0.171	-0.127	-0.115	-0.042	0.972	1.029
Type of stroke	-0.110	1.255	-0.002	-0.088	0.930	-0.113	-0.008	-0.002	0.859	1.164
Type of caregiver	-1.108	0.658	-0.052	-1.685	0.094	0.044	-0.140	-0.051	0.971	1.029
MMT	0.478	0.272	0.086	1.759	0.081	0.048	0.146	0.053	0.380	2.630
BDS	-0.469	0.056	-0.306	-8.309	**0.000**	-0.716	-0.572	-0.251	0.672	1.487
Barthel group	11.664	0.598	0.728	19.510	**0.000**	0.892	0.853	0.589	0.656	1.524
RMI	2.188	0.272	0.508	8.053	**0.000**	0.921	0.561	0.202	0.158	6.316

SIS: Stroke Impact Scale; SE: Standard error; VIF: Variance inflation factor; MMT: Mini Mental Test; BDS: Beck Depression Scale; RMI: Rivermead Mobility Index.

tients, some studies did not find a relationship with age.[23]

In our study, no relationship was found between education level and HRQOL. Although some studies found that the HRQOL decreases with the decrease in education level.[21,23] There are also studies in which education level does not affect the HRQOL of stroke survivors.[24] Instead of categorizing the degrees of education level, the fact that they use the "average formal education period" may explain this finding.

In our study, communication skills were higher in patients with left hemiplegia. Similarly, commu-

nication skills were found to be of higher quality in left hemiplegic patients.[25]

When we look at the etiology of stroke, it is known that ischemic stroke is more common than hemorrhagic stroke. Mortality is higher in the acute period of hemorrhagic stroke. In some studies, HRQOL was higher in hemorrhagic stroke than in ischemic stroke.[21,26] This is because the functional level is higher among hemorrhagic stroke survivors with high morale. Our study found no significant difference in the HRQOL between ischemic and hemorrhagic stroke.

Although not a single function is affected after a stroke, the patient experiences a multifaceted negative impact. In our study, the HRQOL of the patient increased as the level of independence and mobility increased. All sub-headings of HRQOL, including emotional, mobility, and social relations, were affected. Independence in DLA was evaluated with BI and FIM. When the literature was examined, scales were used similarly and stated as factors affecting the HRQOL. In our study, HRQOL was evaluated with SIS 3.0, and there are also studies evaluating it with the same questionnaire. However, there are also studies assessing with different scales in the literature.[16,22-24]

In other studies evaluating the level of independence with BI, a positive correlation was found with the HRQOL.[21,27] When we look at the different parameters affecting the HRQOL, in our study, HRQOL decreased as the level of depression increased.

In identifying predictors for HRQOL domains, multivariate regression analysis found that BI of independence was the most important predictor. Barthel group, RMI, and duration after stroke were positively correlated, and BDS was negatively correlated.

Loss of upper extremity function, especially of the hands, is one of the most significant and devastating losses an individual can experience. Use of the upper extremities is critical in completing basic DLA such as self-feeding, dressing, bathing, and toileting. Hand functions are also essential in using assistive devices for walking and moving. HRQOL was found to be higher in stroke patients with assistive device use. This draws attention to the importance of the assistive device for supporting mobility.

Among the limitations of our study, first of all, our patient population could have been more prominent since stroke patients with dementia and aphasia were not included in the study. The second limitation was the absence of a comparison group of healthy adults. Finally, it was a single-center study. To make more substantial generalizations, the study group should be more significant, and patients from more than one hospital should be interviewed.

CONCLUSION

As a result, the current study shows that both generic and stroke-specific HRQOL are impaired in stroke patients. In addition, this study provides valuable information on determining HRQOL predictive factors in stroke survivors. Further longitudinal studies using standard scales are needed in rehabilitation units in post-stroke patients. We also recommend routine measurement of HRQOL in rehabilitation units to monitor the impact of the rehabilitation program on patients' HRQOL.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

This study is entirely author's own work and no other author contribution.

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