Jordan Medical Journal, Volume 58, No.1 2024
DOI: https://doi.org/10.35516/jmj.v58i1.281

Quality of Life Among Individuals with Stroke in Jordan

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Abstract

Background and aims: Stroke has long-term consequences for the functional performance of daily activities. Evaluating the impact of stroke on health and well-being is essential when designing stroke-specific programs supporting home and community participation. This study describes the impact of stroke on quality of life as reported by stroke survivors. It also examined the effect of different personal and clinical characteristics on the quality of life among adults with stroke.

Materials and Methods: This cross-sectional study encompassed a sample of 64 adults with stroke (mean age 58.9 years) who were receiving rehabilitation services after stroke onset. Outcome measures included the Stroke Impact Scale (SIS) and its subdomains to assess the self-perceived disability following a stroke. The data analysis plan included MANOVA, followed by ANOVA of main effects and post-hoc analyses.

Results: Jordanian individuals with stroke had a mean SIS total score of 59.9 (SD ±15.4, range 25.8–94), indicating moderate quality of life following stroke. Furthermore, the domains of hand function, strength, activities of daily living, participation, and emotions received lower mean SIS scores. Participants with a higher number of previous strokes had significantly lower emotional subdomain scores on the SIS (p=0.001). Participants with aphasia had significantly lower scores in the memory (p< 0.001) and communication subdomains (p=0.0001).

Conclusion: Individuals with stroke reported moderate levels of disability after stroke onset. Aphasia and an increased number of previous strokes were associated with greater challenges in quality of life post-stroke.

Keywords: Stroke, quality of life, performance, rehabilitation

(J Med J 2024; Vol. 58(1): 69-79)

Received *August 9, 2022* *Accepted* *September 18, 2022*

INTRODUCTION

Stroke is the second leading cause of mortality and is considered the third leading cause of disability worldwide [1]. Statistics from the Jordanian Institute for Health Metrics and Evaluation (IHME), similarly, classified stroke as the second leading cause of death in Jordan [2]. The World Stroke Organization (WSO) reported that approximately 15 million people globally are affected by stroke each year [3]. Differences in stroke parameters have been noted between low/middle-income and high-income countries, especially in the last fifty years, including stroke incidence, prevalence, mortality, and disability-adjusted life [4]. There has also been an increased unmet need for rehabilitation services in low- and middle-income countries (Rehab-2030/Call for Action) [5].

Stroke is a major global health concern that affects quality of life (QoL) [6]. The Occupational Therapy Practice Framework (OTPF) defines QoL as the 'dynamic appraisal of life satisfaction, self-concept, health and functioning, and socioeconomic factors' [7]. Continuing advances in medical interventions for patients with stroke have increased the survival rate of patients and consequently led to a significant interest in QoL research [8].

Based on the severity and type, stroke often has several negative consequences for those impacted as it often leaves a permanent impairment in physical, psychological, social, and cognitive functions. These changes have major influences on the person's QoL [9]. Baumann et al. [10] showed that people who survived stroke perceived QoL as being markedly low, especially for the domains of interpersonal relationships, sleep, cognition, emotions, and pain [11].

Many research studies have investigated QoL and its relationship with demographic characteristics

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(such as age, gender, educational level, economic level, and work status) and clinical characteristics (such as type and side of stroke, previous stroke, and having aphasia). Several studies have concluded that factors such as increasing age, male gender, working, and higher educational levels lead to a higher QoL among participants experiencing a stroke [12–15]. On the other hand, Baumann et al. [10] found that females had a better QoL than males. Having aphasia and multiple strokes were identified as factors that can reduce the QoL of stroke survivors [16,17]. Moreover, the side of the stroke and its type have been significantly associated with QoL [8, 18]; people with right hemiplegia and hemorrhagic stroke were reported to have lower QoL [19].

Culture may also affect the level of participation and QoL. Hosseini et al. [20] found that QoL is multidimensional and subjective. To evaluate cultural differences in stroke survivors, Wang and Langhammer [21] reviewed the results of 43 articles, 31 of which were conducted in Western countries and 12 in China, to extract and compare predictors of QoL for the two cultures. They reported that predictors were similar between the two cultures and included demographic, clinical, environmental, and individual factors. The authors concluded that small discrepancies found in the reported predictors can be explained by the difference between the individualistic culture in the West and the collectivist culture in China. These cultural values include factors of interdependency in the East and independence in the West.

Evaluating the impact of stroke on QoL and the well-being of Jordanian stroke survivors is essential in designing stroke-specific programs supporting home and community participation, especially for groups at risk. Therefore, the purpose of this study was to describe the impact of stroke on the QoL of stroke survivors in Jordan, as well as to examine QoL and its relationship with selected demographic characteristics (age, gender, education level, economic level, and work status) and clinical characteristics (type and side of stroke, previous stroke, and having aphasia).

METHODS

Study Design

This study utilized a descriptive, cross-sectional design with independent variables including demographic and clinical characteristics. The demographic characteristics studied were: age, gender, education level, economic level, and work status; clinical characteristics were: type and side of stroke, previous stroke, and presence of aphasia. The dependent variables were the Stroke Impact Scale (SIS) total score and the scores of its domains (i.e., strength, memory and thinking, emotion, communication, hand function, and physical and instrumental activities of daily living (ADL\IADL), mobility, and participation) [22].

Participants

The study was ethically approved by the Deanship of Academic Research at the University of Jordan. Written informed consents were obtained from each participant after the nature of the study had been explained. Purposive sampling was used for the selection of participants. The inclusion criteria were: (1) participants who had a stroke (diagnosis confirmed by a neurologist); (2) between the ages of 20–80 years; (3) able to understand the questions in SIS; (4) duration of stroke of more than six months; and (5) all were functionally independent before the stroke. All participants received occupational therapy services (in-patient or outpatient) in one of the three major rehabilitation hospitals in Amman, Jordan.

Procedures

The SIS was administered using face-to-face interviews with the participants. Both forms for the demographic and clinical data were completed during the interview and by reviewing the patients' medical files. The interviews were conducted by four study coordinators. These were occupational therapists who had received instruction at an investigators' meeting, at which they reviewed an administration guide. Reliability checks were conducted to ensure uniform data collection.

Outcome Measures

The SIS third edition is a stroke-specific, self-report, health status measure of QoL [22]. It was developed to detect persistent stroke effects, primarily in patients with mild to moderate stroke [23]. It includes 59 items and consists of eight domains, as listed in the section on study design. Scores for each domain range from 0 to 100; higher SIS scores indicate better QoL. Four of the subscales (strength, hand function, ADL/IADL, and mobility) can be combined as a composite physical domain (CPD). The SIS 3.0 also includes a question to assess the patient's global perception of recovery on a scale of 0 to 100, with 100 representing full recovery and 0 representing no recovery [22]. Initial validation of SIS 2.0 in a sample of stroke survivors 1–3 months after stroke was performed in the United States [23]. Rasch analysis further detected and excluded misfitting items from the eight domains of SIS 2.0 and established the validity of SIS 3.0 [22]. The

validity and internal consistency of SIS 2.0 have also been assessed in German and Australian stroke patients [24, 25]. The acceptability, reliability, and validity of the SIS 3.0 Brazilian version and Italian version were adequate [26, 27]. The Arabic version of SIS 3.0 was utilized in this study [28].

Data Analysis

The Statistical Package for the Social Sciences (SPSS v.23) was used to analyze the data. The data analysis plan included descriptive statistics of the SIS domain and total scores. A multivariate analysis of variance (MANOVA) was conducted to determine the effects of age, education level, gender, working status, type of stroke, previous strokes, side of hemiplegia, and speech abilities on the dependent variables of SIS total score and domain scores. Univariate analyses of variance (ANOVA) and Tukey's post-hoc tests were conducted as follow-up tests. Prior to examining the ANOVA results, the alpha level was adjusted utilizing the Bonferroni adjustment, which counteracts the potential of an inflated error rate due to the multiple uses of ANOVAs. Consequently, the overall α-level was divided by the number of dependent variables (i.e., 6) to achieve the adjusted α-level. Accordingly, the adjusted α-level was determined to be 0.05/6= 0.008.

RESULTS

The final sample consisted of 64 individuals with stroke. The descriptive statistics confirmed that the majority of participants were males (63%), married (89%), and had an average age of 58.9 years (range 20–80 years). Most participants had a diagnosis of ischemic stroke (84.4%), and a small proportion of participants had a history of previous strokes (20.3%). The clinical manifestations of stroke among participants were hemiplegia affecting the right side (54.7%), who were non-aphasic (79.7%). Comorbidities were also prevalent among participants, with hypertension (60%) and diabetes (53%) being the most reported conditions. All participants received occupational therapy services, and more than half of the participants reported using assistive tech tools and/or walking aids (57.8%). Table 1 presents the demographic and clinical characteristics of the participants.

Table 1. Demographic characteristics of individuals with stroke (n=64)

Variable	Frequencies/ n (%)
Mean age	58.9 years
Standard deviation	12.4
Range	20–80 years
Gender	
Male	40 (63%)
Female	24 (37%)
Education Level	
Doctorate	2 (3%)
Bachelor	14 (21%)
Diploma	10 (16%)
High school	19 (30%)
Less than high school	19 (30%)
Marital Status	
Married	57 (89%)
Single	1 (2%)
Widow/divorced	6 (9%)
Annual Income in Jordanian Dinar	
<6000	40 (63%)
6000–12000	14 (22%)
12 000–24000	4 (6%)
>24 000	2 (3%)
Employment Status	
Employed	6 (9.4%)
Unemployed	58 (90.6%)
Stroke Type	
Ischemic	54 (84.4%)
Haemorrhagic	10 (15.6%)

Variable	Frequencies/ n (%)
Affected Side	
Right	35 (54.7%)
Left	29 (45.3%)
Previous Stroke	
Yes	13 (20.3%)
No	51 (79.7%)
Assistive Tech and Aids	
Yes	37 (57.8%)
No	27 (42.2%)
Medical Services	
Occupational Therapy	64 (100%)
Physical Therapy	54 (84%)
Speech Therapy	10 (16%)
Number of Occupational Therapy Sessions	
1–10	29 (52%)
11–20	9 (16%)
21–30	10 (18%)
>30	8 (14%)

The SIS total scores varied between participants with a mean of 59.9 and a standard deviation (SD) of 15.4 (range 25.8–94), indicating moderate levels of QoL following stroke. The lowest SIS domain average scores were reported for hand function (35.1), strength (44.4), ADL/IADL (54.6), participation (54.9), and emotions (60.6), in this order. The recovery score was very similar to the SIS total score with a mean recovery score of 58.3 (SD 18.9, range 0–95). Table 2 shows the SIS domains and total scores.

Table 2. Stroke impact scale scores (n=64)

SIS[1] Domains	Mean Score	SD[2]	Range
Strength	44.4	22.2	0–93
Hand Function	35.1	21.4	0–95
ADL/IADL	54.6	21.2	10–100
Mobility	63.4	36.3	8.3–100
Composite Physical	**49.4**	**19.2**	
Communication	85.5	24.9	3.6–100
Emotions	60.6	19.2	13.9–100
Memory	81.6	21.4	0–95
Participation	54.9	15.4	3.1–100
Total SIS Score	**59.9**	**15.4**	**25.8–94**
Recovery Score	**58.3**	**18.9**	**0–95**

[1] SIS = Stroke Impact Scale; [2] SD = standard deviation

MANOVA results, presented in Table 3, revealed that only the main effect of the demographic characteristic of education level significantly affected the combined dependent variables of SIS total score and domain scores (Wilks' Λ =0.684, $F^{6,41}$ =3.155, p =0.012). Of the clinical characteristics, the main effect of the type of stroke significantly affected the combined dependent variables of SIS total score and domain scores (Wilks' Λ =0.687, $F^{6,41}$ =3.110, p =0.013). In addition, the main effect of previous strokes significantly affected the combined dependent variables of SIS total score and domain scores (Wilks' Λ =0.843, $F^{18,116}$ =1.900, p =0.022). Finally, the main effect of speech abilities significantly affected the combined dependent variables of SIS total score and domain scores (Wilks' Λ =0.455, $F^{6,41}$ =8.184, p <0.0001).

Table 3. MANOVA results of the effects of demographic and clinical characteristics on quality of life

Effect	Statistic	Value	F Value	Hypothesis DF	Error DF	*p* value
Age	Wilks Lambda	0.923	0.557	6	40	0.62
Education level	Wilks Lambda	0.684	3.155	6	41	0.012*
Economic status	Wilks Lambda	0.958	0.303	6	41	0.932
Gender	Wilks Lambda	0.941	0.427	6	41	0.857
Working status	Wilks Lambda	0.800	0.808	12	82	0.641
Type of stroke	Wilks Lambda	0.687	3.110	6	41	0.013*
Previous stroke	Wilks Lambda	0.843	1.900	18	116	0.022*
Side of hemiplegia	Wilks Lambda	0.872	1.006	6	41	0.435
Speech ability	Wilks Lambda	0.455	8.184	6	41	0.000*

*Indicates that the mean difference is significant at $p < 0.05$

Follow-up univariate ANOVA and Tukey's post-hoc tests were conducted. The same Bonferroni adjustment mentioned earlier was used. The univariate ANOVA results, presented in Table 4, revealed that education level did not significantly differ for the SIS total and domain scores. Moreover, the type and side of stroke did not significantly differ for the SIS total and domain scores. However, the number of previous strokes significantly differed for the emotion subdomain ($p = 0.001$). In addition, speech ability significantly differed for the communication ($p < 0.0001$) and memory subdomains ($p = 0.001$).

Table 4 Univariate ANOVA results for the SIS dependent variables and domains

Source	Dependent Variable (domain)	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Composite physical	6770.741	13	520.826	1.525	.145
	Participation	8113.917	13	624.147	1.016	.453
	Communication	18586.344	13	1429.719	3.300	.001
	Emotions	10368.813	13	797.601	3.332	.001
	Memory	9589.884	13	737.683	1.843	.064
	SIS total	5071.899	13	390.146	1.898	.056
Intercept	Composite physical	11056.472	1	11056.472	32.366	.000
	Participation	12774.229	1	12774.229	20.789	.000
	Communication	21121.958	1	21121.958	48.746	.000
	Emotions	14113.344	1	14113.344	58.960	.000
	Memory	16248.291	1	16248.291	40.599	.000
	SIS total	13375.631	1	13375.631	65.060	.000
Education	Composite physical	153.991	1	153.991	.451	.505
	Participation	703.047	1	703.047	1.144	.290
	Communication	678.390	1	678.390	1.566	.217
	Emotions	1557.978	1	1557.978	6.509	.014
	Memory	220.139	1	220.139	.550	.462
	SIS total	94.003	1	94.003	.457	.502
Income	Composite physical	245.013	1	245.013	.717	.401
	Participation	30.381	1	30.381	.049	.825

Source	Dependent Variable (domain)	Type III Sum of Squares	df	Mean Square	F	Sig.
	Stroke Recovery	8.750	1	8.750	.027	.869
	Communication	28.931	1	28.931	.067	.797
	Emotions	31.622	1	31.622	.132	.718
	Memory	42.303	1	42.303	.106	.747
	SIS total	40.386	1	40.386	.196	.660
Gender	Composite physical	12.519	1	12.519	.037	.849
	Participation	15.752	1	15.752	.026	.873
	Communication	9.520	1	9.520	.022	.883
	Emotions	410.058	1	410.058	1.713	.197
	Memory	371.043	1	371.043	.927	.341
	SIS total	43.530	1	43.530	.212	.648
Working	Composite physical	875.764	2	437.882	1.282	.287
	Participation	1327.233	2	663.617	1.080	.348
	Communication	489.636	2	244.818	.565	.572
	Emotions	511.597	2	255.798	1.069	.352
	Memory	868.071	2	434.035	1.084	.347
	SIS total	499.289	2	249.644	1.214	.306
Type of stroke	Composite physical	737.249	1	737.249	2.158	.149
	Participation	42.289	1	42.289	.069	.794
	Stroke Recovery	318.709	1	318.709	.994	.324
	Communication	418.867	1	418.867	.967	.331
	Emotions	1431.608	1	1431.608	5.981	.018
	Memory	634.724	1	634.724	1.586	.214
	SIS total	179.858	1	179.858	.875	.355
Number of previous strokes	Composite physical	2978.365	3	992.788	2.906	.045
	Participation	1833.591	3	611.197	.995	.404
	Stroke recovery	2788.293	3	929.431	2.900	.045
	Communication	1485.555	3	495.185	1.143	.342
	Emotions	4731.082	3	1577.027	6.588	.001
	Memory	1469.820	3	489.940	1.224	.312
	SIS total	1925.156	3	641.719	3.121	.035
Side of hemiplegia	Composite physical	978.194	1	978.194	2.863	.097
	Participation	2733.089	1	2733.089	4.448	.040
	Communication	714.439	1	714.439	1.649	.206
	Emotions	577.688	1	577.688	2.413	.127
	Memory	767.403	1	767.403	1.917	.173

Source	Dependent Variable (domain)	Type III Sum of Squares	df	Mean Square	F	Sig.
	SIS total	1022.796	1	1022.796	4.975	.031
Presence of aphasia	Composite physical	601.548	1	601.548	1.761	.191
	Participation	133.651	1	133.651	.218	.643
	SIS total for all	1209.167	1	1209.167	5.881	.019
	Communication	14325.248	1	14325.248	33.060	.000
	Emotions	362.996	1	362.996	1.516	.224
	Memory	4608.006	1	4608.006	11.514	.001
Error	Composite physical	15714.177	46	341.613		
	Participation	28265.771	46	614.473		
	Communication	19932.204	46	433.309		
	Emotions	11011.175	46	239.373		
	Memory	18410.016	46	400.218		
	SIS total	9457.083	46	205.589		
Corrected Total	Composite physical	22484.917	59			
	Participation	36379.689	59			
	Communication	38518.547	59			
	Emotions	21379.988	59			
	Memory	27999.900	59			
	SIS total	14528.982	59			

Post-hoc results for the subdomains of previous stroke and emotions, presented in Table 5, indicated that patients who had had three strokes reported significantly lower emotional domain scores than those who had not had any strokes (p= 0.001) and those who had had one previous stroke (p <0.0001). Post-hoc results for the subdomains of speech ability and communication (Table 6) indicated that scores reported for patients who were fluent were significantly higher than those with aphasia (p <0.0001). Post-hoc results for the speech ability and memory subdomains (Table 6) indicated that scores for fluent patients were significantly higher than for those with aphasia (p= 0.001).

Table 5: Post-hoc test for the emotion subdomain by number of previous strokes

Dependent variable (subdomain)	Previous strokes		Mean I	Mean J	Mean difference (I–J)	Std. Error	*p* value
	I	J					
Emotion	0	1	63.139	76.704	-13.56	6.73	0.050
	0	2	63.139	53.453	9.69	16.69	0.564
	0	3	63.139	24.046	39.09	10.46	0.001*
	1	2	76.704	53.453	23.25	17.91	0.201
	1	3	76.704	24.046	52.66	12.02	0.000*
	2	3	53.453	24.046	-29.407	19.98	0.148

* p significant at 0.008

Table 6: Post-hoc test communication and memory subdomains by the presence of aphasia

Dependent variable (subdomain)	Presence of aphasia		Mean non-aphasic	Mean aphasic	Mean difference (I–J)	Std. Error	*p* value
Communication	Non-aphasic	Aphasic	87.167	45.776	41.390	7.199	0.000*
Memory	Non-aphasic	Aphasic	70.038	46.563	23.475	6.918	0.001*

*p significant at 0.008

DISCUSSION

This study described the impact of stroke on QoL among stroke survivors in Jordan. It also examined QoL and its relationship with demographic characteristics (age, gender, education level, economic level, and work status) and clinical characteristics (type and side of stroke, previous stroke, and having aphasia) as measured by the Arabic form of the Stroke Impact Scale (SIS-3.0) and its domains.

Regarding reported QoL, this study found that Jordanian patients with stroke reported a similar mean SIS total score to an Egyptian study [29]. In addition, the lowest means reported for SIS domains were similar between this investigation and that of the Egyptian study [29] for the hand function and strength domain, indicating that these domains are the most affected following stroke, and should receive the most attention in rehabilitation services.

Among the demographic characteristics, only education level significantly affected QoL. This trend was expected as the level of education can affect compliance with the treatment, management, and knowledge of the recovery process. Furthermore, a better education means higher income and occupation, which all lead to a higher QoL, as reported in [19]. In Jordan, it seemed that most demographic variables had no effect, except for education. QoL was preserved and equal across genders, age, economic level, and work status. Gender showed a trend that did not reach significance, in that females had a lower QoL compared to males, in accordance with previous studies [13, 26, 30–32]. Consistent with the previous literature [12, 29], the current investigation showed that a higher QoL was associated with those having higher levels of education and income, but did not reach significance.

Of the clinical characteristics, type of stroke, number of previous strokes, and speech abilities were significant in MANOVA results. Further investigation of the main effects found significance for the number of previous strokes and speech abilities but not for the type of stroke. This could be due to the highly stringent alpha level preset using the Bonferroni adjustment mentioned earlier. Among the dependent variables evaluated with ANOVA for the previous number of strokes, only the emotions subdomain of the SIS was significant, with two or more previous strokes resulting in lower QoL than those with one or no previous strokes. These results are consistent with previous research [16, 29]. Conceivably, an increased number of strokes should result in more damaged areas in the brain and, in turn, the loss of more functions that may negatively affect QoL. Aphasic patients had a lower QoL in the subdomains of communication and memory than the non-aphasic, consistent with [17, 29]. Both memory and communication were well documented to be related to language functions [33, 34].

Limitations and Recommendations

One limitation of this study is the relatively small number of participants. Future studies should be conducted in the Jordanian context with a larger sample size to improve the evaluation of the QoL of stroke survivors using the SIS. The results of the current study highlight the significance of, and necessity for, considering demographic and clinical variables when evaluating and designing post-stroke rehabilitation programs. This study also emphasizes the significance of a thorough scale evaluation during stroke recovery since it may improve knowledge of individual needs and, consequently, assist with planning for programming throughout recovery. The SIS is a stroke outcome measure with the purpose of accurately evaluating the different domains crucial to determining QoL in stroke patients.

CONCLUSION

Individuals with stroke are still reporting challenges in different domains of QoL months and years after stroke. In this study, the most affected domains of QoL were hand function, strength, and participation, as reported on SIS domain. Multiple personal and clinical factors are associated with poor

health outcomes and greater disability after stroke, such as having a lower education level, multiple strokes, and aphasia.

Funding: This study was funded by the Deanship of Academic Research at the University of Jordan (Grant number: 2427).

Conflict of Interest: None

Acknowledgements: The authors acknowledge the contributions of the following senior OT students at the University of Jordan: Sima Jaberi, Dalia Al Hourani, Wafaa Abu Dakar, Ameera Al Rawashdeh, Dana Odeh, Lama Mansour, Batool Al Barbari, and Mazen Al Hasan.

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نوعية الحياة لدى المصابين بالسكتة الدماغية في الأردن

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الملخص

الخلفية والأهداف: للسكتة الدماغية عواقب طويلة المدى على الأداء الوظيفي للأنشطة اليومية. يعد تقييم تأثير السكتة الدماغية على الصحة والعافية أمرًا ضروريًا في تصميم برامج خاصة بالسكتة الدماغية تدعم المشاركة في المنزل والمجتمع. تهدف هذه الدراسة الى وصف تأثير السكتة الدماغية على نوعية الحياة كما أفاد الناجون من السكتة الدماغية. بالإضافة إلى ذلك، بحثت هذه الدراسة في تأثير الخصائص الشخصية والسريرية المختلفة على نوعية الحياة بين البالغين المصابين بالسكتة الدماغية.

منهجية الدراسة: شملت هذه الدراسة المقطعية عينة من 64 بالغًا مصابًا بالسكتة الدماغية (متوسط العمر 58.9 عامًا) والذين يتلقون حاليًا خدمات إعادة التأهيل بعد بداية السكتة الدماغية. تضمنت مقاييس النتائج مقياس تأثير السكتة الدماغية ((SISومجالاته الفرعية لتقييم الإعاقة الذاتية بعد السكتة الدماغية. تضمنت خطة تحليل البيانات MANOVA، تليها ANOVA للتأثيرات الرئيسية والتحليلات اللاحقة.

النتائج: كان لدى الأفراد الأردنيين المصابين بسكتة دماغية متوسط مجموع نقاط SIS يبلغ 59.9 (15.4 ± SD ، النطاق 25.8–94) مما يشير إلى مستويات متوسطة من جودة الحياة بعد السكتة الدماغية. علاوة على ذلك، أفاد المرضى أن مجالات وظيفة اليد والقوة ومهارات الحياة اليومية والمشاركة والعواطف تلقت متوسط درجات قليلة. كان لدى المشاركين الذين لديهم عدد أكبر من السكتات الدماغية السابقة درجة أقل بشكل ملحوظ في المجال الفرعي العاطفي على .(p= 0.001) SISالمشاركون المصابون بالحبسة الكلامية لديهم درجات أقل بشكل ملحوظ في الذاكرة ((p <0.001ومجالات الاتصال الفرعية (.(*p* = 0.0001)

الاستنتاجات: أفاد الأفراد المصابون بالسكتة الدماغية بمستويات متوسطة من جودة الحياة بعد بداية السكتة الدماغية. ارتبطت الإصابة بالحبسة الكلامية وزيادة عدد السكتات الدماغية السابقة بتحديات أكبر في جودة الحياة بعد السكتة الدماغية.

الكلمات الدالة: السكتة الدماغية ، جودة الحياة ، الأداء، إعادة التأهيل.