

QUALITY OF LIFE IN PATIENTS AFTER STROKE

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ABSTRACT

The goal of all medical treatments is a better quality of life for patients. Post-stroke rehabilitation is a long process with uncertain result. The aim of this study was to explore the factors which affect the quality of life of patients recovering from a cerebrovascular disease. This is a prospective study evaluating the quality of life of one hundred patients one month and six months after a stroke, and patients also answered questions retrospectively, of how they felt before the stroke. As assessment tools we used a questionnaire on general and clinical data and Medical Outcomes Study Short Form (SF-36) questionnaire. Physical functioning and Physical role domains of SF-36 show significant differences in both measured periods ($p < 0.001$). Emotional role, Social functioning, Mental health, Vitality and General health domains show a statistically significant change during first six months, while Bodily pain domain did not change ($p > 0.05$). Physical summary score has changed significantly during 6 months ($p < 0.001$). Mental summary score showed no significant difference in both periods ($p < 0.687$; $p < 0.958$). The brain localization is important factor ($p < 0.0002$). Gender, age, education, employment status and previous strokes did not have a statistically significant influence ($p > 0.05$). Post-stroke physical impairment is not always accompanied by emotional impairment. Emotional functioning impairments generally return to the premorbid level during the period of six months, while physical impairments continue to occur. Further research is needed for better understanding of these relationships.

Keywords: Quality of life, stroke, SF-36.



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INTRODUCTION

Medical science is in a period of transition from biomedical to socio-economic phase. In this context, the main objective of medicine is not merely prolongation of human life, but also the achievement of a higher quality of life (1, 2).

Quality of life as a technical term has been present in the literature for more than three decades. Quality of life can also be understood as an individual perception of one's own position in life in the context of cultural and the system of social values in which the individual lives and it is always closely related to goals, expectations, standards and interests of the person (3).

All questionnaires for assessing the quality of life include a large number of questions from various fields of human life and they assess its functioning in terms of physical, mental and social recovery, especially in terms of personal perception of patient's health (4).

Medical Outcomes Study questionnaires (Short Form SF-8, SF-12, SF-20, SF-36) are most commonly used among the general health questionnaires (5, 6). The major disadvantage of general health questionnaires is the fact that they do not have the appropriate sensitivity for specific diseases (7).

Cerebrovascular diseases, which are the subject of this study, represent more or less a heterogeneous group of diseases associated with various forms of brain circulation disorders.

The aim of this study was to explore the most important factors which affect the quality of life by analyzing physical and mental state, as well as the social capability of patients recovering from a cerebrovascular disease.

MATERIAL AND METHODS

Research methodology

Examinees completed questionnaires one month and six months after their cerebral stroke. Questionnaires were completed under the code, in accordance with the ethical principles of scientific research. Participation in the study was voluntary after signing the voluntary consent. The research was carried out after the approval of the Ethics Committee of the Clinical Center of Vojvodina.

Instruments

Two questionnaires were used: a questionnaire on general and clinical data and a questionnaire about the overall quality of life (Short Form SF-36).

The general information questionnaire was designed for this research and included socio-demographic data (gender, age, education and employment status), the data about previous strokes or transient ischemic attacks (TIA), as well as

data about the type and localization of a stroke. We used the SF-36 questionnaire which assesses eight domains of the quality of life within the last year through 36 items.

Assessments were performed on two occasions: before the incident, one month and six months after the cerebral stroke. Patients also answered questions retrospectively, of how they felt before the incident. (8, 9).

Sample

The sample consisted of 100 patients diagnosed with cerebral stroke who were treated at the Clinic of Neurology, Clinical Center of Vojvodina from 1st January 2019 to 1st June 2019. The inclusion criteria implied that the patients suffered from a cerebral stroke, belonged to both genders, were older than 30, lived on the territory of Novi Sad, were cooperative (regularly attended control check-ups and signed the Informed consent form). Before all the study procedures we evaluated examinee's cognitive state using Mini-Mental State Examination (MMSE) and excluded patients whose scores were less than 19 because those patients were unable to meet the study demands. The exclusion criteria were uncooperativeness due to severe motor disorders and other medical states which could affect the quality of life of subjects.

Characteristics of a group:

The average MMSE score one month after the stroke was 26.8 ± 2.3 (range 21-30) and 28.1 ± 1.2 (range 23-30) six months after the stroke.

There were 46 women and 56 men in the study sample. The average age was 57.7 ± 7.6 years (41 - 77 years). The average age was 58.9 for men and 56.4 for women. 11% of the group finished elementary school, 64% high school and 25% college. There were employed subjects with regular income (37%) and unemployed subjects without regular income (63%). In terms of etiology of the stroke, most of the group had ischemic stroke (93%) and others had hemorrhagic stroke. Supratentorial localization of the stroke was more frequent (67%) than infratentorial (33%). Brain stem lesions were observed in 29% and cerebellar lesions in 3% of the sample. Every fifth (20%) patient had previous insult without permanent neurological deficit and 19% of patients previously experienced transient ischemic attack (TIA).

Collected data was verified by the author and entered in a specially created database. During the database entry additional validation of the data was performed. Statistical analysis included: comparison of distribution of responses in relation to the time point of measurement (χ^2 test), then the calculation of the standard values for domains, subgroup analysis and hypotheses testing concerning the respondents' state during the follow-up (Pearson's t-test, paired t-test, general linear model (GLM) and ANOVA for repeated measures).

RESULTS

Comparison of the average values of Physical health and Role limitation in both time points of the study is statistically significant at $p < 0.001$.

Comparison of the average Role limitations due to emotional problems and Social functioning domain values are significantly different after 1 month and after 6 months, while do not differ in the period before and six months after the stroke.

Comparison of the average values of Bodily pain domain in both time points do not differ.

The average values of the Mental health, Vitality and General health domain show statistically significant differences between the time points 1 month and 6 months after the stroke, while there is no difference between the domains before and 6 months after the stroke.

Analysis of the Physical summary score and Mental summary score

In order to facilitate the interpretation of the results we created a mathematical model that synthesized the values of all eight domains into two summary scores: Physical summary score (PSS) and Mental summary score (MSS).

Physical summary score consists of Physical functioning, Role limitations due to physical health, Bodily pain and General health domains, while Mental summary score consists of Role limitations due to mental health, Social relations, Mental health and Vitality domains (Table 1).

Table 2 shows the average values for Physical summary score presented in relation to the time points of the study. Comparison of the average values of Physical summary score in both points (1 month vs. 6 months after the stroke and before vs. 6 months after the stroke) show a significant difference at $p < 0.001$.

Average values for Mental summary score do not show a significant difference in relation to the time points of the study (Table 2).

With respect to the age, the average value was observed (57,7 years). Values of one standard deviation more or less (from 50 to 60 years) formed the group of the average age, and above and over that younger and older group. Analysis of demographic and neurological parameters in relation to the Physical summary score indicated that there was a statistically significant difference only in relation to the location of the stroke (Table 3).

There is statistically significant difference in the Physical summary score between all three time points of the study (Table 4).

Statistically significant difference is between the time points for Physical summary score in supratentorial left, both sided and brain stem localization of the stroke, while there is no difference in this score in right or cerebellar localization of the stroke (Table 5).

Table 1. Average values of SF-36 scale domains

Domain	Time point	Min	Max	Average	SD	p
PF	before the stroke	40.00	100.00	92.2	13.4	-
	1 month after	0.00	100.00	61.7	30.4	1 m / 6 m < 0,001
	6 months after	10.00	100.00	78.5	22.8	6 m / before < 0,001
RP	before the stroke	25.00	100.00	87.1	21.7	-
	1 month after	0.00	100.00	46.2	33.0	1 m / 6 m < 0,001
	6 months after	0.00	100.00	68.1	27.1	6 m / before < 0,001
RE	before the stroke	25.00	100.00	92.2	17.1	-
	1 month after	0.00	100.00	86.1	26.0	1 m / 6 m = 0.037
	6 months after	50.00	100.00	91.9	13.4	6 m / before = 0.149
SF	before the stroke	12.50	100.00	92.5	22.4	-
	1 month after	0.00	100.00	82.1	25.1	1 m / 6 m = 0.034
	6 months after	25.00	100.00	86.7	20.7	6 m / before = 0.170
BP	before the stroke	12.00	100.00	94.4	17.7	-
	1 month after	0.00	100.00	84.4	25.7	1 m / 6 m = 0.062
	6 months after	12.00	100.00	91.6	21.3	6 m / before = 0.126
MH	before the stroke	10.00	100.00	82.5	17.1	-
	1 month after	0.00	100.00	76.7	21.3	1 m / 6 m = 0.021
	6 months after	35.00	100.00	81.2	18.8	6 m / before = 0.227

Domain	Time point	Min	Max	Average	SD	p
VT	before the stroke	18.75	100.00	81.4	18.2	-
	1 month after	0.00	100.00	71.0	21.2	1 m / 6 m = 0.011
	6 months after	25.00	100.00	72.1	21.9	6 m / before = 0.807
GH	before the stroke	35.00	100.00	75.6	19.1	-
	1 month after	0.00	100.00	61.5	20.9	1 m / 6 m < 0,001
	6 months after	25.00	100.00	66.0	19.3	6 m / before = 0,214

* PF - physical functioning; RP - role limitations due to physical health;
RE - role limitations due to emotional problems; SF - social functioning; BP – bodily pain;
MH - mental health; VT - vitality, GH - general health.

Table 2. Results of Physical summary score and Mental summary score.

	Data point	Average value	Min	Max	SD	p
PHYSICAL SUMMARY SCORE	Before	53,7	37,5	61,6	5,6	-
	1 month after	41,6	23,4	57,4	9,4	1 m / 6 m < 0,001
	6 months after	47,7	32,1	58,0	6,7	6 m / before < 0,001
MENTAL SUMMARY SCORE	Before	55,2	29,4	65,8	9,1	-
	1 month after	54,8	17,9	64,7	10,1	1 m / 6 m < 0,687
	6 months after	55,1	21,0	65,1	8,6	6 m / before < 0,958

Table 3. Results of general and neurological characteristics in relation to the Physical summary score results.

Variable	SS	degree	MS	F	P
Gender	2.75	1	2.75	2.017	0.158
Age	0.66	4	0.16	0.470	0.757
Education	1.56	4	1.39	1.993	0.241
Employment	0.98	1	0.76	0.376	0.845
Stroke localization	11.43	8	1.429	4.711	0.0002
Previous cerebral incidents	0.74	4	0.187	0.520	0.714

Table 4. Analysis of the Physical summary score in relation to the time point of the study and the location of the stroke.

PHYSICAL SUMMARY SCORE	Time point	DF	SS	MS	F	P
	before	4	6.158	1.540	3.150	0.017
	1 month after	4	12.325	3.081	3.048	0.020
	6 months after	4	9.563	2.390	6.484	0.000

Table 5. Mean value, standard deviation and the significance of differences of the Physical summary score in relation to the location of stroke

Localization of the stroke	Before stroke	SD	After 1 month	SD	After 6 months	SD	P 1m / 6 m	P 6 m / before
Left	4.454	1.175	4.181	1.424	4.818	0.583	0.000	0.000
Right	5.000	0.000	4.777	0.427	5.000	0.000	0.209	1.000
Cerebellum	5.000	0.000	4.647	0.485	4.764	0.430	0.190	0.945
Both sides	4.750	0.452	4.250	1.356	4.000	1.279	0.505	0.046
Brain stem	5.000	0.000	3.000	0.000	4.000	0.000	0.000	0.047

DISCUSSION

Patients have better results 6 months after than one month after the stroke, but some domain scores do not reach the values prior to the cerebrovascular incident.

Lowest achievements can be observed in the field of Physical role and General health domains, and the best-preserved domain is Emotional role. Results suggest that physical damage is not necessarily accompanied by an emotional damage. Kong and Singaporean group of authors assessed the quality of life in patients after stroke and stated that there was a significant impact of depression on the outcome (10). Our research did not confirm that claim.

Physical functioning and Physical role dimensions showed a significant difference in both time points of the study. There was a significant recovery six months after the stroke, but the quality of life measured by these dimensions was still significantly lower than before the stroke. All other dimensions showed a significant improvement after six months and came to the state similar to the state before the insult. Bodily pain is approximately the same during the whole period, which means that there is no significant difference between the period before and after the stroke in terms of pain. Widar et al. investigated the impact of pain on the quality of life in patients who suffered from a stroke with long-lasting pain (11).

The average value of the Physical summary score one month after the stroke is significantly reduced compared to the value before the stroke and is significantly improved after six months, but still does not reach the premorbid level.

This result is in accordance with scores of individual domains that make the Physical summary score. Identical results were found by Gallien et al, Pickard et al, Carod-Artal, and Xie (12-15).

Comparison of the average values of the Mental summary scores are no statistically significant changes in mental function of patients. This result is probably a consequence of the previously mentioned selection of patients. This is already mentioned shortcoming of the SF-36 questionnaire in terms of the inability to be applied on patients with severe mental deterioration after the stroke, which Hagen and his associates also noted (16). They also noted lower sensitivity of the questionnaire in the period of 3-6 months after the stroke, which was not detected in this study.

Physical summary score is dependant on the location of the cerebral stroke, whereas gender, age, education, employment status and history of previous strokes do not have a significant influence.

There were slightly fewer women (46%) in the sample. According to the data from the world reference cerebral stroke is more common in male, but mortality is higher in female population. Increasing trend of the incidence of stroke has been noted in the female population, and it is approaching

male incidence during the last decade. Lai with a group of authors from the Pamela Duncan team examined the differences in the quality of life with respect to gender and reached the conclusion that women recovered more slowly, especially if they had depressive symptoms (17). Gall and associates, as well as Bushnell and Appelros found that women have worse functional outcome and a lower quality of life after the stroke, especially if their occupations involve physical work, but this was not confirmed by our research (18, 19).

Divani and associates studied the effect of subject's age on the outcome and came to the conclusion that the occurrence of stroke in later years have a worse outcome. However, age did not prove to be a significant factor in our study (20).

Hardie gives data on the importance of recurrent strokes for the outcome of patients. Earlier strokes did not have a significant impact on the quality of life in our study, which can be explained by the fact that patients already had a personal experience with stroke and thereby less fear of the unknown (21). Mackenbach et al. found positive correlation between the level of education and outcome after stroke. However, educational level and employment status showed no influence on the quality of life of patients after the stroke in our study (22).

Location of the cerebral stroke has significant impact on the quality of life in all observed time points in our study. Brain stem localization is associated with lower scores and supratentorial right with higher scores of the quality of life questionnaires. Our results indicate that brain stem, supratentorial left and bilateral localizations produce significant changes of the quality of life, while these changes are not so prominent in supratentorial and cerebellar localizations. Hinduja and Eminovic have not found a relation of the outcome and localization of the stroke (23, 24). De Haan found that patient with left-sided lesions have worse quality of life probably because of the speech disabilities, that is confirmed in our study. Infratentorial lesions have a better outcome according to his research (25).

CONCLUSION

This study shows that the stroke leads to the decline in the quality of life of patients as a rule. Physical symptoms, which are dominant, are not always accompanied by the emotional symptoms. Emotional functioning deficits generally withdraw to the premorbid level after 6 months, while physical deficits are retained. Change in the quality of life after stroke is not dependant on gender, education, employment status and previous strokes. However, the localization of the lesion is substantial in terms of the quality of life, and is most affected in patients with bilateral lesions, left-sided lesions and lesions of the brain stem. Further research will lead to better understanding of these relationships with special emphasis on the risk factors that diminish the quality of life.

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CONFLICT OF INTEREST

The authors declare no financial or commercial conflict of interest.

REFERENCES

1. Arbutina M, Zikic M, Miljkovic S, Petrovic N, Djajic V, Vujkovic Z. Znacaj izucavanja kvaliteta zivota kod pacijenata obolelih od mozdanog udara. *Aktuelnosti iz neurologije, psihijatrije i granicnih podrucja*. 2000; 8(1): 33-9.
2. Arbutina M, Zikic M, Miljkovic S, Petrovic N, Potic Z, Vujkovic Z. Protokol o istrazivanju kvaliteta zivota pacijenata poslije mozdanog udara. *Aktuelnosti iz neurologije, psihijatrije i granicnih podrucja*. 2000; 8(1): 40-5.
3. Spilker B. *Quality of Life Assessment in Clinical Trials*. New York: Raven Press; 1990.
4. Wood-Dauphinee S, Williams JI: Reintegration to Normal Living as a Proxy to Quality of Life. *J Chronic Dis*. 1987; 40(6):491-502. DOI: 10.1016/0021-9681(87)90005-1 PMID: 3597654
5. Dorman PJ, Dennis M, Sandercock P. How do scores on the euroQoL relate to scores on the SF-36 after stroke? *Stroke*. 1999; 30(10):2146-51. DOI: 10.1161/01.STR.30.10.2146 PMID: 10512920
6. Cerniauskaite M, Quintas R, Koutsogeorgou E, Meucci P, Sattin D, Leonardi M, et al. Quality-of-Life and Disability in Patients with Stroke. *Am J Phys Med Rehabil*. 2012; 91(13):839-47. DOI: 10.1097/PHM.0b013e31823d4df7. PMID: 22193309
7. Ebers RG, Rietberg MB, Van Wegen EEH, Verhoef J, Kramer SF, Terwee CB, et al. Self-report fatigue questionnaires in multiple sclerosis, Parkinson's disease and stroke: a systematic review of measurement properties. *Qual Life Res*. 2012 Aug; 21(6): 925-44. DOI: 10.1007/s11136-011-0009-2. PMID: 22012025
8. Godwin KM, Ostwald SK, Cron SG, Wasserman J: Long-term Health Related Quality of Life of Survivors of Stroke and their Spousal Caregivers; *J Neurosci Nurs*; 2013 June; 45(3): 147-54. DOI: 10.1097/JNN.0b013e31828a410b. PMID: 23558977
9. Zorovitz RD, Gillard PJ, Brainin M. Poststroke spasticity Sequelae and burden on stroke survivors and caregivers. *Neurology*. 2013 Jan; 80(3): S45-S52. DOI: 10.1212/WNL.0b013e3182764c86 PMID: 23319485
10. Kong KH, Yang SY. Health-related quality of life among chronic stroke survivors attending a rehabilitation clinic. *Singapore Med J*. 2006 Mar; 47(3): 213-8. PMID: 16518556
11. Widar M, Ahlström G, Ek AC: Health-related quality of life in persons with long-term pain after a stroke. *J Clin Nurs*. 2004 May; 13(4):497-505. PMID:15086636
12. Gallien P, Adrien S, Petrilli S, Durufle A, Robineau S, Kerdoncuff V, et al. Maintien à domicile et qualité de vie à distance d'un accident vasculaire cérébral. *Ann Readapt Med Phys*. 2005 Jun; 48(5): 225-30. DOI: 10.1016/j.annrmp.2005.02.001
13. Pickard AS, Wang Z, Walton SM, Lee TA. Are decisions using cost-utility analyses robust to choice of SF-36/SF-12 preference-based algorithm? *Health Qual Life Outcomes*. 2005; 3: 11. PMID: 15748287
14. Carod-Artal FJ: Specific scales for rating quality of life after stroke. *Rev Neurol* 2004 Dec; 39(11): 1052-62. PMID:15597269
15. Xie J, Wu EQ, Zheng ZJ, Croft JB, Greenlund KJ, Mensah GA, et al. Impact of stroke on health-related quality of life in the noninstitutionalized population in the United States. *Stroke*. 2006 Oct; 37(10): 2567-72. DOI: 10.1161/01.STR.0000240506.34616.10
16. Hagen S, Bugge C, Alexander H: Psychometric properties of the SF-36 in the early post-stroke phase. *J Adv Nurs*. 2003 Dec; 44(5). 461-8. DOI: 10.1046/j.0309-2402.2003.02829.x
17. Lai SM, Duncan PW, Dew P, Keighley J. Sex differences in stroke recovery. *Prev Chronic Dis*. 2005 Jul; 2(3): A13.
18. Gall S, Lan Tran P, Martin K, Blizzard L, Srikanth V. Sex Differences in Long-Term Outcomes After Stroke Functional Outcomes, Handicap, and Quality of Life. *Stroke* 2012; 43:1982-7. DOI: 10.1161/STROKEAHA.111.632547
19. Bushnell CD, Reeves MJ, Zhao X, Pan W, Prvu-Bettger J, Zimmer L, et al. Sex differences in quality of life after ischemic stroke. *Neurology*. 2014 March; 82(11): 922-31. DOI: 10.1212/WNL.0000000000000208
20. Divani AA, Majidi S, Barrett A, Noorbaloochi S, Luft A. Consequences of Stroke in Community-Dwelling Elderly - The Health and Retirement Study, 1998 to 2008. *Stroke*. 2011 Jul; 42(7): 1821-5. DOI: 10.1161/STROKEAHA.110.607630
21. Hardie K, Hankey GJ, Jamrozik K, Broadhurst RJ, Anderson C: Ten-Year Risk of First Recurrent Stroke and Disability After First-Ever Stroke in the Perth Community Stroke Study. *Stroke*. 2004; 35: 731-5 DOI: 10.1161/01.STR.0000116183.50167.D9
22. Mackenbach JP, Stirbu I, Roskam AJ, Schaap MM, Menvielle G, Leinsalu M, et al. European Union Working Group on Socioeconomic Inequalities in Health Socioeconomic inequalities in health in 22

- European countries. *N Engl J Med*. 2008;358:2468–81. DOI: 10.1056/NEJMsa0707519
23. Hinduja A, Limaye K, Patel A, Mahuvala Z. Impact of Stroke Location on Stroke Outcome. *Neurology*. 2014 April; 82(10): 147.
24. Eminovic F, Konstantinovic LJ, Arsic S, Pavlovic D. Correlation between demographic characteristics, cognitive functioning and functional independence in stroke patients. *Serbian Archives of Medicine*. 2016 Feb; 144(1-2): 31-7. DOI: 10.2298/SARH1602031A
25. De Haan RJ. Measuring Quality of Life After Stroke Using the SF-36 Stroke. 2002; 33:1176-77. DOI: 10.1161/01.STR.0000015223.98452.97

