



Comparing the Quality of Life in Patients with Stroke Under the Treatment with and Without Recombinant Tissue Plasminogen Activator

Zahra Goudarzi¹, Zhila Najafpour² and Nahid Hatam^{3,*}

¹Pharmacoeconomics and Pharmaceutical Administration, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran

²Department of Health Care Management, School of Public Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

³Department of Health Service Administration, School of Management and Information Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

*Corresponding author: Professor, Department of Health Service Administration, School of Management and Information Sciences, Shiraz University of Medical Sciences, 4th Floor, Almas Building, Alley No. 29, Ghasredasht St., Shiraz, Iran. Tel: +98-917127258, Email: hatamn@sums.ac.ir

Received 2019 January 05; Revised 2019 May 29; Accepted 2019 June 10.

Abstract

Background: Stroke has been considered one of the most common life-threatening neurological disease and a global health problem. It causes disability in adults and ranked as the third leading causes of human mortality worldwide.

Objectives: The aim of this study was to compare the quality of life in patients with stroke in both treated and not-treated groups with recombinant tissue plasminogen activator (rt-PA).

Methods: We conducted a cohort study on 126 patients with stroke, including 42 and 84 patients treated with rt-PA and without rt-PA, respectively. We used a disease-specific questionnaire for stroke, including (SSQOL) and EQ5D. Both groups were tested for potential differences regarding socio-demographic characteristics. A multiple linear regression model was exerted to find factors that affected the different aspects of QOL of the whole samples of the patients.

Results: The result of this study showed a significant correlation in the intensity of stroke and patients' quality of life between two groups of patients with stroke. In other words, the severity in the patients treated with rt-PA is less than a stroke three months after a stroke, and the desirability of living in this group is higher. The results of regression models for each subscale showed that age, sex, utility, hemisphere, and NHISS were associated with several subscales of the SSQOL; NIHSS was significantly relevant to "language", "mobility", "personality" "social roles" and hemisphere damaged significantly correlated with "energy", "thinking", "language" ($P < 0.05$). The patient's utility was significantly associated with "energy", "family roles", "language", "mobility", "mood", "personality", "self-care", "social roles", "upper extremity function", "work productivity", and "third severity" subscales ($P < 0.05$).

Conclusions: In this study, it was seen that there are significant differences between QOL of with rt-PA and without rt-PA, but the limitation of our study was that the results may be different in other countries and even various areas in Iran.

Keywords: Stroke, Recombinant Tissue Plasminogen Activator, Quality of Life

1. Background

Stroke is a long-term illness with a significant socioeconomic burden on individuals and the community. About half of the people find it difficult to recover, and the other half needs help in their daily activities (1). In addition, quality of life for patients and their satisfaction with post-stroke life are important health care issues that unfortunately do not pay much attention to in some countries. In this regard, stroke has significantly reduced the patients' quality of life, even if these people do not experience much disability after the stroke (2).

It is difficult to define the quality of life; therefore, a single universal definition of it is not available. But there is a

general agreement that the quality of life is a multidimensional structure that consists of three physical, psychological, and social domains. The impact of stroke on the patients' quality of life can be catastrophic, which has irreversible effects on all aspects of life such as physical condition, mental function, daily activities, and social roles (3).

One of the treatments for stroke is thrombolysis, which uses drugs to dissolve blood clots that are effective in reducing the damage of the stroke. Recombinant tissue plasminogen activator therapy was approved by the World Food and Drug Administration, which can be effective in improving thrombolytic conditions in acute ischemic stroke (4). In this regard, recombinant tissue plas-

minogen activator (rt-PA) is the most promising method to treat acute ischemic stroke (5). In general, most studies indicate that the use of rt-PA (3.4 - 3.5 hours after stroke) has led to an increase in life expectancy and improved the patients' quality of life (6, 7).

2. Objectives

The aim of this study was to compare the quality of life of patients with stroke undergoing the treatment with and without rt-PA

3. Methods

We conducted a cohort study on 126 patients with stroke, 42 patients were undergoing the treatment with rt-PA and 84 patients without rt-PA. These patients were registered in training centers affiliated to the Shiraz University of Medical Sciences.

Patients undergoing treatment and non-treatment with rt-PA were diagnosed based on the severity of the stroke, according to a specific stroke severity questionnaire (NIHSS) for the first week. According to the MRS, the degree of disability was evaluated. Then, in order to match the two case and control groups, according to age, sex, and the degree of the severity of the case group (with rt-PA), the number of the patients in the control group (without rt-PA) was determined.

Owing to the limited samples of the patients treated with rt-PA, selection was not performed for this group of patients and all patients were included in the study, but patients without rt-PA treatment were selected using simple random sampling. The patients' quality of life with stroke was assessed using a special questionnaire (SS-QOL). The validity and reliability of this questionnaire in Iran were measured by Mahmoodi et al. (8). This questionnaire contains 14 domains that have a total of 78 questions, including energy, family role, speech, movement, behavior, personality, personal care, social role, thinking, upper limb activities, vision, work/usefulness, sleep quality, and fatigue. It is worth noting that EQ5D is also used to complete the patients' quality of life. Finally, for data analysis, *t*-test, one-way ANOVA and correlation analysis were used.

3.1. Statistical Analysis

To analyze the data of the patients' characteristics in both groups Pearson χ^2 or *t*-student test were used. The QOL scores were expressed as mean \pm standard deviation (SD) and qualitative variables as absolute numbers and percentages. *T*-student test was used to assess differences

between two groups for all continuous measures. Finally, a multiple linear regression model was constructed by using summary scores of each dimension as dependent variables to find factors that affected the different aspect of QOL of the whole samples of patients, using patient groups as a constant factor. The SPSS software version 16.0 for Windows was used to analyze the data.

4. Results

Our results demonstrated that the differences with respect to demographic and clinical features were not significant between the two groups (Table 1), but there was a significant difference between the clinical features of the two groups of the study in the intensity of the stroke and the desirability of patients' quality of life, and there was no statistically significant correlation in other variables.

Table 2 shows the mean scores for 14 multi-item scales scores of the SS-QOL instrument. As a result, there were no significant differences between both stroke groups in terms of SS-QOL.

The results of the Multiple Linear Regression Model performed to find factors that affected the quality of life of the whole sample of patients using SS-QOL scores as a dependent variable are presented in Table 3. Our results after adjustment for age, sex, utility, hemisphere damaged and NIHSS revealed that patient's utility was significantly associated with "energy", "family roles", "language", "mobility", "mood", "personality", "self-care", "social roles", "upper extremity function", "work productivity", and "third severity" subscales ($P < 0.05$). Sex and age significantly correlated with «personality» ($P < 0.05$). Also NIHSS was significantly relevant to "language", "mobility", "personality" "social roles" and hemisphere damage significantly correlated with "energy", "thinking", and "language" subscales ($P < 0.05$). The specific HRQOL scale model for self-care had the highest volume of variance (adjusted $R^2 = 78\%$).

5. Discussion

The present study was conducted to measure and compare the quality of life of patients with stroke treated with and without rt-PA. The result of this study showed a significant correlation in the intensity of the stroke and the patients' quality of life between the two groups suffering from stroke. In other words, the severity in the patients treated with rt-PA is less than a stroke three months after a stroke and the desirability of living in this group is higher, which represents the effectiveness of the treatment with rt-PA in stroke patients. It seems that rt-PA is an effective

Table 1. Characteristics of the Patients Treated with and Without rt-PA

Variable	With rt-PA, Count	Without rt-PA, Count	P Value
Male, No. (%)	27 (64)	53 (63)	0.9
Female, No. (%)	15 (36)	31 (37)	0.9
Age, mean	63.3	63.3	0.9
Los, days	13.42	16.63	0.15
Hemisphere damage	1.42	1.44	0.9
Hand	1.15	1.16	0.9
NHSS	11.21	13.53	< 0.001
MRS	3.35	3.53	0.6
Utility	0.63	0.07	< 0.001

^aP < 0.05 considered statistically significant.

^bP values refer to t-test or Pearson χ^2 .

Table 2. Comparison of SS-QOL Scores Between Treated with and Without rt-PA Groups^{a,b}

Measures	With rt-PA	Without rt-PA	P Value ^c
Energy	4.20 ± 0.90	2.87 ± 0.83	0.11
Family roles	3.75 ± 0.13	2.90 ± 0.96	0.13
Language	2.11 ± 0.13	1.23 ± 0.71	0.13
Mobility	3.34 ± 0.19	1.88 ± 1.2	0.19
Mood	3.62 ± 0.12	3.08 ± 0.71	0.12
Personality	3.49 ± 0.11	2.76 ± 0.86	0.11
Self-care	3.26 ± 0.20	1.88 ± 0.17	0.20
Social roles	4.14 ± 0.10	3.32 ± 0.82	0.10
Thinking	1.84 ± 0.09	1.41 ± 0.58	0.09
Upper extremity function	3.20 ± 0.21	1.70 ± 0.23	0.21
Vision	1.56 ± 0.09	1.29 ± 0.33	0.09
Work productivity	3.61 ± 0.17	2.08 ± 0.22	0.17
Sleep	1.90 ± 0.06	1.49 ± 0.09	0.06
Third severity	4.98 ± 0.12	3.97 ± 0.20	0.12

^aValues are expressed means ± SD.

^bP values refer to t-test between with rt-PA and without rt-PA groups.

^cStatistically significant for P < 0.05.

factor in the reduction of disability from stroke consistent with the study of Wardlaw et al. (5) and Tseng and Chang (9).

No significant difference was observed in questionnaire surveys to separate each health condition among the two health groups. However, it should be noted that the mean scores of each of the health items in the SS-QOL tool are higher in patients undergoing treatment with rt-PA, which suggests additional effectiveness for the treatment of the patients. In fact, this group seems to have a better

physical and psychological condition leading to physical disabilities as a result of the treatment with rt-PA. Sundercok et al. by using EURO-QOL instrument showed that rt-PA could be used as an effective alternative to the treatment of stroke and it was associated with significantly higher overall self-reported health. However, the differences between the groups in visual analogue scale score and the proportion living at home were not significant (10).

Also, Boudreau et al. (11), Araujo et al. (12), and Amiri et al. (13) demonstrated that the treatment with rt-PA is more effective rather than without rt-PA and increased the quality of life in patients with stroke. In the frontal lobe lesions and dominant hands of stroke patients, no significant correlation was observed in the two treatment groups. In this study, a significant correlation was observed between the damaged hemisphere and the quality of life of patients. Because most patients suffered from damage to the right side of the brain area; thus individuals with the right brain conflict seem to have a lower quality of life due to their problems in the context of language, compared to de Hann et al. studies (14) and Kar and John (15), whereas in the study of Khayatzadeh-Mahany et al. (16), there is no significant correlation between the affected hemispheres and the patients' quality of life.

The patients' quality of life with age and gender showed a statistically significant correlation. In other words, older people have a lower quality of life because of their lower physical and physical strength and functional disorders, and males compared to females are higher than they are because of physical strength, which is consistent with the study of de Hann et al. (14) and Fattahi et al. (17), meanwhile contrary to the study of Durmaz et al. (18). Moreover, the quality of life of patients with stroke is affected by the intensity of their stroke; thus NIHSS shows

Table 3. Multiple Linear Regression Model for SS-QOL Scores Where Patient Groups Are Constant Factor^{a,b}

Variables	Constant	Sex	Age	Utility	NIHSS	Hemisphere Damage	Adjusted R ²
Energy	4.81	0.14	0.001	-1.27*	-0.012	-0.47*	0.45
Family roles	3.54*	0.081	-0.002	-1.11*	0.23	-0.22	0.52
Language	2.13*	-0.17	-0.01	-0.55*	0.038*	-0.26*	0.31
Mobility	2.41	0.39	0.01	-1.97*	0.03*	0.26	0.67
Mood	3.65*	0.26	-0.006	-1.22*	-0.14	0.15	0.48
Personality	1.72*	0.45*	0.02*	-1.05*	-0.03*	0.04	0.37
Self-care	3.5*	0.31	-0.006	-2.46*	0.006	-0.16	0.78
Social roles	4.52*	-0.03	-0.005	-1.006*	0.002*	-0.015	0.66
Thinking	0.92	0.3	-0.001	-0.06	0.02	-0.56*	0.08
Upper extremity function	2.92*	0.29	0	-2.43*	0.01	-0.19	0.78
Vision	0.9	0.16	-0.005	-0.33	-0.005	0.16	0.23
Work productivity	3.90*	0.13	0.001	-2.03	0.009	-0.35	0.75
Sleep	0.82*	0.14	0.003	-0.06	0.018	0.29	0.26
Third severity	4.48*	0.26	0.004	-1.49*	-0.008	0.02	0.67

^aEach regression model was adjusted for sex, age, utility, MRS.

^bThe P < 0.05 was considered significant.

a significant correlation with “language”, “mobility”, “personality” “social role, which they requires continuous support from the family and others, leading to a reduction in their quality of life, which is consistent with the study of Jafari and Dalvandi (19).

Overall, in this study, there was no significant correlation in terms of the quality of life in the two treated groups with stroke using the SS-QOL tool items. But in general, the patients’ quality of life in the treated group with rt-PA was better than the treated group without rt-PA. Considering that this study is performed only in two health centers and due to the limitation in the number of samples treated with rt-PA, we suggest to study the quality of life of patients with stroke under treatment with rt-PA; thus further study is recommended by a higher sample size for patients with stroke to increase their quality of life.

Footnotes

Conflict of Interests: It is not declared by the authors.

Ethical Consideration: It is not declared by the authors.

Funding/Support: It is not declared by the authors.

References

- 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 Suppl 1):S39-47. doi:10.1097/PHM.0b013e31823d4df7. [PubMed: 22193309].
- Abubakar SA, Isezuo SA. Health related quality of life of stroke survivors: Experience of a stroke unit. *Int J Biomed Sci.* 2012;**8**(3):183-7. [PubMed: 23675271]. [PubMed Central: PMC3615283].
- Opara JA, Jaracz K. Quality of life of post-stroke patients and their caregivers. *J Med Life.* 2010;**3**(3):216-20. [PubMed: 20945810]. [PubMed Central: PMC3018998].
- Boudreau DM, Guzasukas G, Villa KF, Fagan SC, Veenstra DL. A model of cost-effectiveness of tissue plasminogen activator in patient subgroups 3 to 4.5 hours after onset of acute ischemic stroke. *Ann Emerg Med.* 2013;**61**(1):46-55. doi: 10.1016/j.annemergmed.2012.04.020. [PubMed: 22633340]. [PubMed Central: PMC3598015].
- Wardlaw JM, Sandercock PA, Berge E. Thrombolytic therapy with recombinant tissue plasminogen activator for acute ischemic stroke: where do we go from here? A cumulative meta-analysis. *Stroke.* 2003;**34**(6):1437-42. doi: 10.1161/01.STR.0000072513.72262.7E. [PubMed: 12730560].
- Del Zoppo GJ, Saver JL, Jauch EC, Adams HP Jr; American Heart Association Stroke Council. Expansion of the time window for treatment of acute ischemic stroke with intravenous tissue plasminogen activator: A science advisory from the American Heart Association/American Stroke Association. *Stroke.* 2009;**40**(8):2945-8. doi: 10.1161/STROKEAHA.109.192535. [PubMed: 19478221]. [PubMed Central: PMC2782817].
- Reed SD, Cramer SC, Blough DK, Meyer K, Jarvik JG. Treatment with tissue plasminogen activator and inpatient mortality rates for patients with ischemic stroke treated in community hospitals. *Stroke.* 2001;**32**(8):1832-40. doi: 10.1161/01.STR.32.8.1832. [PubMed: 11486113].
- Mahmoodi M, Safari A, Vossoughi M, Golbon-Haghighi F, Kamali-Sarvestani M, Ghaem H, et al. Stroke specific quality of life questionnaire: Test of reliability and validity of the Persian version. *Iran J Neurol.* 2015;**14**(2):94-100. [PubMed: 26056554]. [PubMed Central: PMC4449400].
- Tseng MC, Chang KC. Cost-effectiveness analysis of tissue plasminogen activator for acute ischemic stroke: A comparative review. *Acta Neurol Taiwan.* 2004;**13**(3):149-55. [PubMed: 15508942].

10. I. S. T. Collaborative Group. Effect of thrombolysis with alteplase within 6 h of acute ischaemic stroke on long-term outcomes (the third International Stroke Trial [IST-3]): 18-month follow-up of a randomised controlled trial. *Lancet Neurol.* 2013;**12**(8):768-76. doi: [10.1016/S1474-4422\(13\)70130-3](https://doi.org/10.1016/S1474-4422(13)70130-3). [PubMed: [23791822](https://pubmed.ncbi.nlm.nih.gov/23791822/)]. [PubMed Central: [PMC3854835](https://pubmed.ncbi.nlm.nih.gov/PMC3854835/)].
11. Boudreau DM, Guzauskas GF, Chen E, Lalla D, Tayama D, Fagan SC, et al. Cost-effectiveness of recombinant tissue-type plasminogen activator within 3 hours of acute ischemic stroke: current evidence. *Stroke.* 2014;**45**(10):3032-9. doi: [10.1161/STROKEAHA.114.005852](https://doi.org/10.1161/STROKEAHA.114.005852). [PubMed: [25190439](https://pubmed.ncbi.nlm.nih.gov/25190439/)].
12. Araujo DV, Teich V, Passos RB, Martins SC. Analysis of the cost-effectiveness of thrombolysis with alteplase in stroke. *Arq Bras Cardiol.* 2010;**95**(1):12-20. doi: [10.1590/s0066-782x2010005000067](https://doi.org/10.1590/s0066-782x2010005000067). [PubMed: [20563521](https://pubmed.ncbi.nlm.nih.gov/20563521/)].
13. Amiri A, Goudarzi R, Amiresmaili M, Iranmanesh F. Cost-effectiveness analysis of tissue plasminogen activator in acute ischemic stroke in Iran. *J Med Econ.* 2018;**21**(3):282-7. doi: [10.1080/13696998.2017.1401545](https://doi.org/10.1080/13696998.2017.1401545). [PubMed: [29105528](https://pubmed.ncbi.nlm.nih.gov/29105528/)].
14. de Haan RJ, Limburg M, Van der Meulen JH, Jacobs HM, Aaronson NK. Quality of life after stroke. Impact of stroke type and lesion location. *Stroke.* 1995;**26**(3):402-8. doi: [10.1161/01.STR.26.3.402](https://doi.org/10.1161/01.STR.26.3.402). [PubMed: [7886714](https://pubmed.ncbi.nlm.nih.gov/7886714/)].
15. Kar N, John SP. Site of stroke : Correlation with cognitive deficits, symptoms of anxiety and depression, and quality of life. *Indian J Psychiatry.* 2003;**45**(4):218-20. [PubMed: [21206861](https://pubmed.ncbi.nlm.nih.gov/21206861/)]. [PubMed Central: [PMC2952367](https://pubmed.ncbi.nlm.nih.gov/PMC2952367/)].
16. Khayatzadeh-Mahany M, Goharpei S, Rostami HR, Jahantabinezhad S. [Comparative study of quality of life in stroke patients in Ahwaz]. *Zahedan J Res Med Sci.* 2011;**14**(2):86-90. Persian.
17. Fattahi A, Azad A, Montazeri A. [Quality of life among stroke patients in kermanshah city]. *Novin Rehabil J.* 2008;**2**(1):1-8. Persian.
18. Durmaz T, Özdemir Ö, Özdemir BA, Keleş T, Bayram NA, Bozkurt E. Factors affecting quality of life in patients with coronary heart disease. *Turkish J Med Sci.* 2009;**39**(3):343-51.
19. Jafari M, Dalvandi A. [Quality of life of stroke survivors and its related factors]. *Iran J Nur.* 2014;**27**(87):14-22. Persian.