



Quality of Life of Patients After Stroke - Observational Research

Marlena Krawczyk-Suszek¹

<https://orcid.org/0000-0003-4100-588X>

¹ Department of Physiotherapy, Faculty of Medicine, University of Information
Technology and Management in Rzeszow, Rzeszów, Poland

Address for correspondence

Marlena Krawczyk-Suszek
Department of Physiotherapy, Faculty of Medicine, University of Information
Technology and Management in Rzeszow
2 Sucharskiego Str., 35-225 Rzeszów, Poland
e-mail: m.krawczyk.umlub@gmail.com

Abstract

Background and objective: The quality of life of patients after stroke is a determinant of human existence. The aim of the research was to assess the quality of life of patients after stroke.

Material and method: The research involved 117 patients after stroke. The criteria to be included in the research were: a time of at least 1.5 years from the last stroke, logical contact with the patient, lack of mental illness and other chronic diseases apart from risk factors for stroke. The research tool was a questionnaire SF-36v.2. The test results at the level of $p \leq 0.05$ were considered statistically significant.

Results: Patients in the general quality of life of ILQ obtained 60.1% of the maximum number of points. The lowest average level of LQ was noted in terms of physical role: 19.2 ± 2.8 , emotional role: 14.0 ± 3.2 and physical functioning: 30.9 ± 14.5 . The quality of life of patients significantly determined the number of strokes ($p < 0.05$). The first stroke of the participants significantly reduced the quality of life compared to patients after two strokes. Conducting home rehabilitation (HR), adjusted to individual patient's dysfunctions significantly increased the quality of life in the patients of the research (HR: 100.1pts.; without: 125.5pts.; $p = 0.000 < 0.05$).

Conclusions: The patients after stroke assessed mental dimension significantly better compared to the physical quality of life.

Key words: stroke, quality of life, SF-36 questionnaire, rehabilitation

Introduction

Stroke is one of the most common cardiovascular diseases. Currently there are over 55 million people in the world who have suffered stroke, and in half of them this disease has significantly impacted on functioning in everyday life [1]. For this reason, it is extremely important to implement effective rehabilitation, which should be aimed at compensating for lost psychophysical functions or restoring dysfunction. Rehabilitation is also a form of secondary prevention, the aim of which is to minimize the risk of another stroke [2]. Comprehensive rehabilitation of patients after stroke affects both the physical and mental spheres and may significantly determine the quality of their lives

The quality of life in the definition includes the ability to function physically, mentally and socially in relation to the limitations caused by the disease [3]. Lower quality of life after stroke is mainly caused by reduced physical fitness and dependence on caregivers, depression and lack of social support. The research of the quality of life of people after stroke serves to recognize the different conditions of functioning of these people, which, according to the Helsingborg Declaration, is an important condition for proper rehabilitation planning [4]. It also allows to look at the effectiveness of the treatment perceived by the patient and helps to modify the patient's therapy [5]. Aim: Assessment of the quality of life after stroke.

Materials and Methods

Questionnaire

The research was conducted using the own structure questionnaire supplemented with a standardized tool to assess the quality of life SF-36v.2.

In the analysis of data from the SF-36v.2 quality of life questionnaire, the quality of life was assessed in the following dimensions: physical functioning – PF; role physical – RP; bodily pain – BP; general health – GH; vitality – VT; social functioning – SF; role emotional – RE; mental health – MH. SF-36v.2 questionnaire contains one unspecified question

(question 2) regarding the change in the general, subjective health of respondents during the last year.

The individual parameters were combined into groups, adding four parameters concerning the assessment of the physical sphere of the quality of life and four parameters of the mental zone. The following assignment was made: PF+RF+BT+GH = Physical Component Summary (PCS); VT+SF+RE+MH = Mental Component Summary (MCS). Both of these dimensions constitute the Quality of Life Index (ILQ). The higher the point value in the analysed scale is, the lower the level of the felt quality of life of the patient being researched is. The maximum number of points to be obtained according to the key proposed by Prof. J. Tylka is 171 [6].

The research was not subject to any risk. The study was conducted in accordance with the Declaration of Helsinki.

Respondents

117 patients with stroke regardless of etiology were included in the research. In order to analyse and assess the quality of life of the patients, the criteria of inclusion in the research were adopted: time: at least 1.5 years from the last stroke to assess the quality of life (the 1st criterion) and logical contact with the patient (the 2nd criterion), no chronic diseases beyond risk factors stroke (the 3rd criterion), no mental illness (the 4th criterion).

The rehabilitation procedure at various stages of the disease was recorded for all subjects. Rehabilitation was individually adjusted to the clinical condition of the patient; it was not the main factor differentiating the group of the researched patients. The overall impact of rehabilitation planned individually for the patient, on the quality of life of the patients was assessed.

The research was anonymous and voluntary. The patient was informed about the possibility of resigning from participation in the research at any stage.

The research did not bear any risk. The respondents were only obliged to complete the questionnaire supplemented with a standardized questionnaire. The subject of the research was the current subjective assessment of

the quality of life. The treatment and rehabilitation process were conducted by medical facilities in accordance with medical recommendations.

The sociodemographic characteristics of the research group are shown in table 1.

Table 1. General characteristics of the research group of the patients. Sociodemographic data, categorical variables

Characteristic	n	%
Gender (n – 117) - female / male	57 / 60	48.7 / 51.3
Education (n – 117) - higher / secondary / vocational / lack of education	37 / 25 / 25 / 30	31.6 / 21.4 / 21.4 / 25.6
Stroke Type (n – 117) hemorrhagic (HS)/ ischemic (IS)	55 / 62	47.0 / 53.0
Number of strokes (n – 117) - 1 / 2	88 / 29	75.2 / 24.8
Paretic Side left / right	62 / 55	53.0 / 47.0
Start time of rehabilitation (n – 117) - till the 3rd day / 4 – 7 day / 8 days – month / over a month	58 / 36 14 / 9	49.6 / 30.8 12.0 / 7.7

Source: own study.

Statistical analysis

A stratified random sampling was used to create two groups of the patients after stroke with different etiology. Continuous variables did not meet the normal distribution assumptions. Shapiro Wilk's test rejected the hypothesis of normality of distribution. Descriptive statistic and non-parametric statistics were used to compare two independent groups (U Mann-Whitney). The correlation between measurable variables (few groups) was assessed using the Spearman rank correlation coefficient. The test power was verified with the assumption of H_0 hypothesis: $M_{i1} \leq M_{i2}$, where the average quality of life in the patients after the first stroke is lower than the average quality of life of people after two strokes (t test of two averages: $t = 1.658$). The test power with the probability of the 1st degree

error set at the level of $p = 0.05$, amounted to 0.81. The statistical analyses were performed with STATISTICA 13.0 PL. The test results at the level of $p \leq 0.05$ were considered statistically significant.

Results

The respondents' age was on average 58.8 ± 11.8 years old. 47.0% out of total indicated the occurrence of stroke twice, the others declared the occurrence of only one stroke. Among the respondents, 49.6% started rehabilitation in the first three days, and the next 30.8% during the first week after stroke. In the group of people whose physiotherapeutic activity started over 8 days, the patients after haemorrhagic stroke were significantly more frequent (HS: 38.2% from the group; IS: 3.2% from the group; Pearson's $\chi^2 = 29.04367$; $p = 0.000$). The average time from stroke in the research group was 25.5 ± 8.2 months. On average, the rehabilitation process was conducted in the home environment of the patient for the longest period of time - 2.5 ± 1.7 months. Rehabilitation conducted in the neurological ward lasted on average 2.2 ± 1.2 months, in the rehabilitation ward 1.9 ± 2.1 months (table 2).

While analysing ILQ and its individual dimensions, the significant impact of gender, age, education, type of stroke as well as the side of paralysis ($p > 0.05$) was not confirmed. The level of the perceived quality of life in each dimension significantly determined the number of strokes of the patient ($p < 0.05$) (table 3).

The quality of life in the research group significantly depended on the number of stroke impacts in terms of perceived pain ($p = 0.027$) and social roles ($p = 0.009$). After the first stroke in both aspects (BP and SF), the patients assessed the quality of life as worse compared to the patients after two strokes. The general quality of life as well as the physical (PCS) and mental (MCS) dimensions were assessed worse by the patients after the first stroke at the time of the research. In SF-36 questionnaire (ILQ), the patients after two strokes obtained a significantly lower value of points, which means a subjective sense of a higher level of the quality of life compared to the second group (the patients after one stroke). (table 4).

Table 2. General characteristics of the group, taking into account the place and length of rehabilitation. Continuous variables

Variable	M	SD	Reference	Me	Q1	Q3
Age (n - 117) [years]	58.8	11.8	39.0-88.0	58.0	49.0	67.0
Time after last stroke (n - 117) [months]	25.5	8.2	18.0 - 48.0	24.0	18.0	28.0
Time of rehabilitation conducted in: [months]						
neurological / stroke ward (n - 117)	2.2	1.2	1.0 - 6.0	2.0	1.0	3.0
rehabilitation ward (n - 61)	2.0	0.9	1.0 - 6.0	2.0	1.0	2.0
rehabilitation office (n - 56)	1.9	2.1	1.0 - 16.0	1.0	1.0	3.0
home rehabilitation (n - 105)	2.5	1.7	0.25 - 12.5	2.0	1.0	3.5

*M – mean; SD – standard deviation; Reference – minimum to maximum; Me - median; Q1 - lower quartile; Q3 – upper quartile.

Table 3. Analysis of factors determining the level of quality of life and its dimensions

ILQ vs	PCS	MCS	ILQ
	p		
Gender (n - 117)	0.73	0.69	0.77
Age (n - 117)	0.88	0.91	0.87
Education (n - 117)	0.50	0.62	0.54
Stroke Type (n - 117)	0.30	0.61	0.76
Number of strokes (n - 117)	*0.02	*0.03	*0.01
Paretic Side (n - 117)	0.18	0.29	0.07

* p - level of statistical significance

Table 4. The level of restrictions of the patients in terms of quality of life in different spheres

Questionnaire SF-36	Analyse				
	\bar{x}	SD	Me	Reference	*
PF	30.9	14.5	30.0	0 – 50	50
RF	19.2	2.8	20.0	5 – 20	20
BP	3.3	2.6	3.0	0 – 9	9
GH	10.6	2.5	11.0	6 – 17	20
VT	10.2	3.0	10.0	4 – 18	20
SF	3.4	1.7	3.0	0 – 8	8
RE	14.0	3.2	15.0	0 – 15	15
MH	10.7	4.9	11.0	1 – 23	25
Subjective sense of change in health	1.6	1.1	1.0	0 – 4	4
PCS	64.1	19.0	64.0	18 – 95	99
MCS	38.7	8.6	39.0	13 – 60	68
ILQ SF – 36	102.7	24.0	102.0	47 – 155	171

*- Maximum number of points to be obtained in a given sphere; ** - Percentage of points from the maximum; PF – physical functioning; RF – role physical; BP – bodily pain; GH – general health; VT – vitality; SF – social functioning; RE – role emotional; MH – mental health; PCS – Physical Component Summary; MCS – Mental Component Summary; ILQ SF – 36 – Index of Life Quality

The analysis of data transformed according to the key presented by Professor Jan Tylka is presented below. In the overall quality of life, the patients averagely obtained 60.1% of the maximum number of points, which confirms a significantly reduced quality of life. The average value of points obtained in SF-36 scale was 102.7 ± 24.0 . The researched patients showed a lower level of the quality of life in the physical dimension (PCS: 64.1 ± 19.0). The worst-rated aspects of life of the patients after stroke involve physical functioning (PF: 30.9 ± 14.5 ; 61.8%**), restrictions in performing social roles caused by physical sphere (RF: 19.2 ± 2.8 ; 96.) 0% **and limitations in performing social roles resulting from emotional problems (RE: 14.0 ± 3.2 ; 93.3%** (table 5).

Table 5. Average quality of life, including the number of strokes

Questionnaire SF-36	Number of strokes				p
	1		2		
	M	SD	M	SD	
PF	32.6	13.0	25.6	17.6	0.057
RF	19.4	2.4	18.8	3.7	0.507
BP	3.6	2.5	2.5	2.9	0.027
GH	10.7	2.5	10.4	2.7	0.592
VT	10.2	3.0	10.1	3.1	0.570
SF	3.6	3.0	2.8	1.8	0.009
RE	14.4	2.2	12.8	5.1	0.074
MH	10.9	4.9	9.9	5.1	0.307
Subjective sense of change in health	1.7	1.1	1.4	1.0	0.358
PCS	66.3	17.2	57.2	22.4	0.043
MCS	39.7	7.8	35.6	10.4	0.029
ILQ SF - 36	106.0	21.2	92.9	29.2	0.010

*PF - physical functioning; RF - role physical; BP - bodily pain; GH - general health; VT - vitality; SF - social functioning; RE - role emotional; MH - mental health; PCS - Physical Component Summary; MCS - Mental Component Summary; IQL SF - 36 - Index of Life Quality; M - mean; SD - standard deviation; p - level of statistical significance;

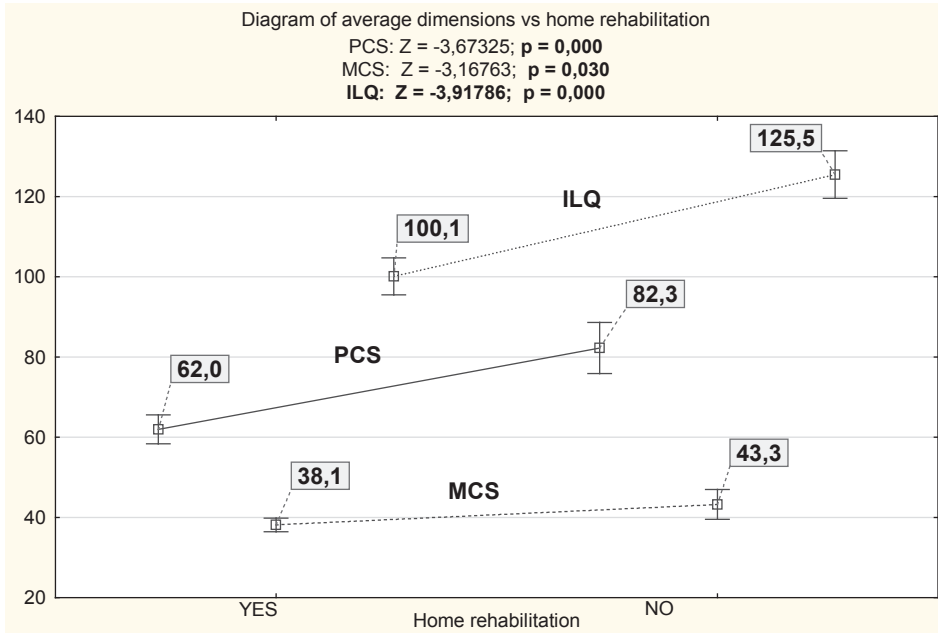
The presence of a significant correlation of individual components of the quality of life against the overall ILQ assessment was confirmed ($p < 0.001$). The strongest positive correlation in relation to the overall quality of life of the researched patients was noted in the following components of the quality of life: PF ($R = 0.91$), MH ($R = 0.83$), SF ($R = 0.82$) and BP ($R = 0.81$). The weakest correlation was recorded in: RF ($R = 0.38$) and RE ($R = 0.44$) (table 6).

Table 6. The impact of individual components on the overall quality of life of the researched patients

ILQ vs.	R	p
PF	0.91	≤ 0.001
RF	0.38	≤ 0.001
BP	0.81	≤ 0.001
GH	0.64	≤ 0.001
VT	0.71	≤ 0.001
SF	0.82	≤ 0.001
RE	0.44	≤ 0.001
MH	0.83	≤ 0.001

*R-value of Spearman's rank correlation; p - differences significance level

105 patients, out of the total number of the researched patients, continued rehabilitation in the home environment. Two dimensions were assessed: PCS, MCS and the general quality of life index – ILQ, assessed using SF-36v.2 standardized tool. There was a significantly lower ILQ level in the group of the patients who did not involve in home rehabilitation (higher point value means a reduced sense of the quality of life, $p < 0.001$). Significantly statistical differences were observed in each of the analysed dimensions ($p < 0.05$) (figure 1).



* PCS – Physical Component Summary; MCS – Mental Component Summary; ILQ SF – 36 – Index of Life Quality

Figure 1. Average quality of life of patients after stroke including home rehabilitation

The presence of a statistically significant relationship between the quality of life of the researched patients and the length of rehabilitation conducted in the neurological ward and the rehabilitation ward was confirmed. In the case of the neurological ward, the time of rehabilitation significantly impacted the quality of life of the respondents in the physical, mental and general dimensions. In the neurological ward, rehabilitation is conducted during the early rehabilitation period, whereas in the case of rehabilitation conducted in the rehabilitation ward, a significant impact was noted in the mental and general dimensions of the quality of life. The values of the correlation coefficient R were positive for the listed relationships. This means that the longer rehabilitation (in the neurological and rehabilitation ward) is, the more points were obtained by the patients on SF-36 scale. The quality of life of the researched patients decreased along with the length of rehabilitation time ($p < 0.001$). This relation

may be applied to the group of patients where the presence of complex dysfunctions in the patient after stroke determines a longer stay in the neurological ward and a worse functional state of the patient reducing the overall quality of life. Negative correlation of the quality of life with regard to the length of home rehabilitation and time after the last stroke in all analysed dimensions of the quality of life was indicated. If the value of points in SF-36 questionnaire increased (worse quality of life), the time after stroke decreased (shorter time of home rehabilitation) and vice versa. This means that the shorter the time after stroke (and the shorter the time of rehabilitation in the home environment) is, the subjective quality of life of the patient is lower. However, the longer the period after stroke (and longer time of home rehabilitation) is, the better the patient's quality of life is (table 7).

Table 7. Assessment of the relationship between the quality of life of the researched patients and the length of rehabilitation

Variables:	ILQ					
	PCS		MCS		ILQ	
	R	p	R	p	R	p
Length of rehabilitation:						
- hospital (neurological ward)	*0.44	0.000	*0.33	0.000	*0.46	0.000
- hospital (rehabilitation ward)	0.44	0.056	*0.32	0.011	*0.28	0.017
- rehabilitation study	-0.04	0.723	0.16	0.206	0.02	0.886
- environmental rehabilitation at home	-0.09	0.304	-0.10	0.261	-0.09	0.317
Time after the last stroke	-0.15	0.103	-0.09	0.332	-0.15	0.101

* statistical significance; R-value of Spearman's rank correlation; p - differences significance level

Discussion

In addition to the length of life, the assessment of the patient's quality of life is a particularly important factor in assessing the effectiveness of

treatment. There are many different definitions of the quality of life, but it most often consists of many different factors, not only physical, but also psychological and social, and their assessment is made by the patient himself/herself [7]. The quality of life assessment also provides information about the impact of the disease itself and the effects of its treatment on various areas of the patients' lives, which helps to improve the examination methods, treatment effectiveness and shape the quality of life.

The average level of the quality of life of the respondents was average. The researched patients rated the quality of their life in the mental dimension a bit higher than in the physical dimension. Reduced quality of life in the physical dimension is confirmed by another research [8, 9, 10].

Bodzek et al. researched 53 patients after stroke. The average assessment of the patients' quality of life deteriorated as a result of stroke. However, it was defined at the level between medium and good [11]. Similar results were also obtained in the research by Bejer and Kwolek, which covered 39 people after stroke. These authors, similarly to Bodzek et al., used SJŻUM scale in their research [12]. Somewhat different results were obtained in the research by Hartman-Maier et al., which covered 56 Israeli patients. Only 33% of them were satisfied with life as a whole [13]. The results of the research by Tasiemski et al involving 25 patients after stroke were similar. Only every fourth respondent was satisfied with life as a whole [14]. In the research that concern patients after ischemic or haemorrhagic stroke, the impact of the stroke type on the quality of life of the patient is not usually described, which may indicate that the stroke type is not a factor differentiating the quality of life of the patient. In this research, the impact of the stroke type on the perceived level of the quality of life was also not confirmed ($p > 0.05$). In addition, no significant impact of demographic characteristics on the perceived level of the quality of life in the research group ($p > 0.05$) was demonstrated.

In this research, all researched patients were subject to comprehensive rehabilitation, while in the case of half of them, rehabilitation was implemented within 3 days after stroke. The vast majority of the respondents considered that the applied rehabilitation impacted the improvement of

their health, especially in relation to home rehabilitation ($p < 0.05$). There was a significant difference in the average quality of life as well as a significantly better quality of life in the physical and mental dimensions in the group of the patients who conducted home rehabilitation. Other authors confirm significantly improved fitness of the researched people. It was also indicated that the fastest improvement in fitness was obtained by the patients who conducted rehabilitation in the early period after stroke (up to 1 month). The use of PNF (Proprioceptive Neuromuscular Facilitation) therapy in the patients after ischemic stroke located in the left hemisphere impacted by movement and coordination dysfunction on the right side of the body increases fitness in 70% of the respondents as a result of rehabilitation [15]. There is also a positive effect of the therapy on the improvement of shoulder and shoulder bone rhythm and the increase in the function of the upper limb, mainly through the control of motion in space [16]. Intensive rehabilitation, especially with regard to the time devoted to individual therapy of daily activities, provides better functional results of the therapy [17]. The individual ability to cope with difficult situations, which is conditioned by personality traits of the patient, is also crucial [18].

The research on the effectiveness of home rehabilitation is confirmed by all used scales: Rankin, Brunnström and locomotion possibilities, in which a significant improvement in the functional status of the patients was noted [19]. In addition, the use of comprehensive rehabilitation impacts on the improvement of both functional and mental state in the patients after ischemic stroke, and thus the assessment of the quality of life of the patients [20]. Conducting comprehensive therapy allows the assessment of the effects of early rehabilitation during hospitalisation of the patients with ischemic stroke. There is a statistically significant improvement in self-care and everyday activities in the study groups [21]. Pasek et al., assessing everyday activities depending on the subtype of ischemic stroke and conducted rehabilitation, showed a significant improvement in the quality of life based on the Rivermead Mobility Index.

In addition, the research confirmed the positive impact of early rehabilitation on the results of rehabilitation of the patients after stroke. The patients after post-hospital rehabilitation within one month after stroke revealed better results compared to the patients who started treatment after 2 months [22]. The importance of early rehabilitation in reconstructing lost functional abilities was also demonstrated by Bernhardt et al. The authors achieved optimal functional results in the first day after stroke [23].

The literature reports that locomotion improved due to several weeks of rehabilitation in the patients after ischemic stroke referred to further post-hospital rehabilitation. In addition, the recovery of the ability to move independently to varying degrees positively impacted on the patients' psyche and justified the need to continue rehabilitation. The effects of improvement visible in the performance of everyday activities mobilised. The initial low self-esteem of one's state of health occurring after stroke caused a temporary loss of social contacts and an initial weakening of family ties, which in turn caused progressive deterioration of well-being, including depression [24, 25, 26]. The improvement in health caused the improvement of lost ties, and in some people, it increased interest in sport as a form of rehabilitation. The author concluded that rehabilitation of the patients conducted as part of rehabilitation with the use of specialized kinesitherapy methods significantly contributed to the improvement in gross (gait) and low (manual) motor skills [27]. In our own research it was observed that the longer the time after stroke is, the quality of the patient's life increased slightly (ILQ: $R = -0.15$). Considering that each of the researched patients had individual planned rehabilitation, the reduction of dysfunctions significantly increased the overall quality of life of the patients.

The importance of early and comprehensive rehabilitation for the quality of life of the patients after stroke is confirmed by the guidelines for post-stroke management. Based on articles signed by the European Stroke Organization and the Polish Neurological Society, Mazurek et al. claim that rehabilitation of the patients after stroke should be coordinated and

multidisciplinary. It is proposed to start it early, although there is no optimal time to implement the improvement. Active rehabilitation should, however, be started immediately after the patient's general condition stabilized. The authors also state that the quality and organization of rehabilitation care are more important than the number of hours of therapy, and physiotherapists should choose therapeutic agents individually to the patient's needs [28].

In addition, the research confirmed a significant relationship between the quality of life (general and in both dimensions – physical and mental) and the length of rehabilitation. It is also necessary to measure the functionality of the patients because the presence of many dysfunctions in the motion system often determines a longer stay in hospital and rehabilitation wards, which may also be a factor that reduces the quality of life of the patient.

The research also confirmed the existence of dependence between individual components of the quality of life and its overall assessment. The patients subject to this research were on average approximately 25.5 ± 8.2 months after the last stroke, therefore rehabilitation includes therapeutic activities in the patient's environment. At the time of the research, the patients indicated that their overall quality of life was determined the most by the sphere of physical functioning ($R = 0.91$) and social functioning ($R = 0.82$), as well as mental health ($R = 0.83$) and pain sensation ($R = 0.81$). The values of the R factor in each of the exchangeable quality of life dimensions were positive and increased with the increase in the total number of the ILQ points. This means that the patient's functionality in the physical and social dimension, pain complaints and his/her subjective sense of mental health are important factors determining the overall quality of life, and in the case of a positive correlation significantly lowering the quality of life (increase in the SF-36 score). The significance of these factors confirms the great importance of psychological and social support for the patients after stroke who are in the process of adaptation to their own environment [29, 30], as well as further comprehensive rehabilitation aimed at reducing physical dysfunctions and pain. The literature of the sub-

ject confirms the great impact of fulfilling social roles, functioning of the upper limb and self-care on the negative assessment of the quality of life [31]. It is worth noting that the respondents claimed that limitations in the field of physical quality of life were not the most severe, but limitations in the performance of social roles were the most painful, including the socio-environmental limitations [32]. In addition, the presence of dysfunctions of the upper and lower limbs, dysfunctions in the field of vision, speech, mental disorders and problems in perception of the world and problems in the field of interpersonal communication, dysphagia, increase the probability of psychological disorders in the patient, which in turn reduces the sense of the quality of life, therefore, it is important to conduct comprehensive therapy in this area [33, 34, 35].

The improvement of the psychophysical state and the general quality of life of the patient after stroke as a result of rehabilitation is unquestionable. Its range may depend on the moment of starting rehabilitation, individual planning of therapy for the patient, the occurrence of coexisting diseases. It is worth conducting research on the impact of rehabilitation, and more recently available methods and therapies, on the functional level of the patient after stroke, to maximally reduce the resulting dysfunctions and improve the quality of life of the patient after stroke.

Conclusions

- The patients assessed the mental dimension of the quality of life slightly better than in the physical dimension.
- The patients after the second stroke reported a significantly higher level of the quality of life compared to those after one stroke.
- Conducting long-term comprehensive rehabilitation in the post-acute period and environmental rehabilitation is important in the aspect of improving the quality of life in the physical dimension of the patient after stroke.
- In the mental dimension of the quality of life, the patients stated that the largest problem involved limited social roles resulting from emotional problems.

- It is important to provide psychological support to the patients after stroke, to increase their assimilation with the environment and to reduce psychological barriers.

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