The Influence of Neurological Rehabilitation on Patients' Quality of Life After Ischemic Stroke: A Prospective Study in Romania

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Abstract

Background: Stroke is a public health problem in Romania, with important medical, social and financial implications, and sustained efforts are being made to improve post-stroke rehabilitation phase. A significant concern nowadays is the patient's quality of life (QOL); a successful stroke recovery therapy implies the increasing of QOL index. However, there are very few studies evaluating patients' QOL after stroke in Romania. In this context, the aim of this study was to evaluate the benefits that 1-year rehabilitation therapy brings to a patient with a history of ischemic stroke, highlighting the factors that influence the QOL index.

Methods: A prospective study was conducted in which the QOL (calculated using the stroke-specific QOL (SSQOL) questionnaire) was measured in a group of 40 patients who had suffered an ischemic stroke in the left middle cerebral artery territory and benefited from rehabilitation therapy for 1 year. Patients admitted in our Neurology Department between January 2018 and June 2019 were divided into several subgroups according to age, gender, domicile, educational level, familial support and comorbidities. Statistical data were processed in SPSS v.20.

Results: Among the individual factors studied, young age (under 60) showed a positive impact on QOL improvement after 1 year of stroke rehabilitation therapy (P = 0.005). This was explained by the young patient's profile, with urban domicile (55% vs. 45%), higher educational level (60% vs. 40%) and family support. The best recovered functions as noted by the questionnaire were language (18.25 ± 4.95; P = 0.015), upper motor functions (21.50 ± 2.70; P = 0.039), personality (12 ± 0.81; P = 0.032) and family roles (11.53 ± 1.81; P = 0.007). On the other hand, patient's gender (male 155.55 ± 31.21 vs. female 152.94 ± 28.14) did not influence the outcome of the therapy (P = 0.267).

Conclusion: Stroke rehabilitation treatment is an essential compo-

nent for improving the QOL of the patient after stroke; it has become topic of concern in the literature nowadays. This work complements the existing data on this topic for stroke patients in Romania.

Introduction

Among neurological diseases in adults, stroke ranks first in terms of frequency and importance, therefore the topic of post-stroke rehabilitation is significant and in continuous transformation [1-3].

Worldwide, stroke is one of the leading causes of morbidity and mortality [4]. Prospective studies show that it will become the main cause of mortality by 2030 [5, 6]. From a recovery perspective, stroke is the leading cause of serious long-term disability in the USA [7] and in other developed countries [8], and also the second leading cause of dementia and the most common cause of epilepsy in the elderly [9], representing substantial economic burden.

In Romania, stroke is a real health problem because of high incidence, high related mortality and significant consequences on the motor and cognitive performances of the survivors [10]. Stroke sequelae can have catastrophic effects on the quality of life (QOL) of the patient and their family as well as negative socio-economic effects [11-13].

However, there are very few studies evaluating patients' QOL after stroke in Romania. Nowadays, besides the assessment of improvements related to motor deficit and aphasia, patients are observed from other perspectives such as emotional, cognitive and community involvement [14, 15]. This holistic perspective defines the QOL.

Although there are many definitions of this concept, an adequate and measurable definition is elusive. Various "objective" and "subjective" indicators across a range of disciplines and scales, besides recent work on subjective well-being surveys and the psychology of happiness, have spurred renewed interest [16].

QOL means, for many, life satisfaction encompassing several dimensions: social, physical/motor, emotional and cognitive [17]. QOL is also an important parameter to monitor the recovery process in patients undergoing post-stroke

rehabilitation [18]. Recent studies worldwide are concerned with the factors that could influence QOL and rehabilitation outcome [19]. Elements such as activity, ability to move, communication skills, degree of dependence, degree of social interaction and satisfaction of professional performance are just a few components found under the umbrella of the term QOL [20, 21]. It should be noted, however, that these concepts also differ from individual to individual, depending on age, gender, living environment, education level and aspects that are under-studied in Romania and initially in other countries [22, 23].

In this context, the purposes of this study were to analyze the impact of neurological rehabilitation on the QOL of ischemic stroke patients in a clinical university hospital in Romania and to determine the relationship between QOL and individual characteristics.

Materials and Methods

Subjects

We conducted a prospective study on a group of 40 patients admitted in our Neurology Department from January 2018 to June 2019. Patients enrolled in the study had an ischemic stroke in the left middle cerebral artery (clinically and radiographically confirmed) for the first time, regardless of the mechanism of production. They were subsequently divided into several subgroups according to different criteria (age, social background, gender and risk factors). Other clinical relevant data for the etiology and secondary prevention of stroke were noted; however, not all data were included in this study.

In order not to alter the results, strict exclusion criteria were used: age below 18 years (our clinic is an adult clinic, all patients were above 18), an ischemic or hemorrhagic stroke in the medical history besides the last one, other neurological diseases associated with the onset of stroke (Parkinson's disease, Alzheimer's dementia and other neurodegenerative diseases), fluctuating stroke with no acute ongoing neurologic developments (relapse), dementia on minimal state examination (of < 22) (due to inability to directly communicate), history of ongoing psychoactive substance abuse, presence of psychiatric morbidity before and after stroke which specifically includes manic disorders, schizophrenia and associated terminal diseases such as renal failure or end-stage cancer.

Patients come from several counties in the North-East region of Romania, from both rural and urban areas, and the cohort was significant for the general population of the region. Patients arrived at our department after being treated in the acute phase (at least the first 10 - 14 days after stroke) in an acute care clinic to initiate recovery treatment.

Patients were consulted clinically and evaluated using two tests/questionnaires (stroke-specific quality of life (SSQOL) questionnaire and mini-mental state examination (MMSE) test) at the first clinic admission and then 12 months after the start of recovery therapy. We selected the 1-year period as a reference after consulting the literature which states that the most significant progress is recorded in the first 12 months af-

ter the start of recovery.

SSQOL questionnaire and its Romanian version

SSQOL questionnaire was used as it is one of the most specific questionnaires for determining QOL in stroke patients [24]. It consists of 49 questions/items, structured into 12 main subscales/subdomains: self-control (five questions), view (three questions), mobility (six questions), work/productivity (three questions), upper limb functionality (five questions), language (five questions), thinking (three questions), personality (three questions), disposition (five questions), social role (five questions), family role (three questions) and energy (three questions). The patients' answers were evaluated on a scale of 1 to 5.

The items of the SSQOL questionnaire present an adequate distribution with simple items for people with a higher degree of restriction from a participatory perspective and difficult items for those with few participation restrictions. All items have demonstrated adequate reliability [25]. Many studies showed that SSQOL is a useful clinical tool for assessing the QOL of stroke survivors [26].

This questionnaire, although exhaustive and with a long duration of application (approximately 15 min/patient), was selected because it addresses several essential areas of the patient's life. The translated Romanian version of the questionnaire was administered at the initiation of therapy and after 1 year. During this period, the patients benefited from physio-kinetotherapeutic and aphasiologic treatment, both in our clinic (repeated hospitalizations of 12 - 14 days every 3 months), with daily continuation of the learned exercises in other clinics/medical centers specialized in rehabilitation [27].

In order to use the Romanian language version of this questionnaire, a committee of national experts in neurology, stroke and rehabilitation along with translators specialized in medical language was formed. Via forward and backward translation, they approached this task from two perspectives: the linguistic validation (when the equivalence of concepts in the questionnaire was assessed) and the cultural validation (when the concepts were tested with respect to the target culture - Romanian culture). Although validated in other languages [28, 29], the questionnaire was already used in Romania in other studies but no official validation had been recognized yet.

Statistical analysis

Regarding data processing, continuous variables were presented as mean ± standard deviation and were compared using the Student's t-test. Categorical variables were expressed as numbers and/or percentages and were compared as a Pearson's Chi-squared test. All statistical tests, conducted in IBM SPSS Statistics version 20, were two-tailed with a P value < 0.05 which was considered statistically significant.

This study was approved by the institutional ethical committee and the chief doctor of the neurology clinic at that time. The study was conducted in accordance with the principles of

Table 1. Social, Clinical and Individual Characteristics of Patients

Parameter	n (%) (N = 40)	P value
Sex		0.527
Male	22 (55%)	
Female	18 (45%)	
Age	70 ± 11.89 years	
Age groups		
< 50 years	2 (5%)	
50 - 59 years	4 (10%)	
60 - 69 years	10 (25%)	
70 - 79 years	16 (40%)	
> 80 years	8 (20%)	
Environment		0.489
Rural	18 (45%)	
Urban	22 (55%)	
Smoking		0.752
Yes	19 (47.5%)	
Alcohol		0.011
Yes	12 (30%)	
Obesity		< 0.001
I	6 (15%)	
II	2 (5%)	
III	7 (17.5%)	
Hypertension		0.001
I	4 (10%)	
II	9 (22.5%)	
III	21 (52.5%)	
Diabetes		0.001
Yes	9 (22.5%)	
Atrial fibrillation		< 0.001
Paroxysmal	7 (17.5%)	
Permanent	5 (12.5%)	
Hypercholerolemia		0.011
Yes	12 (30%)	
Aphasia		-
Yes	40 (100%)	
Aphasia type		0.003
Expressive	30 (75%)	
Receptive	10 (25%)	
Level of education		0.670
Less than eight classes	16 (40%)	
Romanian Baccalaureate Exam	12 (30%)	
Graduate student	12 (30%)	
Family support		1
Yes	20 (50%)	

Table 2. Gender Variations of SSQOL Before and After Rehabilitation

Parameter	Male group (n = 40)	Female group (n = 18)	P value
SSQOL total before	123.23 ± 22.48	121.56 ± 19.28	0.291
SSQOL total after 1 year	155.55 ± 31.21	152.94 ± 28.14	0.267
SSQOL energy before	7.41 ± 2.13	7.56 ± 1.75	0.231
SSQOL energy after 1 year	8.77 ± 2.13	8.67 ± 1.97	0.234
SSQOL family roles before	7.86 ± 1.93	8 ± 1.68	0.312
SSQOL family roles after 1 year	9.27 ± 2.09	9.22 ± 1.98	0.334
SSQOL language before	13.55 ± 1.47	13.44 ± 1.38	0.275
SSQOL language after 1 year	17.45 ± 2.55	16.61 ± 2.74	0.326
SSQOL mobility before	14.64 ± 1.67	14.67 ± 1.78	0.177
SSQOL mobility after 1 year	18.86 ± 3.01	18.89 ± 1.78	0.212
SSQOL mood before	14.14 ± 1.80	13.67 ± 1.45	0.382
SSQOL mood after 1 year	18.14 ± 2.62	17.89 ± 2.44	0.324
SSQOL personality before	7.59 ± 2.10	7.56 ± 1.77	0.189
SSQOL personality after 1 year	9.05 ± 2.14	8.78 ± 2.04	0.221
SSQOL self-care before	13.45 ± 1.65	13.39 ± 1.42	0.284
SSQOL self-care after 1 year	18 ± 2.94	17.61 ± 2.66	0.252
SSQOL social roles before	9.77 ± 3.72	9.50 ± 3.13	0.181
SSQOL social roles after 1 year	13.23 ± 4.51	13.28 ± 4.35	0.175
SSQOL thinking before	7.82 ± 1.84	7.67 ± 1.71	0.331
SSQOL thinking after 1 year	9.09 ± 2.26	8.83 ± 2.14	0.287
SSQOL upper motor function before	12.64 ± 2.17	12.33 ± 1.81	0.165
SSQOL upper motor function after 1 year	16.91 ± 3.17	16.83 ± 2.70	0.197
SSQOL vision before	8.23 ± 2.11	8.06 ± 1.92	0.276
SSQOL vision after 1 year	9.18 ± 2.46	9.17 ± 2.30	0.254
SSQOL work before	6.14 ± 1.88	5.72 ± 1.67	0.208
SSQOL work after 1 year	7.59 ± 2.84	7.17 ± 2.61	0.158

SSQOL: stroke-specific quality of life.

the Declaration of Helsinki.

Results

The results of the study were divided into two parts: in the first part, a descriptive analysis of the demographic data (gender, age, educational level, living environment and comorbidities) of the group of patients was performed; subsequently, the QOL index was calculated for every member of the group before and after the 1-year period of post-stroke rehabilitation, comparing the results with respect to the individual characteristics mentioned previously.

Individual characteristics

Regarding the socio-demographic and clinical characteristics of patients, the details are presented in Table 1. More men than

women were enrolled in the study group (55% vs. 45%). The mean age of these patients was 70 ± 11.89 years, corresponding to the decade with an average frequency in the group (parametric demographic with statistically significant value). Most patients enrolled in the present study were from urban areas (55% of all cases) and were non-smokers and chronically non-consumers of ethanol. Obesity, high blood pressure, diabetes and atrial fibrillation were statistically significant comorbidities (statistical p 0.001 or < 0.001). All patients included in the study were aphasic, with the predominance of expressive aphasia (statistical P = 0.003).

SSQOL before and after 1-year rehabilitation program

Concerning the SSQOL scores, the results were divided according to the total score and the scores of the participants on the subdivisions of the questionnaire as well as according to gender, level of education, living environment and family

Table 3. Age-Related Progress After Rehabilitation for Patients Below 60 Years

Parameter	Age below 50 years (n = 2)	Age between 50 and 59 years (n = 4)	P value
SSQOL total before	158.50 ± 2.12	156.50 ± 3.87	0.424
SSQOL total after 1 year	213.00 ± 1.41	206 ± 6.05	0.495
SSQOL energy before	11 ± 1.41	10.50 ± 0.57	0.385
SSQOL energy after 1 year	12.50 ± 0.70	12 ± 0.81	0.402
SSQOL family roles before	10.50 ± 0.70	11 ± 0.81	0.325
SSQOL family roles after 1 year	13.00 ± 0.40	11 ± 0.81	0.376
SSQOL language before	14.50 ± 21.21	12.75 ± 0.50	0.410
SSQOL language after 1 year	22.00 ± 0.00	15.25 ± 0.95	0.432
SSQOL mobility before	17 ± 1.41	21.25 ± 0.95	0.287
SSQOL mobility after 1 year	24 ± 1.41	24 ± 0.81	0.217
SSQOL mood before	15 ± 0.00	16.25 ± 1.25	0.336
SSQOL mood after 1 year	22 ± 0.00	21.50 ± 0.57	0.365
SSQOL personality before	11 ± 0.00	10.50 ± 0.57	0.221
SSQOL personality after 1 year	13 ± 0.00	12 ± 0.81	0.285
SSQOL self-care before	15.50 ± 0.70	15.50 ± 0.57	0.316
SSQOL self-care after 1 year	23.50 ± 0.70	22.75 ± 1.50	0.354
SSQOL social roles before	16 ± 0.00	14.50 ± 0.57	0.274
SSQOL social roles after 1 year	21 ± 0.00	20.50 ± 0.57	0.329
SSQOL thinking before	11 ± 0.00	10.50 ± 0.57	0.175
SSQOL thinking after 1 year	13 ± 0.00	12.75 ± 1.50	0.224
SSQOL upper motor function before	16 ± 0.00	15.50 ± 0.57	0.186
SSQOL upper motor function after 1 year	22.50 ± 0.70	21 ± 0.81	0.194
SSQOL vision before	12 ± 0.00	11.25 ± 0.50	0.427
SSQOL vision after 1 year	13.50 ± 0.70	13 ± 0.61	0.453
SSQOL work before	9 ± 0.00	8.25 ± 0.50	0.282
SSQOL work after 1 year	13 ± 0.00	12.50 ± 0.57	0.243

SSQOL: stroke-specific quality of life.

support. No statistically significant differences were observed between SSQOL parameters in female or male patients (P = 0.267). Both groups registered higher scores after 1 year of rehabilitation, showing a general improvement under therapy: total SSQOL score from 123.23 ± 22.48 to 155.55 ± 31.21 in men, while in women we assessed a total score improvement from 121.56 ± 19.28 to 152.94 ± 28.14. Table 2 shows in a more detailed manner the score evolution for all subdomains of the questionnaire.

Regarding the influence of age on rehabilitation process, patients were divided into five subgroups corresponding to decades (Tables 3-5). The statistical analysis registered higher scores in patients under 50 (213.00 ± 1.41) and between 50 and 60 (206 ± 6.05), compared to older patients (above 60 years), where improvements were lower (168 ± 11.87 for 60 to 70 years old patients, 143.25 ± 6.38 for 70 to 80 years old, and only 119.13 ± 9.92 in people over 80.

Younger age has a positive impact on rehabilitation prognosis (P = 0.005), as total score in patients under 60 years (210 ± 8.45) was significantly better compared to total score in sub-

jects over 60 years (153.25 ± 17.38) (Table 5). Improvement in language (18.25 ± 4.95 vs. 17.56 ± 2.23), upper motor function (21.50 ± 2.70 vs. 13.38 ± 3.25) and working ability (12.50 ± 0.57 vs. 7.14 ± 1.96) were subdomains where younger had significant higher scores. However, no significant differences were found in values in the age groups under 50 and between 50 and 59 years (total score P = 0.495) (Table 3).

According to our results, the living environment (urban 55% vs. rural 45%) and the educational level (30% university graduates) also influence stroke rehabilitation. Patients from urban areas scored higher on both the initial assessment (156.50 ± 3.87) and that after 1 year (210 ± 8.45) compared to participants from rural areas (121.56 ± 19.28 before and 158.25 ± 16.78 after 1 year of therapy). Moreover, the highest scores were registered in patients with university education (213.00 ± 1.41) in contrast with patients with eight classes (119.13 ± 9.92) or Baccalaureate graduation (139.56 ± 7.23), where no statistical significance was observed (P > 0.05).

The importance of family support in the recovery of these patients was indirectly illustrated by the scores obtained in the

Table 4. Age-Related Progress After Rehabilitation For Patients Over 60 Years

Parameter	Age between 60 and 69 years (n = 10)	Age between 70 and 79 years (n = 16)	Age over 80 years (n = 8)	P value
SSQOL total before	133.80 ± 7.49	116.25 ± 6.56	94.75 ± 8.31	0.178
SSQOL total after 1 year	168 ± 11.87	143.25 ± 6.38	119.13 ± 9.92	0.165
SSQOL energy before	8.10 ± 1.37	7.06 ± 0.85	5.13 ± 0.83	0.204
SSQOL energy after 1 year	9.80 ± 1.22	7.81 ± 0.98	6.63 ± 0.74	0.184
SSQOL family roles before	8.70 ± 0.94	7.31 ± 0.94	6 ± 1.19	0.210
SSQOL family roles after 1 year	10 ± 1.05	8.50 ± 0.89	7.13 ± 1.12	0.175
SSQOL language before	13.40 ± 1.05	13.36 ± 1.03	12.38 ± 1.50	0.192
SSQOL language after 1 year	17.50 ± 2.22	16.56 ± 1.03	14.25 ± 1.75	0.208
SSQOL mobility before	15.60 ± 0.84	13.94 ± 0.92	12.88 ± 0.83	0.213
SSQOL mobility after 1 year	19.90 ± 1.44	17.56 ± 0.81	16.38 ± 1.18	0.178
SSQOL mood before	14.70 ± 0.67	13.88 ± 0.95	11.63 ± 1.30	0.190
SSQOL mood after 1 year	19.20 ± 0.91	17.56 ± 1.20	14.75 ± 2.18	0.223
SSQOL personality before	8.60 ± 0.84	7 ± 0.89	5.13 ± 0.83	0.219
SSQOL personality after 1 year	10.10 ± 1.01	8 ± 1.03	6.75 ± 0.70	0.125
SSQOL self-care before	14 ± 1.24	13.25 ± 0.85	11.50 ± 0.92	0.167
SSQOL self-care after 1 year	18.60 ± 1.64	16.88 ± 0.71	14.88 ± 1.35	0.206
SSQOL social roles before	12 ± 2	8.19 ± 0.98	8.25 ± 1.38	0.254
SSQOL social roles after 1 year	15.90 ± 2.23	11.31 ± 1.40	5.63 ± 1.38	0.188
SSQOL thinking before	8.80 ± 0.78	7.06 ± 0.68	5.63 ± 0.51	0.174
SSQOL thinking after 1 year	10.10 ± 0.87	8 ± 0.73	6.63 ± 0.74	0.226
SSQOL upper motor function before	13.60 ± 0.84	12 ± 0.73	9.75 ± 0.70	0.232
SSQOL upper motor function after 1 year	13.60 ± 0.84	16.38 ± 1.25	12.75 ± 0.88	0.173
SSQOL vision before	9.40 ± 0.69	7.31 ± 0.70	5.75 ± 0.70	0.186
SSQOL vision after 1 year	10.60 ± 0.96	8.13 ± 0.80	6.50 ± 0.92	0.254
SSQOL work before	6.90 ± 0.73	5.69 ± 0.94	3.38 ± 0.51	0.221
SSQOL work after 1 year	8.10 ± 0.94	6.56 ± 0.96	4.25 ± 0.46	0.264

SSQOL: stroke-specific quality of life.

two categories of patients; thus, the first subgroup made up of patients without family support had lower scores both before (94.75 ± 7.19 vs. 110.24 ± 13.72) and after 1 year of rehabilitation (131.53 ± 6.79 vs. 158.62 ± 10.27) with even less progress (36.78 vs. 45.32).

Discussion

Of all the parameters evaluated after the 12-month rehabilitation treatment, perhaps the most significant aspect for the patient is the improvement of the QOL. An increased index of patient's QOL means better social and work reintegration, a lower requirement for medical care, greater autonomy and lower costs for the insurance system and for the family [30].

According to the present research, an essential factor for predicting QOL after treatment is the patient's age, a result consistent with the literature [31-33]. On the other hand, an-

other study demonstrated the variability of the QOL index according to the geographical region [34]. Many studies [34-41] highlight the difference of personal factors correlated to stroke and therapy outcomes for different countries, and although the same rehabilitation treatments were used, it becomes difficult to compare the results of two centers in different countries because of patients' heterogeneity.

Another element that could influence the QOL after treatment is the sex of the patient. We have found several studies in the literature about the influence of gender on QOL after stroke, but no conclusion could be drawn [42-45]. In the current research, we found no correlation between gender and rehabilitation prognosis.

In terms of living environment, however, the results were surprising. According to our data, patients living in urban areas showed a better recovery rate as opposed to those in rural areas. Some explanations in the Romanian context would be as follows: 1) People from rural regions benefit from a low level

Table 5. Comparison of Extreme Ages Regarding Rehabilitation Progress

Parameter	Age under 60 years (n = 6)	Age over 60 years (n = 34)	P value
SSQOL total before	156.50 ± 4.57	110.52 ± 16.75	0.019
SSQOL total after 1 year	210 ± 8.45	153.25 ± 17.38	0.005
SSQOL energy before	10.30 ± 1.57	7.36 ± 1.45	0.056
SSQOL energy after 1 year	12.2 ± 0.82	7.81 ± 2.08	0.045
SSQOL family roles before	11 ± 0.81	8.11 ± 0.94	0.009
SSQOL family roles after 1 year	11.53 ± 1.81	8.50 ± 1.59	0.007
SSQOL language before	10.50 ± 0.90	13.36 ± 1.83	0.015
SSQOL language after 1 year	18.25 ± 4.95	17.56 ± 2.23	0.03
SSQOL mobility before	19 ± 3.41	14.43 ± 0.92	0.104
SSQOL mobility after 1 year	24 ± 1.41	18.96 ± 1.61	0.063
SSQOL mood before	16.25 ± 1.25	13.98 ± 1.25	0.126
SSQOL mood after 1 year	21.50 ± 0.57	18.56 ± 1.70	0.067
SSQOL personality before	10.50 ± 0.57	7.32 ± 0.89	0.173
SSQOL personality after 1 year	12 ± 0.81	8.25 ± 1.43	0.032
SSQOL self-care before	15.50 ± 0.70	12.15 ± 1.25	0.204
SSQOL self-care after 1 year	23.25 ± 1.25	17.28 ± 1.41	0.052
SSQOL social roles before	15.50 ± 1.57	10.19 ± 1.98	0.108
SSQOL social roles after 1 year	13.25 ± 4.55	12.16 ± 2.80	0.061
SSQOL thinking before	8.20 ± 1.28	7.76 ± 0.78	0.098
SSQOL thinking after 1 year	12.75 ± 1.50	8.98 ± 1.73	0.047
SSQOL upper motor function before	15.50 ± 0.57	12.7 ± 0.83	0.163
SSQOL upper motor function after 1 year	21.50 ± 2.70	13.38 ± 3.25	0.039
SSQOL vision before	11.25 ± 0.50	7.51 ± 2.70	0.028
SSQOL vision after 1 year	13 ± 0.71	7.93 ± 1.40	0.024
SSQOL work before	8.25 ± 0.50	4.89 ± 1.94	0.302
SSQOL work after 1 year	12.50 ± 0.57	7.14 ± 1.96	0.004

SSQOL: stroke-specific quality of life.

of education, which leads to a greater chance of being non-adherent to the long-term treatment of rehabilitation. 2) There is a significant difference between the revenues allocated to home rehabilitation services in urban and rural areas. 3) In rural regions, there is a lack of medical staff to encourage the active participation of the patient in the therapy.

These explanations are also supported by another correlation that we have determined in the present work: patients with a high level of education (university studies) made the most significant progress in language recovery. Moreover, the fact that most intellectuals were active and wanted a professional reintegration was an additional reason behind the active improvement of their QOL. We did not find studies that directly describe the relationship between the area of living and post-stroke rehabilitation. In studies evaluating the influence of the level of education on rehabilitation [33, 46-49], the direct correlation between a high level of education and a better recovery has been observed; this tendency was also observed in this work.

Comorbidities may influence not only stroke occurrence, but also rehabilitation measures and QOL. In our group, there were numerous patients with associated diseases (obesity, high blood pressure, diabetes and atrial fibrillation) who had altered values of SSQOL index. These data are in line with the literature that shows lower QOL in diabetic patients [50]. Moreover, the combination of more comorbidities can affect both motor function and neuropsychological functions such as memory and cognition [51, 52].

An important dimension that was not explored in this work was the influence of depression installed after stroke on QOL. According to Thompson and Ouden [53], depression is a considerable factor in the acute post-stroke period, affecting 25% of patients. On the other hand, a study [54] showed that depression is also predominant in the chronic post-stroke period, possibly influencing rehabilitation. The results of other researches showed that QOL was profoundly affected by depression, which also had a negative influence on the function of language [55-58].

Finally, family support was found to be an important factor that increases the QOL. All patients living with at least one relative had significantly higher SSQOL indices than those living alone or in nursing homes. Our research data are similar to the results of a study conducted in Portugal and Luxembourg that demonstrated a strong correlation between patient satisfaction and family integration in aphasia rehabilitation therapy [49] as well as other works [59-62].

Limitations and strengths

This study is a prospective one, and its major strength is the accuracy of data collection, the close follow-up of the patients and the multitude of variables which were studied.

However, this study also has its limitations. Compared to other cohort studies, the dimension of the cohort in this work is small (only 40 patients); this is mostly due to the harsh exclusion criteria which, on the other hand, makes the final result more accurate.

Another limitation of this work would be the absence of the study of depression in the post-stroke context. The correlation between particular damaged areas of the brain after stroke and psychiatric disorders such as depression is a topic of great interest for both neurologists and psychiatrists. However, as the patients from this group are still under monitoring and have the opportunity to re-enter our clinic for continuation of rehabilitation therapy, there is a high possibility to complete this study with references to psychiatric symptoms or other factors thought to influence the rehabilitative process [63-75].

Conclusions

Stroke is a major health problem in Romania with neurologists focusing more on the subacute and chronic rehabilitation stages.

This work was divided into two parts: first, the socio-demographic and clinical aspects of the group were highlighted, and the second part was dedicated to the study of QOL and its influencing factors. The members of the study group were predominantly men (55%), with a mean age of 70 ± 11.89 years, living in urban areas (55%), surprisingly non-smokers and chronically non-consumers of ethanol.

Concerning the risk factors, obesity, high blood pressure, diabetes and atrial fibrillation were statistically significant comorbidities (statistical $P \leq 0.001$), which is in line with all studies dedicated to the study of influencing factors for stroke occurrence [34-41, 45, 49-79]. Because stroke occurred in the left middle cerebral artery, all patients included in the study had a low or high degree of aphasia with the predominance of expressive aphasia.

An essential factor for stroke patients is the QOL, which in recent years has been measured using different scales. Although a specific scale (SSQOL) has been developed for patients with stroke, it is subjective and has limitations.

The QOL index depends on many modifiable and unchangeable factors; however, because of the small number of patients in our study, the continuation of research to establish an exact correlation is necessary.

Gender does not influence the outcome of 1-year rehabilitation. Age is a good predictor for rehabilitation as younger patients (under 60 years) improve significantly in their QOL compared to the elderly. Urban domicile and higher educational status (university studies) are positive factors for good rehabilitative probability and a satisfactory outcome. Family support from the very beginning of the rehabilitation therapy benefits the patient.

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Conflict of Interest

The author states that there was no conflict of interest.

Informed Consent

Informed consent was taken from all the patients.

Data Availability

The authors declare that data supporting the findings of this study are available within the article.

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