Pomeranian J Life Sci 2025;71(2):69-73 doi: 10.21164/pomjlifesci.1156

Quality of life and functional capacity of patients after ischemic stroke

Ewa Kupcewicz[1, A] ✉, Sylwia Iwona Żaczkiewicz[2, B], Aleksandra Bentkowska[3, C]

[1] University of Warmia and Mazury in Olsztyn, Collegium Medicum, Department of Nursing, School of Public Health, Żołnierska 14c, 10-561 Olsztyn, Poland
[2] Provincial Specialist Hospital in Olsztyn, Neonatology and Neonatal Intensive Care Unit, Żołnierska 18, 10-561 Olsztyn, Poland
[3] Independent Public Provincial Specialist Hospital in Chełm, Dermatology Department, Ceramiczna 1, 22-100 Chełm, Poland

[A] ORCID: 0000-0002-0641-3979; [B] ORCID: 00009-0002-9035-4496; [C] ORCID: 0009-0005-2187-617X

✉ ewa.kupcewicz@uwm.edu.pl

ABSTRACT

Introduction: The World Health Organization defines quality of life as an individual's perception of their position in life within the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns. The aim of this study was to assess the quality of life of individuals following ischemic stroke in relation to their functional capacity.

Materials and methods: A survey was conducted among 50 patients after ischemic stroke and a control group of 50 healthy individuals. The research method was a diagnostic survey, and data were collected using the SF-36 quality of life questionnaire and the Lawton Instrumental Activities of Daily Living Scale.

Results: The mean age of the patients was 68.42 ±11.6 years. The average quality of life scores in both the physical (M = 43.6, SD ±12.0) and mental domains (M = 36.9, SD ±11.2) were significantly lower than those of the healthy control group (physical domain: M = 90.5, SD ±13.8; mental domain: M = 45.7, SD ±5.4). A negative correlation was found between functional capacity and quality of life in the physical health domain, associated with the presence of pain symptoms ($r = -0.59$; $p < 0.0001$).

Conclusions: Quality of life is significantly reduced in patients following ischemic stroke, and functional capacity is closely related to quality of life in both the physical and mental domains.

Keywords: stroke; quality of life; functional capacity.

INTRODUCTION

The World Health Organization defines quality of life as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns" [1]. The quality of life of stroke patients depends on both objective and subjective factors. Objective factors include health status (based on test results), psychopathological presentation, financial condition, and social contacts (both their quantity and quality). Subjective factors include physical aspects (pain, constipation, insomnia), psychological aspects (depression, anxiety, low self-esteem), social aspects (lack of satisfaction with work, reduced social engagement, diminished enjoyment of leisure activities, worsening financial situation), and interpersonal factors such as social support [2].

It is well established that functional capacity decreases after a stroke. In Western Europe, 50% of patients remain permanently disabled, whereas in Poland, this figure reaches up to 70% [3]. Brain damage resulting from stroke leads to motor function impairment. Literature data indicate that 6 months after a stroke, 50% of patients still present with hemiplegia, and 30% with persistent motor coordination disorders. Additionally, 22% of patients are unable to walk independently, and 24–53% require assistance with activities of daily living. About 70% of patients have difficulty walking, and 30% suffer from severe motor deficits [4, 5].

While a significant number of individuals regain independent ambulation, their gait is often inefficient. Both household and community mobility remain limited. Walking, though possible, requires substantial effort and is typically slow; the more functional limb bears greater load due to prolonged support time, and step lengths vary depending on the side in use. This inefficient gait limits the distance patients can cover and restricts their ability to perform basic daily activities. Without assistance, many patients are unable to leave their homes [4, 6, 7].

Damage to upper motor neurons after stroke results in upper limb dysfunction. Initially, the limb is flaccid, followed by spasticity. These issues highlight the importance of appropriate care and rehabilitation [8]. Patients with spasticity experience significant difficulties in performing daily tasks and often depend on others for support. Seizures are a common complication after stroke, with post-stroke epilepsy occurring in an estimated 3–30% of patients. For this reason, family members should be trained in first aid, and patients should not be left alone [2, 9].

Preventing systemic complications in the early post-stroke phase is crucial, as they can lead to long-term disability. For instance, early-stage edema makes limbs more vulnerable to damage and abrasions, which can later impede mobility and daily function. The same applies to the development of pressure ulcers [2, 10].

The aim of this study was to assess the quality of life of individuals after ischemic stroke in relation to their functional capacity.

MATERIALS AND METHODS

Study organization

A survey was conducted among 50 patients after ischemic stroke and a control group of 50 healthy individuals. The research was carried out in the neurological wards of 3 hospitals in Olsztyn, day care centers, and the patients' home environments. Inclusion

criteria for the study group included: obtaining consent from the medical facility or social assistance center to conduct the research, a history of ischemic stroke, and the respondent's informed consent to participate. Exclusion criteria included refusal to participate and difficulties in communicating with the patient. Prior to participation, all individuals were informed about the study's purpose and the procedure for completing the questionnaires. Participants were given the opportunity to ask questions and receive detailed information. The study was anonymous, and participants could withdraw at any time. The average duration of participation was approx. 20 min. Data were collected using Microsoft Excel and analyzed collectively.

Research tools used

The study employed a diagnostic survey method using 2 validated instruments to measure the variables of interest:

- Lawton Instrumental Activities of Daily Living Scale (IADL) [11];
- SF-36 quality of life assessment questionnaire [12].

Additionally, an author-designed questionnaire was used to collect socio-demographic and medical data. This included questions on: age, marital status, place of residence, employment status, financial situation, disability status, height and weight, comorbidities, social support, and types of rehabilitation used.

Lawton Instrumental Activities of Daily Living Scale

The IADL is used to assess the ability to perform more complex activities necessary for independent living. It evaluates 8 domains: using the telephone, shopping, meal preparation, housekeeping, laundry, transportation, medication management, and managing finances. Each domain is scored from 3 points (independent) to 1 point (completely dependent). The total score ranges up to 24 points, with lower scores indicating a decline in health status, impaired daily functioning, increased disability, and greater dependence on others [11].

SF-36v2 quality of life assessment questionnaire

The SF-36v2 questionnaire assesses subjective health status and includes 11 questions encompassing 36 items that form 8 domains: physical functioning, role limitations due to physical health, pain, general health perception, vitality, social functioning, role limitations due to emotional problems, and mental health. Four domains (1, 2, 4, 8) comprise the physical health component (maximum score: 130), while the remaining 4 (3, 5, 6, 7) comprise the mental health component (maximum score: 68). The overall quality of life score is the sum of all 8 domains [12].

Statistical analyses

Statistical analysis was conducted using the Polish version of Statistica 12. Categorical variables were described using the number of cases (N) and their percentage (%) in the study group. To assess differences in quality of life between post-stroke patients and healthy controls, the Mann–Whitney U test was used.

The Shapiro–Wilk test assessed the normality of variable distribution. Relationships between selected variables were evaluated using the Spearman correlation coefficient (r). A p-value of < 0.05 was considered statistically significant.

RESULTS

Characteristics of the study group

The study involved 50 patients after ischemic stroke, aged 37–87 years, with a mean age of 68.42 ±11.6 years. The group included 30 males (60%) and 20 females (40%). The majority were married (n = 28; 56%). Analysis of education levels revealed that 42% (n = 21) had basic or vocational education, while 32% (n = 16) had completed secondary, post-secondary, or college education. Most participants (n = 35; 70%) were retired, and over half (n = 28; 56%) lived in urban areas.

A certified degree of disability was present in 66% of patients (n = 33), including 28 with severe, 3 with moderate, and 2 with mild disability. For 74% of patients (n = 37), the stroke was their first occurrence. Hemiplegia was present on the right side in 58% of cases (n = 29), and 66% (n = 33) experienced speech disorders. The vast majority (n = 44; 88%) reported receiving support from close relatives. In most cases, rehabilitation began within 1–7 days after diagnosis, and 68% (n = 34) reported continuation of rehabilitation in a rehabilitation ward following neurological treatment.

In terms of comorbidities, 92% had diagnosed hypertension, 30% had atherosclerosis, and 24% had diabetes. The largest subgroup of patients was in the early post-stroke phase (up to 12 months; 46%). Others had experienced a stroke 1–3 years prior (22%) or more than 3 years earlier (32%).

The control group consisted of 50 individuals aged 48–85 years, with a mean age of 65.74 ±9 years, including 26 males (52%) and 24 females (48%). The majority were married (n = 28; 56%), had average education (n = 19; 38%), were professionally active (n = 25; 50%) or retired (n = 20; 40%), and lived in urban areas (n = 33; 66%).

Statistical analysis showed that the study and control groups were comparable in terms of age ($t = 1.29$; $p = 0.19$), sex ($\chi^2 = 1.44$; $p = 0.22$), and place of residence ($\chi^2 = 1.05$; $p = 0.30$). However, significant differences were found in education level ($\chi^2 = 9.44$; $p = 0.02$) and occupational status ($\chi^2 = 17.08$; $p = 0.009$), with the stroke group consisting mainly of individuals with primary education and those who were not professionally active (retired or receiving disability pensions).

Evaluation of complex daily living activities

The assessment of complex daily living activities was conducted using the IADL. The evaluation considered stroke patients' ability to function in contemporary environments. Parameters assessed included the ability to use the telephone, travel beyond normal walking distances, purchase and prepare meals, perform basic household tasks (such as cleaning, minor repairs like changing a light bulb, and laundry), manage medications independently, and handle financial matters.

The average functionality score was 18.1 ±4.5, with a median of 19, providing an approximate measure of the patient's need for assistance or care. Data analysis showed that 10%

of patients were bedridden, 42% led a sedentary-ambulatory lifestyle, 10% were sedentary, 12% were in a lying-sitting condition, and 26% were fully ambulatory.

Participants' independence in changing body positions in bed was also evaluated. Seventy percent of stroke patients reported full independence, 16% reported limited independence, and 14% reported slightly limited independence. Independent functioning was closely associated with physical activity and physical fitness. Most stroke patients in the study moved independently without assistive devices or support, although some used a cane, a single crutch, or a walker.

The methods of mobility among stroke patients are illustrated in Figure 1.

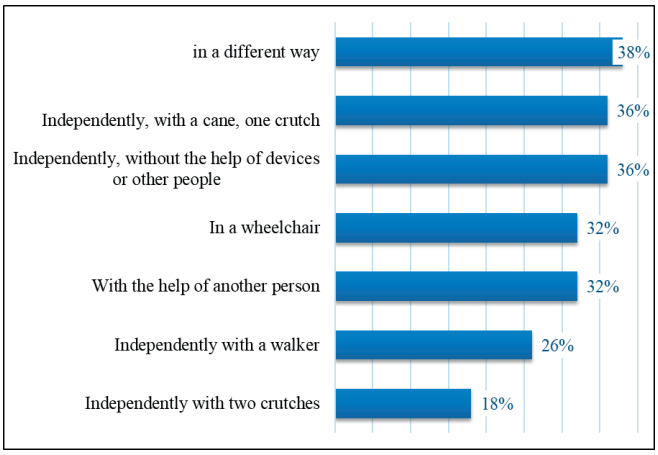

FIGURE 1. Methods of movement of stroke patients

Quality of life of stroke patients and healthy individuals in the control group – comparative analysis

To assess quality of life in the physical and mental domains among stroke patients and healthy individuals in the control group, the SF-36v2 questionnaire was employed. Analysis of the collected data revealed that individuals in the control group had significantly higher quality of life scores in the physical domain compared to stroke patients ($U = 74.5$; $p < 0.0001$). However, further analysis of the individual components within the physical domain showed variation in quality of life between the 2 groups.

Control group participants demonstrated significantly higher quality of life in terms of physical functioning ($U = 98.0$; $p < 0.0001$) and health-related physical activity ($U = 97.0$; $p < 0.0001$) compared to stroke patients.

In the pain-related component of the SF-36 scale, quality of life was significantly lower in the stroke group ($U = 542.5$; $p < 0.0001$), indicating that pain substantially impaired the functioning of these individuals. Detailed results are presented in Table 1.

The comparison of the mean quality of life scores between stroke patients and healthy individuals in the control group, within the physical domain and its 4 components, is presented in Figure 2.

Comparing the mean quality of life scores of stroke patients and healthy individuals in the control group in the mental domain and its 4 components, particular attention is drawn to the component related to emotion-driven activity. The results showed that patients had significantly lower mean quality of life scores compared to healthy individuals in the control group (Fig. 3).

TABLE 1. Comparison of the quality of life of patients and healthy individuals in the control group

No.	SF-36v2	Study group n = 50	Control group n = 50	Mann–Whitney U test	p
		M ±SD; Me; min.–max.	M ±SD; Me; min.–max.		
Physical domain		43.6 ±12.0; 42.9; 19.0–76.2	90.5 ±13.8; 100.0; 50.0–100.0	74.5	**0.0001**
1.	physical fitness	28.3 ±27.8; 25.0; 0.0–100.0	91.9 ±13.4; 97.5; 45.0–100.0	98.0	**0.0001**
2.	health-related physical activity	17.7 ±9.6; 17.5; 0.0–80.0	69.5 ±15.0; 75.0; 25.0–80.0	97.0	**0.0001**
3.	pain symptoms	44.4 ±29.6; 50.0; 0.0–90.0	14.4 ±18.5; 0.0; 0.0–70.0	542.5	**0.0001**
4.	overall health perception	69.1 ±15.2; 70.0; 35.0–95.0	62.5 ±13.9; 57.5; 45.0–90.0	908.5	**0.02**
Mental domain		36.9 ±11.2; 34.8; 19.6–67.9	45.7 ±5.4; 44.6; 33.9–57.1	644.0	**0.0003**
1.	vitality	38.4 ±10.2; 40.0; 15.0–60.0	35.6 ±5.31; 35.0; 25.0–45.0	1030.5	0.13
2.	social functioning	55.5 ±19.4; 50.0; 0.0–100.0	46.3 ±13.2; 50.0; 0.0–75.0	851.5	**0.006**
3.	activity related to emotional state	40.8 ±30.4; 29.2; 0.0–100.0	90.5 ±13.8; 100.0; 50.0–100.0	188.5	**0.0001**
4.	mental health	28.2 ±11.8; 25.0; 5.0–55.0	29.6 ±6.8; 30.0; 15.0–45.0	1078.5	0.23

statistically significant: $p < 0.05$; $p < 0.01$; $p < 0.001$
M – mean; SD – standard deviation; Me – median

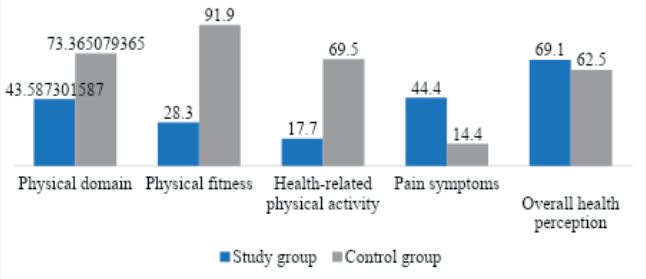

FIGURE 2. Comparison of the mean quality of life scores between stroke patients and healthy individuals in the control group in the physical domain and its 4 components

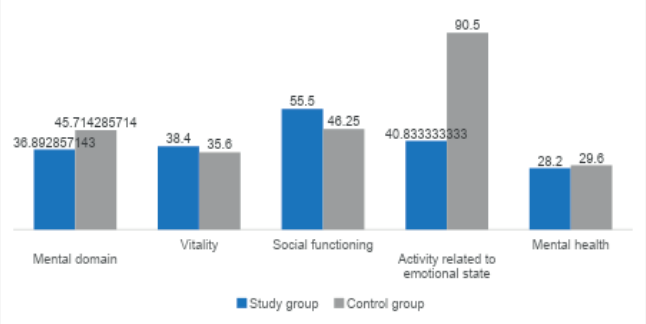

FIGURE 3. Comparison of the mean quality of life scores between stroke patients and healthy individuals in the control group in the mental domain and its 4 components

Functional capacity of the examined individuals and quality of life of patients after ischemic stroke

Further statistical analyses examined the relationship between functional capacity and quality of life in patients after ischemic stroke. The results showed a positive correlation in the physical health domain between functional capacity and both physical functioning ($r = 0.66$; $p < 0.0001$) and health-related physical activity ($r = 0.33$; $p < 0.02$). In the mental health domain, a positive correlation was observed only for the component related to activity influenced by emotional state ($r = 0.45$; $p < 0.0001$).

Conversely, a negative correlation was found between functional capacity and quality of life in the physical health domain in relation to pain symptoms ($r = -0.59$; $p < 0.0001$), indicating that greater pain is associated with lower functional capacity – Table 2.

DISCUSSION

In recent years, growing interest in the quality of life of individuals who have experienced an ischemic stroke has been observed, coinciding with a steady increase in stroke incidence. According to the World Health Organization, between 1990–2019, the global incidence of stroke rose by nearly 70%. The annual global cost associated with stroke is estimated at 721 billion USD [13], encompassing not only direct medical expenses but also the long-term consequences of physical, psychological, social, and occupational impairments.

Individuals who have suffered cerebrovascular events face not only physical limitations but also psychological, social, and professional challenges. Stroke-related disability presents a particularly difficult situation for patients. Anxiety and uncertainty about the future can lead to emotional disturbances, depression, and social isolation – especially among individuals who live alone [14]. Their previous way of life changes significantly, and many patients abandon established habits and routines. Quality of life remains a subjective construct, shaped by personal values, personality traits, habits, and environmental context, both past and present. As reported in the literature and confirmed by multiple studies, stroke survivors generally report lower subjective assessments of quality of life [13, 14, 15, 16, 17].

TABLE 2. Correlational relationships between the level of functional capacity and the quality of life of patients after stroke

No.	SF-36v2	IADL	
		r	p
Physical domain		**0.36**	**0.01**
1.	physical fitness	**0.66**	**0.0001**
2.	health-related physical activity	**0.33**	**0.02**
3.	pain symptoms	**–0.59**	**0.0001**
4.	overall health perception	–0.16	0.24
Mental domain		**0.34**	**0.01**
1.	vitality	–0.001	0.99
2.	social functioning	–0.06	0.66
3.	activity related to emotional state	**0.45**	**0.0001**
4.	mental health	0.26	0.06

statistically significant: $p < 0.05$; $p < 0.01$; $p < 0.001$
SF-36v2 – questionnaire assessing quality of life; IADL – Lawton Instrumental Activities of Daily Living Scale; r – Spearman's correlation coefficient

Within the holistic model of care, assessing a patient's quality of life and identifying the most affected domains are essential components of both therapeutic and caregiving processes [18]. In the present study, the most common comorbidity reported among participants was arterial hypertension (92%). Similar findings were reported by Jaracz and Kozubski, where hypertension affected over 50% of the study group. In the current sample, right-sided hemiplegia was present in 58% of patients, consistent with literature reports indicating a higher incidence of right-sided paralysis following stroke [19].

Our findings revealed significantly lower quality of life scores in both the physical and mental domains among stroke survivors compared to the control group. These results align with those of Jaracz and Kozubski, who also reported significantly lower quality of life among stroke patients in both general and specific domains [19, 20].

International research supports these observations. A study conducted in Romania during the COVID-19 pandemic documented a substantial decrease in quality of life among both stroke patients and their caregivers. Factors such as age, sex, employment status, duration of hospitalization, stroke type, and Barthel Index scores significantly influenced quality of life 90 days post-stroke [21]. Another study found that the quality of life in the first 6 months following ischemic stroke may follow

various trajectories, with these changes linked to long-term patient survival [22]. Research by Du et al. showed that functional disability trajectories during the 12 months following a stroke were associated with the risk of adverse outcomes over the subsequent 24 months. Patients with persistent severe or severe-to-moderate disability were at increased risk of cardiovascular events and all-cause mortality [23].

This study draws particular attention to the negative correlation between pain severity and quality of life in stroke patients. Effective pain management can significantly enhance quality of life in this population. Chronic pain therapy should be considered a key component of comprehensive care, especially for individuals experiencing high levels of disability and complications such as musculoskeletal pain, pressure ulcers, and neuropathic pain due to central nervous system injury.

Further research on quality of life after ischemic stroke is warranted. In conclusion, this analysis emphasizes the critical importance of continued access to rehabilitation services for stroke patients, regardless of the time elapsed since the event, and highlights the need for individualized therapeutic planning and delivery.

This study has certain limitations. The use of purposive sampling limits the generalizability of findings. Comorbidities that may have influenced subjective quality of life assessments were not fully controlled. Moreover, the relatively small sample size (n = 50) reduces the statistical power of the conclusions and underscores the need for further research involving larger and more diverse populations.

CONCLUSIONS

1. The quality of life of patients after an ischemic stroke is significantly reduced, and functional ability is closely associated with quality of life in both the physical and mental domains.
2. In the study group, a negative correlation was observed between functional ability and quality of life in the physical health domain, particularly in relation to pain symptoms.
3. These findings highlight the need for systematic monitoring of pain as a component of quality of life assessment. Effective pain management should be an integral part of the rehabilitation process, as it can improve both daily functioning and patients' subjective well-being.
4. Comprehensive post-stroke rehabilitation should include not only interventions aimed at improving motor function but also measures focused on mental health, such as psychotherapy and cognitive training.

REFERENCES

1. Definicja zdrowia i jakości życia. World Health Organization. http://gabinetzdrowia.net.pl/definicja-zdrowia-i-jakosci-zycia-wg-who.php (7.05.2024).
2. Brola W, Węgrzyn W. Jakość życia po udarze mózgu. Stud Med AŚ 2006;3:161-7.
3. Rykała J. Wpływ masy ciała na jakość życia i częstość występowania powikłań u osób po udarze mózgu. Prz Med UR 2009;4:375-83.
4. Drużbicki M, Kwolek A, Przysada G, Pop T, Depa A. Ocena funkcji chodu chorych z niedowładem połowiczym po udarze mózgu w okresie przewlekłym. Przegl Med Uniw Rzesz 2010;2:145-51.
5. Grochulska A, Jastrzębska M. Poprawa stanu funkcjonalnego osób po przebytym udarze mózgu – rola pielęgniarki. Probl Pielęg 2012;20(3):300-9.
6. Dębiec-Bąk A, Mraz M, Mraz M, Skrzek A. Jakościowa i ilościowa ocena chodu osób po udarze mózgu. Acta Bio-Opt Inform Med Inż Biom 2007;13(2):97-100.
7. Perry J, Garrett M, Gronley JK, Mulroy SJ. Classification of walking handicap in the stroke population. Stroke 1995;26(6):982-9.
8. Kijowski S. Najczęstsze problemy w usprawnianiu porażonej kończyny u chorych po udarze mózgu. Przegl Med Uniw Rzesz 2009;2:169-73.
9. Romaniak A, Barańska-Gieruszczak M. Padaczka poudarowa. Neurol Neurochir Pol 1998;32:603-13.
10. Kwolek A. Postępowanie i profilaktyka powikłań w ostrej fazie udaru mózgu z uwzględnieniem wczesnej rehabilitacji. Post Rehab 1996;10:95-101.
11. Skala oceny złożonych czynności życia codziennego (IADL). Nursing, PZWL. https://nursing.com.pl/artykul/skala-oceny-zlozonych-czynnosci-zycia-codziennego-iadl-631077835b20433134408f9f (7.05.2024).
12. Tylka J, Piotrowicz R. Kwestionariusz oceny jakości życia SF-36 – wersja polska. Kardiol Pol 2009;67(10):1166-9.
13. Feigin VL, Brainin M, Norrving B, Martins S, Sacco RL, Hacke W, et al. World Stroke Organization (WSO): Global Stroke Fact Sheet 2022. Int J Stroke 2022;17(1):18-29.
14. Haley WE, Roth DL, Kissela B, Perkins M, Howard G. Quality of life after stroke: a prospective longitudinal study. Qual Life Res 2011;20(6):799-806.
15. Sokolnicka H, Mikuła W. Medycyna a pojęcie jakości życia. Med Rodz 2003;3-4:126-8.
16. 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.
17. Ramos-Lima MJM, de Carvalho Brasileiro I, de Lima TL, Braga-Neto P. Quality of life after stroke: impact of clinical and sociodemographic factors. Clinics (Sao Paulo) 2018;73:e418.
18. Trojanowska A. Znaczenie badań nad jakością życia w medycynie. Pol J Publ Health 2011;121(1):99-103.
19. Jaracz K, Kozubski W. Jakość życia po udarze mózgu. Część I – badanie prospektywne. Udar Mózgu 2001;3(2):55-61.
20. Jaracz K, Kozubski W. Jakość życia chorych po udarze mózgu w świetle badań empirycznych. Aktualości Neurologiczne (Warszawa) 2002;2(1):35-45.
21. Pădureanu V, Albu CV, Caragea DC, Bugă AM, Florescu MM, Pădureanu R, et al. Quality of life three months post-stroke among stroke patients and their caregivers in a single center study from Romania during the COVID-19 pandemic: A prospective study. Biomed Rep 2023;19(2):52. doi: 10.3892/br.2023.1635.
22. Hu M, Zhang B, Lin Y, Xu M, Zhu C. Trajectories of post-stroke quality of life and long-term prognosis: Results from an eleven-year prospective study. J Psychosom Res 2023;173:111466. doi: 10.1016/j.jpsychores.2023.111466.
23. Du J, Zhai Y, Dong W, Che B, Miao M, Peng Y, et al. One-year disability trajectories and long-term cardiovascular events, recurrent stroke, and mortality after ischemic stroke. J Am Heart Assoc 2024;13(3):e030702. doi: 10.1161/JAHA.123.030702.