

**IMPACT OF PHYSICAL THERAPY ON QUALITY OF LIFE IN THE CAREGIVERS
OF PATIENTS WITH STROKE AND APHASIA**
**VPLYV FYZIKÁLNEJ TERAPIE NA KVALITU ŽIVOTA U OPATROVATEĽOV PACIENTOV
S CIEVNOU MOZGOVOU PRÍHODOU A AFÁZIOU**

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ABSTRACT

Theoretical background: Stroke is one of the worldwide reasons for the rising costs in a health care area and the leading cause of disability. Stroke complications such as sensorimotor aphasia negatively affect various aspects of quality of life (QoL) of informal caregivers of post-stroke patients.

Objective: To research the impact of physical therapy intervention on the QoL of informal caregivers of post-stroke patients with sensorimotor aphasia.

Research sample and method: The study involved 62 informal caregivers of post-stroke patients with sensorimotor aphasia. The assessment of the QoL of caregivers was performed using a short questionnaire “The World Health Organization Quality of Life”.

Results: After the rehabilitation intervention, statistically significant positive dynamics were observed in the following domains of QoL in caregivers of post-stroke patients with aphasia: “physical health,” “psychological health,” and “environment”. Between the intervention group and the comparison group, there was a statistically significant difference in the domains of physical health and mental health in favour of the intervention group.

Conclusions: The use of physical therapy for post-stroke patients with aphasia contributed to a statistically significant improvement in the QoL of their informal caregivers. This suggests that informal caregivers of people with aphasia also benefit from rehabilitation. Furthermore, the application of the developed algorithm of physical therapy for post-stroke patients with aphasia contributed to more significant positive changes in the QoL indicators of their informal caregivers, which indicates the advantages of the developed strategy.

Key words: Stroke. Aphasia. Caregivers. quality of life. Physical therapy.

ABSTRAKT

Východiská: Mŕtvica je jednou z hlavných nákladov na zdravotnú starostlivosť a hlavnou príčinou invalidity na celom svete. Komplikácie mŕtvice, ako napríklad senzomotorická afázia, negatívne ovplyvňujú rôzne aspekty kvality života (KŽ) neformálnych opatrovateľov pacientov po mŕtvici.

Ciele: Výskum vplyvu fyzikálnej terapie na kvalitu života neformálnych opatrovateľov pacientov po cievnnej mozgovej príhode so senzomotorickou afáziou.

Súbor a metódy: Štúdie sa zúčastnilo 62 neformálnych opatrovateľov pacientov po mozgovej príhode so senzomotorickou afáziou. Hodnotenie KŽ opatrovateľov bolo realizované pomocou krátkeho dotazníka “Kvalita života Svetovej zdravotníckej organizácie”.

Výsledky: Po rehabilitačnej intervencii sme zistili štatisticky významnú pozitívnu dynamiku v nasledujúcich doménach KŽ u opatrovateľov pacientov po mozgovej príhode s afáziou: „fyzické zdravie“, „psychologické zdravie“ a „životné prostredie“. Medzi intervenčnou skupinou a porovnávacou skupinou sme zistili štatisticky významný rozdiel v doménach fyzického zdravia a duševného zdravia v prospech intervenčnej skupiny.

Záver: Použitie fyzikálnej terapie u pacientov po mozgovej príhode s afáziou prispelo k štatisticky významnému zlepšeniu KŽ ich neformálnych opatrovateľov. To naznačuje, že z rehabilitácie môžu benefitovať aj neformálni opatrovatelia ľudí s afáziou. Aplikácia vyvinutého algoritmu fyzikálnej terapie u pacientov po cievnnej mozgovej príhode s afáziou prispela k výraznejším pozitívnym zmenám v KŽ ich neformálnych opatrovateľov, čo poukazuje na výhody vyvinutej metodiky.

Kľúčové slová: Mŕtvica. afázia. Opatrovatelia. kvalita života. Fyzická terapia.

INTRODUCTION

Among all non-communicable and neurological diseases, stroke is one of the most destructive diseases, often leading to death cases or permanent disability (Mukherjee et al., 2011; Norving et al., 2013). The annual worldwide incidence of stroke is fifteen million, and five million remain living with disabilities (Katan et al., 2018).

The consequences of stroke cause a persistent decrease in the ability to self-care in daily living and can also negatively impact the activities of daily living of the patient’s family members. One of the severe complications of stroke is aphasia. It is acquired as a communication disorder caused by brain damage and characterised by impaired voice, articulation, and mental modalities such as speaking, listening, reading, and writing (Chapey, 2008).

The difficulties faced by people with aphasia can be different. There are unexpected problems with finding words to almost complete loss of the ability to speak, read or write (Tamplin, 2008). Sensorimotor aphasia is a comorbid disorder resulting from a stroke, affecting the ability to process speech from

outside and reproduce speech, loss of the ability to communicate orally, by signs or in writing, or inability to understand such communication, loss of ability to use language (Elsner et al., 2019). The ability to communicate verbally is an essential factor in human independence. Aphasia in stroke survivors often has a very profound negative effect on the so-called informal caregivers of the patient, who usually are members of their family (Kniepman et al., 2014).

The “informal caregiver of a person with aphasia” in this study refers to a family member assigned to provide unpaid care to another family member who has aphasia due to a stroke. Informal caregivers tend to facilitate the participation of a person with a stroke in their daily functional activities and play a vital role in the social reintegration of post-stroke patients (Kulkarni, 1992).

Considering informal caregivers may often have no experience in caring for a post-stroke patient this new role and responsibility may negatively impact their psychological, physical and social condition (Saban et al., 2012; Masuku et al., 2018). Currently, the problem of improving the health level and quality of life has become one of the most important for modern society (Dereka, 2020; Radziejowska et al., 2021). This leads to a growing interest in the assessment of quality of life (QOL) in informal caregivers of post-stroke patients with aphasia. According to World Health Organization (WHO) experts, quality of life is an integral characteristic of a person’s physical, psychological, emotional, and social functioning, based on their subjective perception (World Health Organization, 1996).

The effect of aphasia in post-stroke patients on the QoL of their informal caregivers has been studied in several studies (Bergström et al., 2011; Mcpherson et al., 2011; Jaracz et al., 2015; Bertilsson et al., 2016). The main factors deteriorating the QoL in informal caregivers of people with aphasia were depressive symptoms (Servaes et al., 1999; Bakas et al., 2006; Gunawan et al., 2021), changing social roles (Servaes et al., 1999), financial problems, physical health disorders (Bakas et al., 2006).

In low-income countries, the burden on guardians is estimated to be higher than in high-income countries (Akosile et al., 2013), mainly due to the difficult economic situation and poor support from the health care system. In the acute phase of the disease, caregivers experience more stress (Akosile et

al., 2018), but the total load decreases over time (Jaracz et al., 2015). However, among studies examining the QoL in caregivers of post-stroke patients with aphasia, there is a lack of data on the dynamics of quality of life of informal caregivers in the process of rehabilitation of patients.

Physical therapy plays an essential role in restoring or compensating for lost functions among rehabilitation interventions for post-stroke patients (Ottawa Panel, 2006). The involvement of informal caregivers in physical therapy increases the effectiveness of rehabilitation (Vloothuis et al., 2016) and is necessary for patients with sensorimotor (total) aphasia. At the same time, problems in communication between the physical therapist and the patient with aphasia lead to the need for more extended treatment, often further disability, and greater patient dependence in everyday life on the help of outsiders, which in turn increases the burden on informal caregivers. The previous study presented the justification for the algorithm of physical therapy measures for post-stroke patients with aphasia based on visualization and physical facilitation during the implementation of therapeutic exercises by the patient (Sybiriakin et al., 2021). This study is devoted to the study of the impact of the developed algorithm on the QoL of informal caregivers of post-stroke patients.

OBJECTIVE

To research the impact of physical therapy intervention on the QoL in informal caregivers of post-stroke patients with sensorimotor aphasia

RESEARCH SAMPLE

The study involved 62 informal caregivers of patients with sensorimotor post-stroke aphasia. The research was conducted in the Municipal Non-Commercial Enterprise “Alexander Clinical Hospital of Kyiv”.

All participants engaged in the study signed an informed consent form. The survey was conducted in compliance with the international principles of the Helsinki Declaration of the World Medical Association (World Medical Association, 2013) and following the Law of Ukraine, “Fundamentals of Ukrainian legislation on health care” (Law of Ukraine, 1992) about ethical norms and rules of medical research with human participants. Furthermore, the study was approved by the commission on

biomedical ethics of the National University of Ukraine on Physical Education and Sports.

Inclusion criteria: the participant had to be an informal caregiver of a person with post-stroke aphasia; only caregivers of patients with total sensorimotor aphasia were included in the study; caregivers' consent to participate in the study. The study involved the family member who spent most of the time with the patient and caring for him.

METHODOLOGY

Assessing the QoL of caregivers was performed using a short WHO questionnaire, "The World Health Organization Quality of Life" (WHOQOL-BREF) (Gholami et al., 2013). WHOQOL-BREF is a self-administered questionnaire that contains 26 questions about a person perceives their health and well-being in the last two weeks. The answers to the questions are given on a Likert scale from 1 to 5. The questionnaire evaluates four domains: physical health, psychological health, social relationships, and environment. Each of the domains considers different aspects of QoL: "physical health" is about activities of daily living, dependence on medicinal substances and medical aids, energy, and fatigue, mobility, pain and discomfort, sleep and rest, work capacity; "psychological health" is about bodily image and appearance, negative feelings, positive feelings, self-esteem, thinking, learning, memory and concentration; "social relationships" is about personal relationships, social support, sexual activity; "environment" is about financial resources, freedom, physical safety and security, health and social care (accessibility and quality), home environment, opportunities for acquiring new information and skills, participation in and opportunities for recreation, leisure activities, transport. The evaluation was carried out on a 100-point scale: the highest score corresponded to the highest quality of life.

Statistical analysis. The correspondence analysis of the distribution type of quantitative indicators by the normal distribution law was tested by the Shapiro-Wilk test (W). For the quantitative indicators that had a normal distribution, the mean was determined (\bar{x}) and standard deviation (SD). For the metrics with a distribution that did not fit the normal, we determined the median (M) and the upper and lower quartiles (25 %; 75 %). The significance of the difference for the independent groups was evaluated using the Mann-Whitney U-test and for the dependent groups using the Wilcoxon test. The

statistical analysis of received results was conducted using the programme Statistic 10.0 (StatSoft, USA).

The research design. The initial survey of caregivers was conducted at 1-to 2 weeks after the stroke, repeated – after implementing the developed algorithm of physical therapy for post-stroke patients with aphasia (5 – 6 weeks after the stroke).

Caregivers were allocated into two groups according to the allocation of patients with post-stroke aphasia: the intervention group and the comparison group. The division into groups was due to the difference in the implementation of methods of therapeutic intervention for post-stroke patients with aphasia. The intervention group ($n = 32$) included informal caregivers of post-stroke patients, for whom the developed algorithm of physical therapy measures was implemented. The fundamental difference between the rehabilitation measures used for the intervention group patients was in the organization of the physiotherapeutic process based on visualization and physical facilitation of movements. The developed approach significantly facilitates communication between the physical therapist and patients with sensorimotor aphasia (Sybiriakin et al., 2021). The comparison group ($n = 30$) included caregivers of patients who received rehabilitation care by the standard recommendations for physical therapy for post-stroke patients. The number of physical therapy sessions during the rehabilitation course in the intervention group and the comparison group did not differ.

RESULTS

The average age of caregivers who participated in the study was $54,1 \pm 11,3$ years ($\bar{x} \pm SD$) and ranged from 35 to 80 years. In addition, 32 individuals of the surveyed caregivers were males, and 30 were females. The caregivers were close relatives of post-stroke patients: children (daughter or son) were 34 persons, spouses (husband/wife) were 20 persons, and siblings (brother/sister) were eight persons.

Table 1 shows a piece of additional information about the study participants, according to their allocation into groups.

Table 2 presents the results of an intergroup comparison of QoL indicators of caregivers before rehabilitation intervention. No statistically significant difference between the intervention and comparison groups was found for any quality of life domains.

Table 1 Descriptive data on participants groups

Indicators	Intervention group (n=32)	Comparison group (n=30)
Average age ($\bar{x} \pm SD$)	54.28±11.4	53.9±11.3
Sex, n (%)		
Male	18 (56.3)	14 (46.7)
Female	14 (43.7)	16 (53.3)
Degree of family relationship with the aphasic partner, n (%)		
Children	18 (56.3)	16 (53.3)
Spouses	9 (28.1)	11 (36.7)
Siblings	5 (15.6)	3 (10.0)
The average age of the aphasic partner, ($\bar{x} \pm SD$)	69.5±8.9	69.8±12.9
Sex of the aphasic partner, n (%)		
Male	17 (53.1)	16 (53.3)
Female	15 (46.9)	14 (46.7)
Bartel index score of the aphasic partner, M (25 %; 75 %)	0 (0;0)	0 (0;0)
Rivermid index score of the aphasic partner, M (25 %; 75 %)	0 (0;0)	0 (0;0)

Table 2 Quality of life in caregivers of post-stroke patients with aphasia before rehabilitation intervention

WHOQOL-Bref score	Intervention group (n=32)	Comparison group (n=30)	Difference Intervention group vs Comparison group
	M (25 %; 75 %)	M (25 %; 75 %)	
PH	44 (38; 44)	44 (38; 50)	p=0.499
PS	56 (41; 56)	47 (44; 56)	p=0.768
SR	97 (87.5; 100)	100 (94; 100)	p=0.425
EN	63 (47; 69)	63 (44; 63)	p=0.419

Caption: PH = Physical, PS = Psychological, SR = Social relationships, EN = Environment.

Table 3 Performance in WHOQOL-Bref at pre-and post-intervention times

WHOQOL-Bref score	Intervention group (n=32)			Comparison group (n=30)			Difference between IG vs. CG
	Pre-I M (25 %; 75 %)	Post-I M (25 %; 75 %)	Difference Pre-I vs Post-I	Pre-I M (25 %; 75 %)	Post-I M (25 %; 75 %)	Difference Pre-I vs Post-I	
PH	44 (38; 44)	69 (63; 75)	p = 0.000	44 (38; 50)	50 (44; 63)	p = 0.000	p = 0.000
PS	56 (41; 56)	81 (75; 88)	p = 0.000	47 (44; 56)	63 (56; 69)	p = 0.000	p = 0.000
SR	97 (87.5; 100)	100 (94; 100)	p = 0.109	100 (94; 100)	100 (94; 100)	p = 0.068	p = 0.423
EN	63 (47; 69)	63 (56; 69)	p = 0.012	63 (44; 63)	63 (50; 63)	p = 0.028	p = 0.148

Legend: PH = Physical, PS = Psychological, SR = Social relationships, EN = Environment, I = intervention, IG = Intervention Group, CG = Comparison Group.

Table 3 presents the QoL indicators of caregivers at the time before and after the intervention, as well as the results of comparisons between the medians of the groups. After the intervention, positive dynamics were observed in the following domains of caregivers' QoL indicators of post-stroke patients with aphasia: "physical health", "psychological health" and "environment". A statistically significant difference between the "before" and "after the

intervention" indicators was found in both participants.

There was no statistically significant difference in the domain "social relationships" between the indicators "before intervention" and "after intervention" in both groups.

In the intergroup comparison of QoL indicators obtained after the intervention, it was found that in the intervention group, there were more significant

positive dynamics in the domains of physical health and mental health than in the comparison group.

DISCUSSION

Effective communication is an essential interaction for a person's social life because it enables people to express themselves and show their feelings. Aphasia disrupts this interaction, thereby causing human communication limitations and interaction with the environment. In addition, family members responsible for caring for stroke patients (informal caregivers) also suffer from the adverse effects of the disease. The negative impact on informal caregivers in post-stroke patients with aphasia is more significant than the impact on caregivers of patients without aphasia (Bakas et al., 2006).

This study assessed and analysed the QoL indicators in the informal caregivers of patients with sensorimotor aphasia under the influence of the rehabilitation program using physical therapy tools. The study involved 62 caregivers (30 females and 32 males aged 35 to 80 years) who had different degrees of relationship with patients (children, spouses, siblings).

The results of the pre-intervention QoL assessment suggest that most caregivers of post-stroke patients with sensorimotor aphasia have deteriorating physical and psychological health, consistent with other studies (Bakas et al., 2006; Gunawan et al., 2021). To a lesser extent, there were violations in the domain of "environment" and almost no deterioration in "social relationships". The decline in QoL for the domain "environment" can primarily be explained by the financial component that is part of this domain. The lack of reduction of QoL in the domain of "social relations" in caregivers of post-stroke patients with sensorimotor aphasia may be due to the initial survey in the acute period of the disease when most problems related to the social life of patients and caregivers are not yet relevant. The introduction of the developed algorithm for applying physical therapy measures for post-stroke patients with aphasia (Sybiriakin et al., 2021) has helped improve some aspects of the QoL of informal caregivers of patients. Both in the intervention group and the comparison group, statistically significant positive dynamics were observed under the influence of rehabilitation interventions in the "physical health", "psychological health" and "environment" domains of the QoL. In the intervention group, implementing the developed algorithm for

the application of physical therapy measures for post-stroke patients with sensorimotor aphasia contributed to more significant positive changes in the domains of "physical health" and "psychological health". Further research aims to identify and analyze the links between the effectiveness of rehabilitation measures and the dynamics of QoL of informal caregivers of post-stroke patients with aphasia.

The results indicate the potential for future research. Therefore, we propose increasing the sample of participants to consider the prospects for further research in this direction.

CONCLUSIONS

Sensorimotor aphasia negatively affects various aspects of the QoL of informal caregivers of post-stroke patients. Assessment of the QoL of caregivers of post-stroke patients with sensorimotor aphasia showed that there is the greatest negative impact on the domains of psychological health, physical health, and the environment in the acute period. The use of physical therapy tools for post-stroke patients with aphasia contributed to a statistically significant improvement in the QoL indicators of their informal caregivers. This suggests that informal caregivers of people with aphasia may also benefit from rehabilitation tools. The application of the developed algorithm of physical therapy measures for post-stroke patients with aphasia in the intervention group contributed to more significant positive changes in the domains of "physical health" and "psychological health" in informal caregivers, which indicates the advantages of the developed methodology and the feasibility of its implementation.

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