

Occupational Therapy in the treatment of post-cerebrovascular accident pain: a case study
Terapia Ocupacional no tratamento da dor pós-acidente vascular encefálico: estudo de caso
Terapia Ocupacional en el tratamiento del dolor tras un accidente cerebrovascular: estudio de un caso

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Objective: this study evaluates the effects of an occupational therapy program on pain perception and functional performance of a patient with post-stroke neuropathic pain. **Methods:** this is a case study carried out between 2018 and 2019, in a Specialized Rehabilitation Center with pre and post intervention assessments using three validated instruments. **Results:** 16 interventions were carried out, achieving a decrease in the Visual Analog Scale score (Pre=7/Post=3), in the McGill Pain Questionnaire Score (Pre=59/Post=37) and, in the Shoulder Pain and Disability Index (Pain Pre=94/Post=48 and Disability - Pre=92.25/Post=48.45). **Conclusion:** it was found that the occupational therapy intervention program promoted a decrease in pain perception, reduced disability and improved functional performance.

Descriptors: Occupational Therapy; Pain; Stroke; Electric Stimulation Therapy; Rehabilitation.

Objetivo: este estudo avalia os efeitos de um programa de terapia ocupacional na percepção da dor e no desempenho funcional de um paciente com dor neuropática pós-acidente vascular encefálico. **Método:** trata-se de um estudo de caso realizado entre 2018 e 2019 num Centro Especializado de Reabilitação com avaliações antes e após sessões de intervenções através de três instrumentos validados. **Resultados:** realizou-se 16 intervenções, alcançando-se diminuição da pontuação da *Escala Visual Analógica* (Pré=7/Pós=3), no *Escore do Questionário de Dor McGill* (Pré=59/Pós=37) e no *Índice de Dor e Incapacidade no Ombro* (Dor Pré=94/Pós=48 e incapacidade - Pré=92,25/Pós=48,45). **Conclusão:** constatou-se que o programa de intervenção de terapia ocupacional promoveu a diminuição na percepção da dor, a redução de incapacidades e melhora do desempenho funcional.

Descritores: Terapia Ocupacional; Dor; Acidente Vascular Encefálico; Terapia por Estimulação Elétrica; Reabilitação.

Objetivo: este estudio evalúa los efectos de un programa de terapia ocupacional sobre la percepción del dolor y el desempeño funcional de un paciente con dolor neuropático tras un accidente cerebrovascular. **Método:** se trata de un estudio de caso realizado entre 2018 y 2019 en un Centro Especializado de Rehabilitación con evaluaciones antes y después de la sesión de intervención mediante tres instrumentos validados. **Resultados:** Se realizaron 16 intervenciones, llegando una disminución en la puntuación de la *Escala Visual Analógica* (Pre=7/Post=3), en la *Puntuación del Cuestionario de Dolor McGill* (Pre=59/Post=37) y en el *Índice de Dolor y Discapacidad de Hombro* (Dolor Pre=94/Post=48 y discapacidad - Pre=92,25/Post=48,45). **Conclusión:** se comprobó que el programa de intervención de terapia ocupacional promovió una disminución de la percepción del dolor, una reducción de la discapacidad y una mejora del desempeño funcional.

Descriptores: Terapia Ocupacional; Dolor; Accidente Cerebrovascular; Terapia por Estimulación Eléctrica; Rehabilitación.

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INTRODUCTION

Stroke represents the main cause of death and disability in Brazil, with a relevant economic and social impact, since its consequences generate enormous demands for resources in diagnosis, treatment and rehabilitation monitoring, making it a serious public health issue¹. Those who survive a stroke usually experience neurological sequelae and related complications, with pain being common in chronic patients, which can affect their quality of life.

Considered highly disabling, hemiplegia is the main complication of stroke, since it leads to loss of selectivity of movements due to predominance of the antagonist muscles, and impairs the performance of daily activities, return to work and social life, which can lead to emotional suffering and negative impacts on the patient's global recovery². Pain syndromes in the shoulder of hemiplegic patients interfere directly in the motor rehabilitation process, making it difficult to recover functions related to the movement of the affected upper limb and indirect motor relations, such as changing positions and postural transfers, and in various activities of daily and instrumental life of daily life³.

Hemiplegic shoulder pain is multifactorial, and may be associated with damage to the muscle and nerve tissue of the shoulder, abnormal joint mechanics, and central nociceptive hypersensitivity. There are many postulated etiologies for post-stroke shoulder pain, with a strong association between pain and abnormal examination of the shoulder joint, ipsilateral sensory abnormality and arm weakness⁴.

The most frequent causes of post-stroke chronic pain are: musculoskeletal pathologies; omalgia of the hemiplegic; pain related to spasticity; neuropathic pain, which is central or complex regional pain syndrome type I5. Neuropathic pain, such as that caused by injury or dysfunction of the nervous system, results from abnormal activation of the nociceptive pathway, representing a limiting factor for functional recovery⁵.

Pain is a frequently undervalued and underdiagnosed condition, requiring intervention strategies, as it indicates one of the limiting factors for quality of life and the potential for functional recovery. Thus, it is characterized as one of the most important complications of stroke, which interferes with rehabilitation care and activities of daily living. The occurrence of many symptoms and factors for its development suggest that this condition may not manifest itself as a single entity, with its own clinical characteristics, varying in the different stages of the stroke⁶.

The occupational therapist analyzes, with the client, the interactions with the environment and the occupations they need or want to perform, seeking to minimize barriers

in the development of daily activities, as well as, it aims to restore functional independence in daily activities, improving the performance of skills, such as muscle strength, range of motion, motor control, cognition and through teaching and development of compensatory strategies, when recovery from deficits in performance areas is not possible to be achieved⁷.

Many post-stroke individuals have changes in their physical, cognitive and emotional abilities that significantly impact their level of independence in daily activities. Occupational therapy focuses on helping these individuals to achieve health, well-being and participation in life, through involvement in occupations⁸. In this context, these professionals can use a variety of techniques and therapeutic resources based on evidence in the rehabilitation of post-stroke patients.

Despite this, data from the World Report on Disability⁹ indicate that in many developed and developing countries, there is an inadequate supply of professionals in the field of rehabilitation sciences. This document points to a serious disparity between the number of Brazilian occupational therapists in relation to the rate of 10,000 inhabitants.

A cross-sectional study with 322 post-stroke individuals showed that the majority (90.1%) reported adopting treatments for pain after the injury. Drug treatment was accessed by 79.8% of participants, non-drug approaches were used by 208 (64.6%), with Physical Therapy being the most frequent (48.1%), followed by Occupational Therapy (15.5%); and that, despite consolidated evidence on the positive effects of occupational therapy in post-stroke treatment, a large portion of the population has difficulty accessing this professional¹⁰.

In Brazil, the Care Network for People with Disabilities establishes the Specialized Rehabilitation Centers (CER) as strategic points in the qualification, regulation and creation of minimum standards for the care of post-stroke people^{1,11}. Being considered the main point of access to occupational therapy services in Specialized Care, aimed at this population in the Unified Health System (SUS)¹¹⁻¹².

Thus, this study aims to evaluate the effects of an occupational therapy program on pain perception and functional performance of a patient with post-stroke neuropathic pain.

METHODS

This is a single case study, adopting the A-B design, in which A indicates the initial pre-intervention phase and B the post-intervention phase. A qualitative approach was used to understand the patient's narratives, their occupational history and family participation in the rehabilitation process, obtained from the information documented in the medical records, in

addition to the quantitative approach, through the measurement of the clinical condition during the rehabilitation process¹³.

Three instruments were used in the evaluation of phases A and B, namely:

(I) *McGill Pain Questionnaire (MPQ)*¹⁴; developed to obtain multidimensional information about pain from the respondent's subjective perception. The MPQ measures the pain experience from multiple dimensions: sensory (pain, location, intensity, quality and pattern); affective (fear, depression and anxiety related to pain); cognitive (global pain assessment); and behavioral (aggravation and relief);

(II) *Shoulder Pain and Disability Index (SPADI-Brazil)*¹⁵; developed to measure shoulder pain and functionality to perform activities of daily living. It contains thirteen questions related to the quality of life associated with shoulder disorders. The questions are scored on a scale of 0 to 10, where zero indicates carrying out the activity with no difficulty and ten indicates the inability to carry out the proposed activity at all. The maximum score of the questionnaire is 130 points, divided into two measures: disability scale with a total of 80 points and pain scale with a total of 50 points;

(III) *Visual Analog Scale (VAS)*; The patient's discomfort in relation to pain was assessed using this one-dimensional instrument, which uses the individual's visual judgment in a standardized dimension, through a horizontal line ten centimeters long, whose left end is classified as "light" and on the right the classification "intense". To use the VAS, the evaluator asks the patient about their degree of pain, with the number 0 meaning total absence of pain and 10 the maximum level of pain bearable by the patient.

The eligibility criteria for the study were to present a diagnosis of stroke according to the ICD-10, to have neuropathic pain manifestation, according to clinical description through evaluation by a physiatrist, and not to present other associated comorbidities that could influence the perception of pain. The participant's choice was considered to be on the waiting list of the Occupational Therapy service of the Neurological Treatment Unit of the Physical Rehabilitation Center of Espírito Santo.

The occupational therapeutic treatment plan was structured, following the guidelines of the American Occupational Therapy Association⁸ and in the studies by Krug & McCormack⁷, with the following intervention procedures being adopted:

I) *Use of orthosis*: it was made of low temperature thermoplastic, a static orthosis with ventral support to promote alignment, avoid deformities and maintain the functional position of the right hand, with guidance for night use;

II) *Physical exercise program*: focus on the functionality of the upper limbs and trunk as an important component to provide body stability, shoulder mobility and hand function;

III) *Use of Optimized Functional Electrical Stimulation Therapy (FES-O)*: used in post-stroke rehabilitation for neuromuscular reeducation of the upper limb and to reduce shoulder subluxation and associated pain⁷. Stimulation was applied to promote pain control, being modulated in the parameters: frequency of 08hz, wavelength of 300us, on/off: 5:10s, rise/fall: 1:1, lasting twenty minutes;

IV) *Training and stimulation of independence in Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs)*: due to hemiplegia, patient training involved the use of compensatory strategies, seeking motor control to progressively improve performance in specific tasks that incorporated increased proximal and distal movements during self-care activities, dressing and undressing, adjusting and closing clothes and shoes, putting on and taking off personal devices; in functional mobility moving from one position or place to another, and during the performance of activities, transfers and transport of objects. Regarding the IADLs, engagement in meal preparation and cleaning, and establishing and managing the home were worked on;

V) *Daily planning for carrying out leisure activities*: the planning of free time, the identification of interests and the possibilities of leisure opportunities appropriate to the context were worked with the patient and his family;

VI) *Family Guidelines*: throughout the rehabilitation follow-up process, guidelines were developed on the physiological, sensory, affective, cognitive and behavioral dimensions of pain, with family members encouraged to make the patient aware of inappropriate postures, with verbal instructions, during exercises and home activities. Through guidance and training with the Occupational Therapist, the family members understood the patient's skills, encouraging the patient's engagement in activities in the domestic environment, and reducing the level of physical assistance available throughout the treatment.

Quantitative data from the assessment instruments were analyzed through comparisons between pre and post-intervention scores, performed using Excel Software™. Already, the qualitative data were organized and presented in a descriptive way.

The development of the study was approved by the Research Ethics Committee of the Health Sciences Center of the Universidade Federal do Espírito Santo, receiving Opinion No 3,628,685 of 2019, with all stages of the research being developed under the guidelines of Resolutions 466/ 2012 and 510/2016 of the National Health Council.

RESULTS

The patient in focus was 53 years old, with no history of smoking or alcoholism, of evangelical faith, married for 30 years, living with his wife and an adult son. He had a stroke in December 2017, and suffered from right hemiplegia as a complication when looking for rehabilitation. The initial complaint referred to hemiplegia and “extreme pain in the right upper limb”, causing impairment in functionality, due to the fact that he was right-handed, and negligence of the affected limb.

Regarding productive occupations of study and work, he had a higher education degree and worked as a state public servant, being removed from this occupation by the Brazilian Institute of Social Security. At the time of the anamnesis, he reported performing few activities, restricting himself to watching television with his wife and participating in church services on weekends. As for resting and sleeping activities, complaints were reported due to pain in the affected upper limb, impairing the quality of sleep. The intervention program per session can be seen in Table 1.

The patient was followed up for four months, totaling 16 sessions of 50 minutes each. The data collected through the Visual Analog Scale showed a decrease in the score immediately after the occupational therapeutic intervention (Pre = 7 / Post = 3). Differences were also found in the perception of pain intensity through the McGill Pain Questionnaire. 59 points at pre-intervention and 37 points at post-intervention, demonstrating pain relief, according to Table 2.

SPADI-Brasil assesses pain and associated disability in different painful musculoskeletal conditions, specific to the shoulder joint complex. The instrument's total standardized score showed a reduction in values, according to the respective functions described in the items of the disability and pain scales, in the pre and post-treatment assessments. The right upper limb disability score went from 96.25 to 48.45 points, and the pain score decreased from 94 to 48 points, as shown in Table 3.

Table 1. Therapeutic procedures adopted per session. Vila Velha, 2019.

Session	Procedures
I	Anamnesis, interview about history and occupational profile, application of standardized assessments.
II	Manufacture of Ortheses Physical exercise program. Family guidelines.
III, IV, V, VI	Physical exercise program. Electrical Stimulation Therapy Family Guidelines.
VII, IIX, IX, X	Physical exercise program. Electrical Stimulation Therapy. Training and stimulation of independence in ADLs. Planning for carrying out leisure activities. Family Guidelines.
XI, XII, XIII	Physical exercise program. Electrical Stimulation Therapy. Training and stimulation of independence in ADLs. Family Guidelines.
XIV, XV	Physical exercise program. Training and stimulation of independence in IADLs. Planning for carrying out leisure activities. Family Guidelines.
XVI	Interview about changes in the occupational profile, reapplication of standardized assessments. Family Guidelines.

Table 2. Pre and post intervention McGill pain questionnaire. Vila Velha, 2019.

	McGill Questionnaire (MPQ)	
	Pre-intervention	Post-intervention
Sensory	32	22
Affective	11	5
Cognitive	5	3
Behavioral	11	7
Total	59	37

Table 3. Shoulder pain and disability index pre and post intervention, according to SPADI-Brasil. Vila Velha, 2019.

Shoulder Pain and Disability Index (SPADI-Brasil)		
Disability Index	Pre-Intervention	Post-Intervention
1. Wash hair with affected arm?	10	5
2. Wash back with affected arm?	10	6
3. Wear a shirt or blouse over head?	9	2
4. Wear a shirt by the front?	8	0
5. Wear pants?	10	2
6. Put something on a high shelf with affected arm?	10	8
7. Carry a 5 kg object with affected arm?	10	8
8. Take something out of back pocket with affected arm?	10	8
Total	96.25	48.45
Pain Index		
1. How severe was the pain at its worst last week?	8	4
2. When did you lie down on the affected side?	9	5
3. When have you tried to pick something up from a high shelf with affected arm?	10	7
4. When have you tried to touch the back of your neck with affected arm?	10	3
5. When have you tried to push something with affected arm?	10	5
Total	94	48

DISCUSSION

This study evaluated the effects of an occupational therapy program on pain perception and functional performance of a patient with post-stroke neuropathic pain, monitored at a Specialized Rehabilitation Center. We understand that the rehabilitation follow-up process requires not only the mastery of resources and techniques, but also the ability to investigate, qualified and humanized listening, and an accurate and global assessment of the patient.

Defining pain is facing a complex issue due to its subjectivity, and its measurement must be carried out systematically, continuously and recorded in detail, aiming at understanding the etiology of pain, the direction and effectiveness of treatment. In the aforementioned case study, the use of standardized instruments allowed the patient to express their perceptions more objectively and facilitated communication between the occupational therapist, the patient and the family members. From the initial interview and administration of the instruments, the perception and repercussion of pain in the patient's social, economic and family life were analyzed, in addition to identifying post-stroke functional disabilities.

During the interview about the history and occupational profile and the pre-intervention evaluation, the patient was observed to have emotional lability, introspection and insecurity in the face of pain, in addition to a protective body posture in relation to the positioning of the right upper limb. Family members reported concern about the patient's mental health. Pain promotes emotional discomfort, resulting in unpleasant emotional experiences, often associated with depressive processes¹⁵.

The patient's family was guided about the painful experience from its physiological, sensory, affective, cognitive and behavioral dimensions, reinforcing the importance of adopting emotional support and encouragement strategies for the patient, through positive coping attitudes. A study carried out with subjects one year after the stroke suggests that pain significantly influences the patient's behavioral and lifestyle changes, with the guarantee of emotional and family support being an effective strategy to deal with stressors, reducing symptoms of depression, because help to improve the perception of the patient's psychosocial well-being¹⁶. In addition, emotional support is directly related to self-efficacy adaptive strategies for coping with this health condition¹⁷.

Throughout the follow-up, the occupational therapist encouraged the patient to verbally express their feelings in relation to the pain so as not to have somatization, promoting psychoeducational explanations for each symptom and raising awareness that their emotions can cause real painful symptoms, with lack of information being a negative factor for adherence to treatment and the emergence of anxiety. Psychoeducational strategies should be used with

the patient and their family members to modify dysfunctional attitudes, with the aim of providing support for increasing feelings of self-control, and the adoption of positive coping strategies to reduce the perception of helplessness, disability, depression and pain intensity¹⁸.

Post-stroke patients with unilateral neglect tend to avoid using their arms, increasing the risk of shoulder trauma due to lack of proper care and positioning². Occupational therapists use various preparatory methods as part of treatment sessions to train clients for occupational performance and participation in occupations¹⁹.

In this study, several approaches were used in post-stroke motor control, and the selection of these approaches was influenced by the patient's needs, the professional's clinical experience and scientific evidence. The use of the orthosis combined with the physical exercise program and the optimized functional electrical stimulation protocol provided the treatment of deficits in motor control. The reduction in muscle tone and increase in the range of motion allows the improvement of the ability to use the upper limbs during functional performance in activities⁷.

A relevant aspect in the follow-up of this case was the possibility of using functional electrical stimulation, generating contractions in the paralyzed muscles that, when contracted, produce movement that can be used functionally, to increase participation in voluntary activities²⁰. A study demonstrated superior efficacy of the combination of functional electrical stimulation combined with occupational therapy sessions in post-stroke motor recovery, when compared to conventional sessions without electrical stimulation¹⁹.

The use of stimulation, associated with training based on daily tasks, centered on the client and on occupations, may favor the functional use of the upper limbs in post-stroke patients²¹. The use of FES-O provides increased isometric muscle strength of wrist extensors and reduced spastic muscle tone²².

The results of the SPADI-Brasil disability scale revealed that in most of the evaluated items there was functional improvement in the affected limb in the post-intervention evaluation. Decreased motor function, proprioception and touch, combined with negligence, are predictors of post-stroke shoulder pain, with increased motor function being negatively related to the prevalence of pain in the affected limb³. After the intervention, there was a decrease in pain and motor re-education, evolving to hemiparesis, with use of the distal residual potential of the right upper limb, starting to include it in activities of daily living.

Occupational therapy helps patients to progress from a passive posture promoted by dependence and pain, to a more independent and productive role, with greater control and quality of life¹⁵. Through routine planning, activities were selected to be carried out in the home

environment, using compensatory strategies to engage in ADLs and IADLs. In addition, the identification of the game of chess as a therapeutic resource for exploring new hobbies, and the development of daily physical activities such as walking and stretching in the community, around the home, and family leisure activities, proved to be fundamental in controlling the stress and training of coping skills by the patient. Patients with pain may experience an occupational imbalance because they develop few activities that provide them with energy and joy, with coping strategies being daily solutions that patients use to manage life and chronic pain at the same time²³.

In the present case, the subject presented a reduction in the perception of pain in all its domains, reflected in his total score before and after the intervention, measured using the VAS, MPQ and the SPADI-Brasil Pain Scale. Initially, the patient presented restriction in occupational activities, reducing them to watching television and participating in church services on weekends. Chronic pain and occupations are directly related; an increase in pain results in a decrease in occupational engagement and an increase in occupational engagement resulted in less pain¹⁸.

Patients with neuropathic pain may express negative emotional reactions because of this experience, which directly impacts their daily lives. Home programs for post-CVA individuals, focusing on the function of the upper limbs, on gaining range of motion and muscle strengthening are relevant to incorporate the patient's goals and interests, as strategies to create meaning in the domestic context²⁴.

Approaches such as the home visit allow evaluating the patient in their usual environment, facilitating the development of strategies to cope with the situation at home and in the community, increasing functional capacity, in addition to providing guidelines and environmental adaptations to prevent physical risks, such as falls.

CONCLUSION

The presence of pain discourages patients from participating in rehabilitation programs, and may even significantly interfere with their daily lives and quality of life. The treatment protocol used in this study proved to be effective in reducing pain and functional disabilities in post-stroke individuals. Significant improvements were observed in the evaluations carried out after the intervention, in the sensory, affective, cognitive and behavioral dimensions of pain and in functional disabilities, in addition to the acquisition of motor skills in the right upper limb.

The present case study presented as a methodological limitation, the impossibility of carrying out a home visit to the patient, due to inflexibility in the organization of the

institutional routine, during the follow-up period. Carrying out home visits is an important element in the practice of occupational therapists, which is why we believe that such a procedure, in addition to the aforementioned benefits, could provide the patient with the opportunity to practice the techniques and guidelines provided in the rehabilitation environment in their own home.

Although the single-case study makes it possible to examine the effects of the intervention carefully and in considerable detail, its design limits the generalizability of the results to a large population. Further research is needed with a larger sample size, using control groups. The importance of longitudinal follow-up of the case is added to monitor the permanence of the functional gains observed after the intervention.

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