

**ARTIGO
DE REVISÃO**

Physiotherapy treatment in hemiplegic shoulder pain in stroke patients-Literature Review

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ABSTRACT

The objective of this study was to review on literature the effect of the physiotherapeutic treatment for hemiplegic shoulder pain. In order to review the literature, articles published from 1997 to 2004 and indexed in: Medline, Lilacs, Pubmed and Cochrane were used. Trials were considered if they included patients of any age with a clinical diagnosis of stroke with hemiplegic shoulder pain in acute or chronic phase, without previous stroke. Sixty-six articles were identified, but only 12 studies met the inclusion criteria. According to the literature reviewed, it's possible to suggest that the electric stimulation is the most studied modality and that offers a promising future for the treatment of hemiplegic shoulder pain, however more research with better methodology must be performed.

KEY-WORDS

stroke, hemiplegic shoulder pain, physiotherapy

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Introduction

Stroke is defined by the World Health Organization (WHO) as a “rapidly developing syndrome with clinical signs of focal or global disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than vascular origin”¹.

Cerebrovascular diseases have a major impact on the health of the general population and it is between the first and third main causes of mortality in Brazil². The annual incidence of stroke in the USA is approximately 500,000 cases, with a total of more than 3 million survivors by the middle of the last decade³.

The recovery of a patient with hemiplegia represents a great challenge, not only due to the complexity of the lost functions, but also the high incidence of shoulder pain, resulting in a negative impact during the rehabilitation process⁴.

Shoulder pain occurs in 34% to 85% of patients, regardless of age and gender, and its onset typically takes place in the second week post-stroke⁵.

The beginning of hemiplegia can compromise the normal biomechanical principles and the stability of the shoulder complex, due to the loss of motor control and the development of abnormal movement patterns; secondarily, there can be soft tissue alterations and misalignment of the glenohumeral joint. The incidence of hemiplegic shoulder pain can be related to several factors: subluxation of the scapulohumeral joint⁵⁻¹², shoulder capsulitis⁷⁻¹³, impingement syndrome^{9,10}, complex regional pain syndrome^{9,12}, bicipital tendinitis¹⁰, brachial plexus neuropathy^{7,9,10,12}, spasticity^{7,10-13}, paralyzed upper limb around range of motion (ROM)⁷, ROM limitation⁷, soft tissue lesions⁷⁻¹¹, central pain⁷.

The physical therapy modalities that are most frequently employed to deal with this clinical condition are: functional electrical stimulation (FES), transcutaneous electrical nervous stimulation (TENS), bandaging, correct handling and positioning and use of a sling^{5,6,8,10,12,14-18}.

Objective

To revise the literature concerning the physical therapy methods utilized to treat hemiplegic shoulder pain in stroke patients.

Material and methods

This study is a literature review, comprising articles published from 1997 to 2004 and indexed at the following databases: Medline, Lilacs, Pubmed and Cochrane, with the following keywords in Portuguese and English, respectively: acidente vascular encefálico, stroke, dor de ombro, hemiplegic shoulder pain, fisioterapia, physical therapy.

The selected articles were analyzed according to the title and abstract. Article selection was assessed by the main author and researcher. Inclusion criteria for the review included:

- *Population:* the articles considered included patients of any

age, with a clinical diagnosis of stroke, in acute or chronic stage; no previous of previous pathologies or stroke with persistent deficits;

- *Intervention:* only physical therapy interventions were considered for the study, mainly positioning and handling, bandaging, slings and electrical stimulation.

- *Problem:* hemiplegic patients with a clinical picture of post-stroke shoulder pain.

- *Characteristics of the selected studies:* systematic reviews, randomized controlled clinical trials, case series, case reports and literature reviews were included in this study.

- *Exclusion criteria:* studies were excluded when: their objective was to prevent and not treat shoulder pain in stroke patients who did not develop a shoulder pain picture after the brain injury; they discussed medical and not physical therapy interventions; and studies that did not take place between 1997 and 2004.

Results

Of the 66 studies that were analyzed, 12 met the inclusion criteria, which correspond to 18.18%.

Discussion

The present study is derived from the necessity to establish effective measures for the treatment of hemiplegic shoulder pain. Shoulder pain is a frequent post-stroke complication and its development mechanism is yet to be clarified, hence the need for new and up-to-date studies and literature reviews.

There is a consensus in literature that hemiplegic shoulder pain is highly associated with a multifactorial etiology, which directly influences the clinical presentation, as each patient will behave in a different manner due to the variety of factors that can lead to pain; this makes samples non-homogeneous and impairs the methodological quality of the study. This multifactorial characteristic directly interferes with the choice of the physical therapeutic resource, as scientific articles are not systematic and double-blind and the fact that they are not randomized clinical trials.

Another point to be considered is that most of the studies consist of case series with small samples and the follow-up duration is short. Additionally, many of the selected studies cannot be utilized as comparison parameters due to the deficit of detailed information on the therapeutic approach used.

In the study by Faghri *et al*¹⁴, the treatment consisted of FES application. We observed that there is a consensus between these authors and Cim, Pandyan¹⁷, whose reports attribute an important therapeutic action to FES, as it promotes a better muscular alignment with less adduction and internal rotation, preventing muscular contractures. Additionally, the stimulation of the muscular contraction

Quadro 1
Resumo dos critérios analisados em cada estudo envolvendo pacientes acometidos de Ombro Doloroso Hemiplégico

Author/Year	Study design	Therapeutic Resource	Parameters	Sample (patients)	Physiological Effects
Cim ¹⁷ /2004	RS	FES TENS			No significant change in pain incidence
Faghri ¹⁴ /1994	ECR	FES	F:35HZ I: Obtained during humerus mobilization to promote its coaptation Cycle: final objective 30:2 ON/OFF	26	Reduction of subluxation and pain
Hanger ⁹ /2000	ECR	Functional bandaging	Continuous Bandaging during a 6-week period	98	No significant change in pain
Tyson ¹⁶ /2002	ECR	Proximal and distal passive mobilization		22	Proximal support allowing more ROM; no pain
Yu ¹² /2004	ECR	NMES	A:20MA Cycle: 20s ON/10s OFF P:20 A 200MS according to the intensity, which was regulated to reduce subluxation	61	Pain reduction after 3 to 6 months of use
Renzenbrink ¹⁸ /2004	SC	P-NMES	A:20MA F:12HZ Cycle: 10s ON/10s OFF	15	Pain reduction and increase of external rotation
Mieras ¹⁹ /2001	RC	P-NMES	F:12HZ Cycle: 10s ON/10s OFF	8	Decrease of subluxation and increase of external rotation of shoulder
Chae ¹⁵ /2001	RC	NMES	A:20MA F:12HZ P:0 A200Ms Cycle: 10s ON/10s OFF	1	Decreased subluxation and pain
Bender ⁹ /2001	RL	Positioning Sling Bandaging FES			No consensus on the most adequate therapeutic modality
Snels ²⁰ /2002	RL	FES Feedback Ultrasound Cryotherapy			No definite conclusion
Turner ¹¹ /2002	RL	Positioning Sling Adequate humerus support Electro-stimulation			Some degree of shoulder pain improvement with electro-stimulation only
Vuagnat ⁵ /2003	RL	Ultrasound Hot packs FES			Ultrasound and hot packs in rotator cuff lesions. FES in subluxation cases

S.R.= Systematic Review; RCT= Randomized Clinical Trial; CS= Case Series; CR= Case Report; L.R.= Literature Review. FES=functional electrical stimulation; TENS= transcutaneous electrical nerve stimulation; NMES=neuromuscular electrical stimulation; P-NMES=percutaneous neuromuscular electrical stimulation. Only the 1st author's name is shown.

decreases spasticity, promoting the motor recovery of the involved limb. This kind of stimulation would work as a biofeedback mechanism, as the patients learn to present an adequate performance with the involved limb after the stroke. However, it is noteworthy the fact that the methodology employed by Faghri *et al*¹⁴ was not adequate, as it does not explain the process of recruiting patients and what their origins are, and it does not describe the patients'

inclusion criteria. Another point to be considered regards the study aim, which was to evaluate the effectiveness of FES treatment in order to prevent the extension of structures located in the shoulder periarticular region and subluxation, but was carried out in patients whose radiographic assessment already showed the presence of subluxation of the glenohumeral joint.

On the other hand, the study by Yu *et al*¹² presented adequate

methodology, with a description of the patients' selection criteria and including the parameters of transcutaneous neuromuscular electrical stimulation (NMES). These authors, as well as in the study by Chae, Walker¹⁵, utilized the same amplitude of current, T off and an equivalent period of stimulation (6 hours/6 weeks); both studies showed pain and subluxation improvement as results.

However, Yu *et al*¹² states that there is a possibility that patients will experience spontaneous motor recovery, coinciding with the stimulation period, although this fact is considered to be unlikely according to other publications. Another broadly accepted hypothesis is that NMES promotes motor recovery due to a better alignment of the shoulder joint. Some aspects must be taken into account in view of the ambiguity of the compared physical therapy methods, if we consider that NMES stimulates the voluntary motricity and the sling restricts it, with their respective effects on pain.

Regarding the percutaneous neuromuscular electrical stimulation (P-NMES), this modality of physical therapy method often employed with a 12 Hz frequency and 10s ON/10s OFF cycles for 6 hours during 6 weeks, showed for Mieras¹⁹ as well as for Renzebrink, Ijzerman¹⁸, to effectively reduce pain. The latter, in discordance with the other authors, for whom electrical stimulation promotes joint alignment, understand that this method influences the neuromuscular system, altering the neural activity due to the principle of pain receptor modulation.

Bender & Mckenna⁸, although emphasizing the necessity of complementary studies, declared that a rehabilitation program must be aimed at the maintenance of postural tonus and body symmetry in their review of literature regarding the different types of treatment utilized with patients presenting post-stroke hemiplegic shoulder pain. The treatment effectiveness will depend on such therapeutic methods, providing they are adequately combined.

Differently from Bender & Mckenna⁸, Snels *et al*²⁰, although utilizing several non-combined physical therapy, pharmacological and surgical methods, declared that the exclusive utilization of functional electrical stimulation showed to be the most promising method in the treatment of patients with post-stroke hemiplegic shoulder pain.

In accordance to Bender & Mckenna⁸, Turner-Stokes & Jackson¹¹ understand that the treatment of hemiplegic shoulder pain must involve a coordinated multidisciplinary management, aimed at minimizing stroke sequelae and optimizing the rehabilitation process.

Another study, by Tyson, Chissim¹⁶, which involved the utilization of only one physical therapy method, concluded that passive mobilization giving proximal support to the hemiplegic shoulder results in short-term beneficial effects in reducing pain symptoms and increasing the flexion amplitude of the glenohumeral joint.

Another therapeutic method, described by Hanger *et al*.⁶, is bandaging. Amongst the benefits observed with this treatment modality, it is worth mentioning: reduction of the subluxation, allowing the active mobilization of the upper limb, as well as providing sensorial stimulation. On the other hand, it is necessary to observe the correct positioning of the bandages, as one of them is positioned anteriorly to the major pectoralis and thus, it can trigger

a facilitatory stimulus for this muscle and for the internal rotation of the glenohumeral joint, with a consequent impairment of the intended benefits.

Finally, in addition to functional electrical stimulation, Vuagnat, Chantraine⁵ utilized other therapeutic methods such as ultrasound and heat provided by hot packs. The study recommended the utilization of such modalities in distinct ways, according to the present clinical condition. While functional electrical stimulation was indicated for subluxation cases, ultrasound or hot packs were indicated for rotator cuff lesions. Despite the indications, the authors did not describe the parameters and utilization methods of the ultrasound as well as the hot packs, and did not mention the possibility that not all patients might benefit from treatment due to sensitivity alterations, presented by many of them.

In spite of the information available in literature concerning the multiple physical therapy methods employed in the treatment of patients with post-stroke hemiplegic shoulder pain, researchers and clinicians present differences of opinion regarding their effectiveness and actual utilization protocols. Such fact necessitates further studies due to the non-homogeneity of the analyzed studies and the low level of evidence presented by them, as most of them are case reports and series and literature reviews.

Conclusion

Based on the literature reviewed, it is suggested that:

- 1 - Electrical stimulation is the most frequently studied therapeutic method utilized in the treatment of shoulder pain.
- 2 - When adequately indicated and utilized, electrical stimulation presented better results in reducing the severity of shoulder subluxation and pain, as well as improving motor function and joint range of motion gain of the upper limbs.
- 3 - The several mechanisms of hemiplegic shoulder pain can influence the therapeutic choice and FES effectiveness, which showed to be the most promising therapy type.
- 4 - It also can be taken into account the fact that no study has shown that electrical stimulation is the best therapeutic resource.
- 5 - Other physical therapy resources, such as positioning, handling, bandaging, ultrasound, cryotherapy, feedback and hot packs must be considered complementary treatment methods, providing they are adequately indicated.
- 6 - Further studies with better methodological quality are necessary to supply more knowledge on the subject.

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