

# Effects of ischemic compression of trigger points in painful episodes of patients with chronic shoulder pain. Systematic Review.

Efeitos da compressão isquêmica em trigger points sobre o quadro álgico de pacientes com dor crônica no ombro. Revisão Sistemática.

Isabel de Almeida Paz<sup>(1)</sup>, Ivo Ilvan Kerppers<sup>(2)</sup>, Andersom Ricardo Fréz<sup>(3)</sup>.

Centro Universitário CESUMAR, Guarapuava (PR), Brazil.

## Abstract

**Introduction:** Disorders of the shoulder are the major musculoskeletal morbidities, whose pathophysiological mechanisms of pain in the shoulder are poorly understood, myofascial trigger points are presented as alternative diagnosis of these disorders. **Objective:** To investigate the effectiveness of the release of trigger points on the pain symptoms in patients with chronic shoulder pain. **Method:** We conducted a descriptive study using a systematic literature review, in consultation with the databases PubMed, EMBASE, CINAHL, PEDro, SportDiscus, and LILACS. Two reviewers assessed the methodological quality of the selected studies, with the help of Quality Scale Jadad and PEDro scale. **Results:** The initial search resulted in 312 articles. After analyzing the titles and reading the abstracts, 70 studies that appeared repeatedly in more than one database and 214 who did not meet the predefined inclusion criteria, 28 texts were analyzed in their entirety were excluded, considering the inclusion and exclusion criteria defined only 2 articles were selected and subjected to analysis for methodological quality. **Conclusion:** The results demonstrate the importance of inspection and inactivation of myofascial trigger points in the muscles of the shoulder in patients with chronic pain, as they contribute to decreased overall picture of pain.

**Keywords:** myofascial pain syndromes, shoulder pain, Manual therapy.

## Resumo

**Introdução:** Distúrbios do ombro representam as principais morbidades osteomusculares, cujos mecanismos fisiopatológicos do quadro álgico do ombro são mal compreendidos, os pontos gatilhos miofasciais apresentam-se como diagnóstico alternativo para essas patologias. **Objetivo:** Investigar a eficácia da liberação de pontos gatilhos sobre o quadro doloroso, em pacientes com dor crônica de ombro. **Método:** Realizou-se um estudo descritivo, por meio de uma revisão sistemática da literatura, com consulta às bases de dados PubMed, EMBASE, CINAHL, PEDro, SportDiscus, e LILACS. Dois revisores avaliaram a qualidade metodológica dos estudos selecionados, com auxílio da Escala de Qualidade de Jadad e a Escala PEDro. **Resultados:** A pesquisa inicial resultou em 312 artigos. Após análise dos títulos e leitura dos resumos, foram excluídas 70 pesquisas que apareceram repetidamente em mais de uma base de dados e 214 que não preenchiem os critérios de inclusão predeterminados, 28 textos foram analisados na íntegra, considerando os critérios de inclusão e exclusão definidos apenas 2 artigos foram selecionados e submetidos a análise de qualidade metodológica. **Conclusão:** Os resultados encontrados demonstram a importância da inspeção e inativação de pontos gatilhos miofasciais na musculatura do ombro em pacientes com dor crônica, pois contribuem para diminuição do quadro geral de dor. **Palavras-chave:** Síndromes de dor miofascial, Dor no ombro, Terapia Manual.

Received: 10 November 2013. Accepted: 13 March 2014. Published: 27 March 2014.

1. Post-graduate student in Terapia Manual e Postural, Centro Universitário (CESUMAR), Guarapuava (PR), Brazil.
2. Master, Professor of Post-graduate program in Terapia Manual e Postural, Centro Universitário (CESUMAR), Guarapuava (PR), Brazil.
3. Master, Professor of the Physical Therapy Department of Universidade Estadual do Centro-Oeste (UNICENTRO), Guarapuava (PR), Brazil.

## Corresponding Author:

Isabel de Almeida Paz – Avenida Padre João Boteiro, 1053, Centro, Zip Code: 89687-000, Passos Maia (SC), Brazil. Phone: +55 47 84657315, e-mail: isabel.de.almeida@hotmail.com

## INTRODUCTION

Shoulder disorders represent major musculoskeletal morbidity in young adults, with prevalence peak in elderly.<sup>(1,2,3,4)</sup> It is characterized by changes in quality of life, sleep, work absenteeism and substantial use of public resources,<sup>(5,6)</sup> furthermore, are a major musculoskeletal complaints seen by health professionals,<sup>(7,8)</sup> and may require surgery in 15-28% of chronic cases.<sup>(9)</sup>

The pathophysiological mechanisms of pain in the shoulder are poorly understood, although the impact syndrome has been suggested as the main cause of pain in this region there other possible causes,<sup>(10,11)</sup> as myofascial trigger points (MTP), which may provide an alternative diagnosis for shoulder pain regardless of the presence of sub acromial abnormalities.<sup>(12,13)</sup> The evidence suggests a strong relationship between MTP and chronic pain in shoulder,<sup>(14,15,16,17)</sup> Bron *et al.*<sup>(18)</sup> report that MTP in the muscles surrounding this joint, producing similar to other syndromes of shoulder pain, including pain at rest and in motion, sleep disorders and pain during provocation tests impact symptoms.

The MTP are defined as highly sensitive local points to pressure that reproduce muscle pain,<sup>(12)</sup> whose origin is associated with excessive muscle use, overloading, severe emotional stress or trauma.<sup>(19,20)</sup> Some authors<sup>(21)</sup> show that in practice MTP identification is usually performed by palpation, and a reliable method for the detection of same, in shoulder muscles.

Once, confirmed the influence of MTP in pain symptoms in chronic shoulder injuries, initial treatment should begin with the inactivation of the same.<sup>(13,22,23)</sup> Hand techniques, including manual compression of trigger points, known as ischemic compression or release point is used to inactivate them<sup>(18)</sup> and retrieve the tissue reperfusion after transient occlusion of the blood flow.<sup>(24)</sup>

Ischemic compression is the application of direct digital pressure sustained over point with sufficient strength and specific time duration, to slow the blood flow and relieve tension in the muscle involved.<sup>(25,26)</sup> A proposed mechanism for the benefit of ischemic compression, suggests that relief of pain and muscle spasm of the direct digital pressure may result from reactive hyperemia produced in the area, or from the spinal reflex mechanism.<sup>(26)</sup>

Considering that the elimination of triggers points located around the shoulder area can be useful for the symptoms of patients with chronic shoulder pain, this systematic review aims to investigate the effectiveness of releasing trigger points in relation to the frame painful for patients with chronic shoulder pain.

## METHODS

We conducted a descriptive study using a systematic literature review, with consultation of PubMed, EMBASE, CINAHL, PEDro, SportDiscus, and LILACS, using

the descriptors of the Medical Subject Headings (MeSH). Two searches were performed: one combining the descriptor shoulder pain with the descriptor trigger point; and other matching shoulder pain with myofascial pain syndromes. It was adopted as inclusion criteria studies using myofascial manual techniques and/or ischemic compression to trigger points in patients with chronic shoulder pain. Studies involving the use of electrotherapeutic resources and/or invasive techniques and/or use of drugs for treatment of trigger points were excluded; application of ischemic compression on neurological, rheumatologic disorders and children.

The articles were evaluated and selected independently by two reviewers. Initially the duplicates were removed (study published in two or more databases). Based on titles and abstracts were excluded those who had no connection with the subject under review. From this pre-selection evaluators analyzed the full texts, considering the inclusion and exclusion criteria defined. Later, the evaluators met to agree upon the inclusion or exclusion of studies in the review. If there was disagreement between reviewers, a third would be asked to resolve the differences. However, it was not necessary.

Also independently by two reviewers assessed the methodological quality of the selected studies. For this evaluation, two methods were used: the Jadad Quality Scale<sup>(27)</sup> and PEDro Scale,<sup>(28)</sup> based on the Delphi list.<sup>(29)</sup>

According to Jadad scale<sup>(27)</sup> work is considered excellent when it presents the maximum score of five, and is characterized as poor when the score is two or less.<sup>(27)</sup> For the PEDro scale,<sup>(28)</sup> that goes 1-11, studies with a score equal to or greater than five are considered high quality.<sup>(28)</sup>

## Data analyse

It was applied a scoring system of five levels of evidence for this review. This system considers the number, the methodological quality of the studies and the results in relation to the variable of interest to verify the level of evidence. Thus, strong evidence is characterized as consistent findings are detected in two or more randomized trials of high quality. Moderate evidence is characterized by consistent findings in a randomized clinical trial High quality coupled to one or more randomized clinical trials of poor quality, or multiple consistent findings of randomized trials of low quality. In case of limited evidence, the characterization is made when the result is found in a single or multiple randomized clinical trial randomized clinical trials of low quality. Characterized when there is conflicting evidence inconsistent findings in multiple randomized clinical trials and absent evidence when the result was not found in any randomized trial.

## RESULTS

The initial search resulted in 312 articles. After an-

alyzing the titles and reading the abstracts, 70 studies that appeared repeatedly in more than one database and 214 who did not meet predetermined inclusion criteria were excluded. To pre-select the evaluators reviewed 28 full texts. From the inclusion and exclusion criteria, based on this assessment only 2 articles framed on the criteria established, they were selected for analysis of quality according to the Jadad scale<sup>(27)</sup> and PEDro.<sup>(28)</sup>

**Quality assessment of studies**

The two articles evaluated by the Jadad scale <sup>(27)</sup> and PEDro <sup>(28)</sup>, were considered high quality because score greater than or equal to 5 on the PEDro scale and greater than 3 on the Jadad scale.

The study by Hains *et al.*<sup>(30)</sup> got the score of 9 on PEDro Scale and 5 on the Jadad, being considered of high quality and outstanding, respectively (Table 1 and Table 2).

The study by Bron *et al.*<sup>(31)</sup> got the score of 9 on PEDro Scale and 4 on the Jadad, being considered of high quality and outstanding, respectively (Table 1 and Table 2).

To facilitate the visualization of the articles included in this review, we selected some information, which were summarized in the following topics: author/ year, sample, study design, outcomes assessed, objectives, interventions, instruments and conclusion (Table 3).

**Table 1.** Quality Analysis according to the PEDro scale <sup>(25)</sup>.

Questions	Hans, 2010 <sup>(30)</sup>	Bron, 2011 <sup>(31)</sup>
0	Yes	Yes
1	Yes	Yes
2	Yes	Yes
3	Yes	Yes
4	Yes	No
5	No	No
6	No	Yes
7	Yes	Yes
8	Yes	Yes
9	Yes	Yes
10	Yes	Yes
Total	9	9

Source: Research data

**Table 2.** Quality Analysis according to the Jadad scale <sup>(26)</sup>.

Questions	Hans, 2010 <sup>(28)</sup>	Bron, 2011 <sup>(29)</sup>
1	1	1
2	1	1
3	1	0
4	1	1
5	1	1
Total	5	4

Source: Research data

**Table 3.** Detalhamento dos artigos selecionados.

Study	Hains et al. <sup>(30)</sup>	Bron et al. <sup>(31)</sup>
<b>Design</b>	Prospective, randomized, clinical trial.	Double blind, randomized trial.
<b>Objective</b>	To evaluate the effects of 15 sessions of myofascial therapy using ischemic compression on trigger points located in the shoulder region in patients with chronic shoulder pain.	To evaluate the effectiveness of a comprehensive treatment program MTP in the shoulder muscles on the symptoms and the functioning of the shoulder in patients with chronic shoulder pain traumatic stress disorder compared with the approach wait to see.
<b>Intervention</b>	Control group: false compression and completed the questionnaire. Experimental group: 15 treatments, 3 times per week of ischemic compression on the trigger points in the supraspinatus muscle, deltoid, infra-spinous and biceps tendon.	Control group: completed the questionnaire. Experimental group: They received treatment for inactivation of trigger points by manual compression once a week for a maximum of 12 weeks.
<b>Instrument</b>	Was used to measure the data Disability Index (SPADI) and numeric pain scale.	Self-administered questionnaires on performance assessments including the Disabilities of Arm Shoulder and Hand (DASH) Visual Analogue Scale for pain (VAS-P), The RAND Medical Outcomes Study 36 - Item Short Form Health Survey (RAND -36) and the Beck Depression Inventory (BDI-II).
<b>Conclusion</b>	The results of this study suggest that myofascial therapy using ischemic compression on trigger points in different locations around the shoulder can reduce the symptoms of patients with chronic shoulder pain.	After 12 weeks the intervention group showed improvement in all variables and statistically significant differences compared with the control group in primary and secondary measures.

Source: Research data

The analysis of the contents of selected clinical trials demonstrated that manual therapy techniques can be used to improve the painful picture of individuals with chronic pain in the shoulder. <sup>(30,31)</sup>

## DISCUSSION

The etiology and pathogenesis of the shoulder diseases, often tend to remain incomprehensible. The complex anatomical and functional structure of this joint often complicates the diagnosis and clinical management of shoulder injury. <sup>(32-34)</sup> Evidence has shown that trigger points present in the muscles of the rotator cuff and the nearby regions of the upper limbs, can cause referred pain this joint, reproducing symptoms similar to other diseases. <sup>(14-17)</sup>

Only Bron *et al.* <sup>(31)</sup> and Hains *et al.* <sup>(30)</sup> presented a randomized, prospective clinical controlled trial, respectively, in addition, other strong parameters should be considered, such as the presence of inclusion and exclusion criteria, eligibility sample of studies and blindness. Both studies used for the treatment of ischemic compression in the shoulder region of MTP, assessed changes in pain status and functional capacity, used as selection criteria, pain in non-traumatic shoulder for at least 3 months <sup>(30)</sup> and 6 months. <sup>(31)</sup>

Despite some similarities between the studies and their strengths, we must consider some limitations in their methodologies. Hains *et al.* <sup>(30)</sup> initially involved 63 patients, with 59 at the end of the study, being considered a small sample, and moreover, their distribution was performed unevenly, while the experimental group was composed of a  $n = 41$  and control group  $n = 18$ , with a gap between samples. The same was true for the study of Bron *et al.* <sup>(31)</sup>, in which the sample calculation presented need 104 patients per group, however, found the sample to conduct the study was 52 patients per group.

Hains *et al.* <sup>(30)</sup> underwent 15 sessions of ischemic compression therapy in MTP, three times per week, while the control group received placebo therapy, referred to as false compression, which could justify the possible

improvements brought by this group. In this study, the analysis of the data showed  $p = 0.003$  in the comparison between groups, considered significant in reducing symptoms assessed by questionnaire SPADI.

Bron *et al.* <sup>(31)</sup> underwent 12 sessions, one per week, and the control group received no intervention. The intervention group showed significant improvement ( $p < 0.05$ ) after 12 weeks, 55% of patients in the intervention group reported improvement, and only 14% in the control group.

The studies highlighted the existence of a significant result in the use of manual therapy to release trigger points, used in the clinical practice of physical therapy in patients with chronic shoulder pain. Both studies <sup>(30,31)</sup> contribute to prove the efficacy of a program of manual physical therapy focused on this dysfunction.

It is believed that the physiological effects of ischemic compression are due to the hyperemic response after a period of compression, which restores blood flow to the tissue by supplying oxygen <sup>(26)</sup> and the desensitization of afferent fibers, leading to pain relief. <sup>(35)</sup>

Based on the results, proves the necessity of a good evaluation in patients with non-traumatic pain in the shoulder joint, in order to lead them to better conduct, considering that point in this region can generate triggers pain similar to other etiologies and clinical presentation, making diagnosis difficult and therefore the treatment. In this context, the technique of ischemic compression to release thereof, is presented as a useful intervention in physical therapy practice.

## CONCLUSION

Manual therapy using ischemic compression of trigger points in different locations around the shoulder reduces the pain status of patients with chronic shoulder pain.

The results lead to the importance of inspection and inactivation of myofascial trigger points in the muscles of the shoulder however, more randomized, controlled studies are needed since there is a dearth of studies on this topic.

## REFERENCES

1. Rekola KE, Keinanen-Kiukaanniemi S, Takala J. Use of primary health services in sparsely populated country districts by patients with musculoskeletal symptoms: consultations with a physician. *Journal of Epidemiology & Community Health.* 1993;47:153-157.
2. Roquelaure Y, Ha C, Leclerc A, Touranchet A, Sauteron M, Melchior M, et al. Epidemiologic surveillance of upper-extremity musculoskeletal disorders in the working population. *Arthritis Rheum.* 2006;55:765-778.
3. Pope DP, Croft PR, Pritchard CM, Silman AJ. Prevalence of shoulder pain in the community: the influence of case definition. *Annals of the Rheumatic Diseases.* 1997;56:308-312.
4. Badley EM, Tennant A. Changing profile of joint disorders with age: findings from a postal survey of the population of Calderdale, West Yorkshire, United Kingdom. *Ann Rheum Dis.* 1992;51:366-371.

5. Smith KL, Harryman DT, Antoniou J, Campbell B, Sidles JA, Matsen FA. A prospective, multipractice study of shoulder function and health status in patients with documented rotator cuff tears. *J Shoulder Elbow Surg.* 2000;9:395-402.
6. Roquelaure Y, Mariel J, Fanello S, Boissiere JC, Chiron H, Dano C, et al. Active epidemiological surveillance of musculoskeletal disorders in a shoe factory. *Occup Environ Med.* 2002;59:452-458.
7. Huisstede BMA, Bierma-Zeinstra SMA, Koes BW, Verhaar JAN. Incidence and prevalence of upper-extremity musculoskeletal disorders. a systematic appraisal of the literature. *BMC Musculoskeletal Disorders.* 2006;7:1-7.
8. Van Der Windt DA, Koes BW, De Jong BA, Bouter LM. Shoulder disorders in general practice: incidence, patient characteristics, and management. *Annals of Rheumatic Diseases.* 1995;54:959-964.
9. Bartolozzi A, Andreychik D, Ahmad S. Determinants of outcome in the treatment of rotator cuff disease. *Clin Orthop Relat Res.* 1994:90-97.
10. Neer CS. Anterior acromioplasty for the chronic impingement syndrome in the shoulder: a preliminary report. *J Bone Joint Surg Am.* 1972;54(1):41-50.
11. Hawkins RJ, Hobeika PE. Impingement syndrome in the athletic shoulder. *Clin Sports Med.* 1983;2(2):391-405.
12. Gerwin RD, Dommerholt J, Shah JP. An expansion of Simons' integrated hypothesis of trigger point formation. *Curr Pain Headache Rep.* 2004;8(6):468-475.
13. Simons DG, Travell JG, Simons LS. *Myofascial Pain and Dysfunction. The trigger point manual. Upper half of body. second. I.* Baltimore, MD: Lippincott, Williams and Wilkins; 1999.
14. Cagnie B, Dewitte V, Coppieters I, Oosterwijck JV, Cools A, Danneels L. Effect Of Ischemic Compression On Trigger Points In The Neck And Shoulder Muscles In Office Workers: A Cohort Study. *Journal of Manipulative and Physiological Therapeutics.* 2013, 36(8)482-89.
15. Hidalgo-Lozano A, Fernández-de-las-Peñas C, Díaz-Rodríguez L, González-Iglesias J, Palacios-Ceña D, Arroyo-Morales M. Changes in pain and pressure pain sensitivity after manual treatment of active trigger points in patients with unilateral shoulder impingement: A case series. Elsevier. *Journal of Bodywork & Movement Therapies.* 2011; 15:399-404.
16. Hidalgo-Lozano A, Fernández-de-las-Peñas C, Alonso-Blanco C, Ge HY, Arendt-Nielsen L, Arroyo-Morales M. Muscle trigger points and pressure pain hyperalgesia in the shoulder muscles in patients with unilateral shoulder impingement: a blinded, controlled study. *Exp Brain Res* 2010;202:915-925.
17. Albuquerque-Sendín F, Camargo PR, Vieira A, Salvini TF. Bilateral Myofascial Trigger Points and Pressure Pain Thresholds in the Shoulder Muscles in Patients With Unilateral Shoulder Impingement Syndrome A Blinded, Controlled Study. *Clin J Pain.* 2013;29(6)478-486.
18. Bron C, Dommerholt J, Stegenga B, Wensing M, Oostendorp ABR. High prevalence of shoulder girdle muscles with myofascial trigger points in patients with shoulder pain. *BMC Musculoskeletal Disorders.* 2011;9(8)12:139.
19. Rubin D. Myofascial trigger point syndromes: an approach to management. *Arch Phys Med Rehabil.* 1981;62:107-110.
20. McNulty WH, Gevirtz RN, Hubbard DR, Berkoff GM. Needle electromyographic evaluation of trigger point response to a psychological stressor. *Psychophysiology.* 1994;31:313-316.
21. Bron C, Franssen J, Wensing M, Oostendorp RA. Interrater reliability of palpation of myofascial trigger points in three shoulder muscles. *J Man Manip Ther.* 2007;15(4):203-215.
22. Lucas KR, Rich PA, Polus BI. Muscle activation patterns in the scapular positioning muscles during loaded scapular plane elevation: the effects of Latent Myofascial Trigger Points. *Clin Biomech.* 2010;25(8):765-770.
23. Gerwin R. Myofascial Pain Syndrome: Here we are, where must we go? *J Musculoskeletal pain.* 2010;18(4):18.
24. Kostopoulos D, Nelson AJ, Ingber RS, Larkin RW. Reduction of spontaneous electrical activity and pain perception of trigger points in the upper trapezius muscle through trigger point compression and passive stretching. *J Musculoskeletal Pain.* 2008;16:266-278.
25. Gemmel H, Miller P, Nordstrom H. Immediate effect of ischaemic compression and trigger point pressure release on neck pain and upper trapezius trigger point: a randomized controlled trial. *Clin Chiropract* 2008;11:30-6.
26. Hou CR, Tsai LC, Cheng KF, Chung KC, Hong CZ. Immediate effects of various physical therapeutic modalities on cervical myofascial pain and trigger point sensitivity. *Arch Phys Med Rehabil* 2002;83:1406-14.
27. Jadad AR, Moore RA, Carroll D, Jenkinson C, Reynolds DJ, Gavaghan DJ, et al. Assessing the quality of reports of randomized clinical trials: is blinding necessary? *Control Clin Trials.* 1996;17(1):1-12.
28. PEDro: Physiotherapy Evidence Database. [online]. Australian; 2006. [visualizados em 30 de Nov.2013] Disponível em: <http://www.pedro.fhs.usyd.edu.au/index.html>.
29. Verhagen AP, De Vet HC, De Bie RA, Kessels AG, Boers M, Bouter LM, et al. The Delphi list: a criteria list for quality assessment of randomized clinical trials for conducting systematic reviews developed by Delphi consensus. *J Clin Epidemiol* 1998; 51(12):1235-41.

30. Hains G, Descarreaux M, Hains F. Chronic shoulder pain of myofascial origin: a randomized clinical trial using ischemic compression therapy. *J Manipulative Physiol Ther* 2010, 33:362-369.
31. Bron C, Gast A, Dommerholt J, Stegenga B, Wensing M, Oostendorp RA. Treatment of myofascial trigger points in patients with chronic shoulder pain: a randomized, controlled trial. *BMC Medicine* 2011;9(8):1-14.
32. Brox JI. Shoulder pain. *Best Pract Res Clin Rheumatol* 2003; 1:33-56.
33. Van der Windt DA, Koes BW, de Jong BA, et al. Shoulder disorders in general practice, incidence, patient characteristics, and management. *Ann Rheum Dis* 1995;54:959-64.
34. Green S, Buchbinder R, Glazier R, Bouter LM. Systematic review of randomized controlled trials of interventions for painful shoulder: selection criteria, outcome assessment, and efficacy. *BMJ* 1998;316:354-60.
35. Wang YH, Ding XL, Zhang Y, Chen J, Ge HY, Arendt-Nielsen L, et al. Ischemic compression block attenuates mechanical hyperalgesia evoked from latent miofascial trigger points. *Exp Brain Res.* 2010; 202:265-270.