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ORIGINAL ARTICLE

# Analgesic effect of whole body cryotherapy in patients with trapezius myofascial pain syndrome: A longitudinal, non-blinded, experimental study

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**KEYWORDS**
Whole body cryotherapy;
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**Abstract**
*Objective:* To determine the analgesic effect of whole body cryotherapy (WBC) in patients with trapezius myofascial pain syndrome.
*Methods:* Twenty patients from an outpatient rehabilitation clinic were recruited. Patients were required to have clinical data for their diagnosis of myofascial pain syndrome in the trapezius. Twenty WBC sessions (−160 °C) were prescribed at four sessions per week for five weeks. A visual analog scale for pain (VAS) and algometry at trigger points (TPs) were applied before and after each session to measure the Pressure Pain Threshold (PPT). Six blood samples per patient were obtained during the study to measure the serum concentration of pro-inflammatory and anti-inflammatory cytokines.
*Results:* A significant decrease in pain immediately after WBC was found from session 1 ($p < 0.001$) onwards. Furthermore, a significant difference was observed in VAS at baseline compared to the value before each cryotherapy session starting from session 6 ($p < 0.001$). Significant differences were found in algometry at each session ($p < 0.001$) and when comparing the initial and pre-session values starting from session 6 ($p < 0.001$). No significant differences were found in the concentrations of inflammatory or anti-inflammatory factors throughout the study ($p > 0.05$).
*Conclusions:* WBC is useful as an analgesic treatment for myofascial pain syndrome in trapezius.'


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## Introduction

Musculoskeletal processes are the most common cause of both acute and chronic pain, as well as temporary or permanent disability.[1] It is estimated that the global prevalence of these diseases ranges from 13.5 to 47%. In Mexico, the prevalence of musculoskeletal pain is approximately 20% and is consistently more prevalent in women and urban areas.[2] It is estimated that one-third of patients with musculoskeletal pain meet the diagnostic criteria for myofascial pain syndrome.[3,4] Myofascial pain syndrome affects up to 85% of the population at some point in their lives.[5]

Myofascial pain syndrome (MPS) refers to soft tissue pain resulting from irritation of local points within the skeletal muscle and myotendinous junctions. These local points are known as *trigger points*.[6] These trigger points (TPs) have been described as hyperirritable sites located in a taut, muscular band, which are felt as small painful nodules that produce nociceptive pain caused by compression.[3]

It has been postulated that TPs are the result of acute muscle injury due to overuse or repetitive activity. When TPs persist for more than three weeks, the diagnosis of MPS is made.[7]

Physical examination and the clinical data thus found are of vital importance for the diagnosis of MPS. When MPS is suspected, the presence of a well-defined trigger point within a tight muscle band that causes pain when firm pressure is applied for 5 s and does not follow established nerve patterns can be suggestive of the disease. This pain should be reproducible with each compression of approximately 3 kg/cm$^2$ per second or less.[6] During the physical examination, there is sometimes an obvious response of muscle twitches and a perception of weakness by the patient.[8] According to the symptomatology, regardless of the clinical findings, TPs can be divided into active and latent.[6] It is important to consider fibromyalgia, bursitis, tendinosis, fasciitis, and disorders of joint hypermobility as differential diagnoses of MPS.[6,9,10]

MPS is a pathology that, while not fatal, represents a significant reduction in quality of life and an important cause of absence from work, generating an enormous cost for its treatment in health systems.[11]

Despite its high incidence, there is no specific treatment for the disease. Several conservative treatments have been described, among them analgesic and anti-inflammatory drugs, and in recent years, acupuncture, dry needle therapy, and botulinum toxin application.[3,4,12,13] Physical rehabilitation has been shown to have significant value in the management of this disease and, due to its analgesic effect in various musculoskeletal diseases, cryotherapy is one of the methods frequently used.[14]

The effects of cryotherapy consist of the provocation of several physiological effects: vasoconstriction, decreased edema, and decreased spasticity. Its direct analgesic effect is to reduce nociceptive conduction velocity in peripheral nerves.[14–17]

There are many different methods for applying cryotherapy. One of these methods is whole body cryotherapy, which, in addition to having a local effect, provides a systemic effect by modifying the levels of pro- and anti-inflammatory markers.[18]

Whole-body cryotherapy (WBC) or total body cryotherapy consists of exposing the body to cold air at temperatures below −110 °C in a chamber that controls the temperature. This type of therapy has been applied in several pathologies to relieve pain and inflammation.[19]

The anti-inflammatory effect observed in subjects after treatment with whole-body cryotherapy has been an increase in anti-inflammatory cytokines (IL-10) and a decrease in proinflammatory cytokines (IL-2, IL-8) and prostaglandin E2.[20]

Recent studies suggest that WBC may be effective in inflammatory processes in patients with some rheumatic diseases such as rheumatoid arthritis, ankylosing spondylitis, osteoarthrosis, and fibromyalgia.[15] Despite this recent introduction of WBC to the field of treatment of rheumatological diseases, there is no evidence of its use in MPS[7,13,21] and therefore it is important to continue searching for new therapeutic methods that could be more successful than those already known.

The aim of this study was to demonstrate the analgesic effect of total body cryotherapy in patients with myofascial pain syndrome of the trapezius muscle.

## Material and methods

### Patient selection

Patients of the Sports Medicine and Rehabilitation Department of a third level hospital in northeastern México with a clinical diagnosis of myofascial syndrome were recruited. These patients were chosen based on their willingness to participate in the study regardless of whether or not they had undergone another treatment. The trial was conducted between February and July of 2016. A sample of 20 subjects was calculated using a hypothesis test formula and a difference of two means, or with the proportion of a reference value considering a $z\alpha$ value of 1.96 with a level of significance of 95% for a queue, and a $z\beta$ value of 1.28 with a power of 90%, with a difference from the initial visual analog scale (VAS) of at least 3 points.

Patients of both genders aged 18–60 years, with a clinical diagnosis of myofascial pain syndrome and with a pain equivalent to 3 or more points on the VAS and who provided signed informed consent were included. During this trial, other analgesic measures such as NSAIDs, physical therapy, and/or other drugs were suspended. Pregnant women and individuals with heart diseases, respiratory diseases, cancer, sensitivity alterations, claustrophobia, poorly controlled hypertension, mental disorders and skin wounds, as well as those intolerant to cold or who had experienced adverse reactions to cold were excluded. Patients who did not comply with the total number of sessions ($n = 1$) were eliminated.

### Study design

This study was a longitudinal, prospective, experimental, and non-blinded, that was approved by the Ethics Committee of a third-level hospital in northeastern México. Informed consent was obtained from patients after a