International Journal of Medicine

journal homepage: www.ijmjournal.org

Original Research Article

A Complete Review on Physiotherapeutic Management of Myofascial Pain syndrome

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HIGHLIGHTS

1. Manual therapy for muscle relaxation.
2. Stretching to improve muscle flexibility.
3. Postural education for correct alignment.
4. Strengthening exercises for muscle support.
5. Modalities like heat or ultrasound application.

ARTICLE INFO

Handling Editor: Dr. S.K. Singh

Key words:
Myofascial pain syndrome(MPS)
physiotherapeutic management
myofascial trigger points(MTrPs)

ABSTRACT

Background: Myofascial Pain Syndrome (MPS) is a prevalent musculoskeletal pain condition characterized by hyperirritable nodules, known as myofascial trigger points (MTrPs) within the taut muscle band. Physiotherapeutic interventions play a pivotal role in managing MPS, encompassing diverse manual therapies, therapeutic physical Modalities and Invasive therapy.
Purpose: The present review was designed to explore evidence-based physiotherapeutic management of MPS and to provide clinicians with a comprehensive understanding of the current physiotherapeutic treatments for MPS. ***Materials and methods:*** The search for suitable journals involved a comprehensive search across multiple databases, namely PubMed, PubMed Central, Cochrane, PEDro, and Google Scholar. The keyword used for this exploration was 'myofascial pain syndrome.' ***Conclusion:*** Evidence suggests that physiotherapeutic treatments plays a pivotal role in addressing the complex nature of MPS, targeting both symptom relief and underlying causes. However, it is crucial to recognize the variability in treatment responses among individuals, which necessitates a personalized and multifaceted approach. Further research and clinical trials are warranted to refine treatment protocols and establish optimal combinations of interventions.

INTRODUCTION

Myofascial pain syndrome (MPS) is a type of musculoskeletal pain that most commonly occurs in muscles and the surrounding fascia. MPS was first described by Dr. Janet Travel and David Simons[1]. It is a regional pain syndrome whose clinical symptoms are mainly characterized by the presence of hyperirritable nodules, called myofascial trigger points (MTrPs), in a taut band of a single muscle or group of muscles accompanied by stiffness, tenderness, fatigue, pain, muscle spasm and contraction, and limited range of joint motion[2]. MPS is most commonly prevalent in muscles that are consistently active against gravity or muscles that are essential for repetitive activities, such as the head, neck, shoulders, hips, and lower back muscles[3]. The most commonly involved muscles and muscle groups the are trapezius, rhomboid, infraspinatus, levator scapulae, and paravertebral muscles[4].

Repetitive muscle overuse and chronic or acute muscle injuries contribute to MPS[7]. Common etiologies of myofascial pain syndrome may be direct or indirect trauma, spine pathology, exposure to repetitive strain, postural dysfunction, and physical deconditioning[8]. Approximately 30–50% of patients with musculoskeletal symptoms suffer from MPS, the incidence of which is higher in women[2]. Currently, the most accepted strategy for the treatment of MPS is to treat the underlying etiology. If the root cause is not properly treated, MTrPs may reactivate and MPS may persist[8].

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Received 22 March 2024; Received in revised form 17 April 2024; Accepted 26 April 2024

Physiotherapeutic treatment of MPS includes dry needling, stretching exercises, low laser therapy, and manual therapy, ischemic compression, also known as manual pressure release or trigger point release massage, is a type of manual therapy that is commonly applied for the treatment of MPS[1]. Transcutaneous electrical nerve stimulation (TENS), extracorporeal shock wave therapy (ESWT), and ultrasound (US) are widely used as therapeutic physical modalities.

Aim of this article is

1. To examine a variety of evidence-based physiotherapeutic treatments for MPS.
2. To provide the clinician with a comprehensive understanding of the current physiotherapeutic treatments for MPS

Methodology :

The search for the relevant journal was carried out through many databases such as PubMed, PubMed Central, Cochrane, PEDro, and Google Scholar searched with the keyword as 'myofascial pain syndrome'. Only articles published after the year 2000 were considered for the review. If other conditions such as fibromyalgia or widespread chronic pain were included, such articles were discarded. Only full-text articles published in English were considered for the review. Confounding conditions, such as temporomandibular pain and migraine, which may have a component of myofascial pain but are essentially separate entities, were also excluded from the review.

Abbreviations:

. MPS : Myofascial pain syndrome
. MTrPs : Myofascial trigger points
. MFR : Myofascial release
. UST : Ultrasound therapy
. ESWT: Extracorporeal shock wave therap
. LLLT: low level laser therapy
. IFT: Interferential Therapy

Physiotherapeutic Interventions

The main focus of this article is on the physiotherapeutic treatment of MPS.Which, which has been divided into three sections: manual therapies (myofascial release(MFR), ischemic compression, Manipulation and Stretching, Massage), therapeutic physical modalities (transcutaneous electrical nerve stimulation (TENS), extracorporeal shock wave therapy (ESWT), ultrasound (US), and low laser therapy), and invasive therapy including dry needling.

Manual therapies	• Myofascial release(MFR) • Ischemic compression • Manipulation and Stretching • Massage
Therapeutic physical Modalities	• Transcutaneous electrical nerve stimulation (TENS) • extracorporeal shock wave therapy (ESWT) • Ultrasound therapy (UST) • Low laser therapy
Invasive therapy	• Dry needling

Study selection

The detailed inclusion and exclusion category describe in table 2.

	Inclusion	**Exclusion**
Study year	From year 2000 to till date	Before year of 2000
Study design	RCTs, systematic reviews, meta analysis, original articles	Survey, dissertation, coherent study, manuscript, cross sectional study
settings	Hospital, OPD, rehabilitation centre	Community, camp, NGO's
context	MFR, Ischemic compression, Manipulation and Stretching, Massage, TENS, ESWT, UST, Low laser therapy, Dry needling	Chiropractic, cupping therapy, ultra violet radiation(UVR)

Data extraction and analysis

4 reviewers independently completed data extract and review the information extracted were on following study characteristics:

1. Introduction (research aim)
2. Physiotherapy interventions
3. Conclusion

The charactersitics mentioned aboved are summersied in table 3

S.no.	Characteristics	author	country	Type of research	conclusion
1.	Comparison of injection methods in myofascial pain syndrome	Ay, S., Evcik, D. & Tur et al (2010)	Turkey	Randomized controlled trial	the combination of exercise with dry needling injections proved effective in reducing pain levels associated with Myofascial Pain Syndrome (MPS)
2.	Treatment of myofascial pain syndrome with lidocaine injection and physical therapy, alone or in combination	Lugo, L.H., García, H.I., Rogers, H.L. et al. (2016)	Colombia	Randomized controlled trial	revealed that there were no differences in pain ratings between the separate treatments (Physical Therapy or lidocaine injection) when compared to the combined treatment involving both Physical Therapy and lidocaine injection.
3.	Efficacy of Pulsed and Continuous Therapeutic Ultrasound in Myofascial Pain Syndrome	Ilter, Leman MD; Dilek, Banu MD; Batmaz, Ibrahim MD et al. (2015)	Turkey	Randomized controlled trial	Continuous ultrasound therapy demonstrates greater efficacy in reducing pain at rest for patients with myofascial pain syndrome compared to pulsed ultrasound therapy.
4.	The Effect of Extracorporeal Shock Wave Therapy on Myofascial Pain Syndrome	Jong Hyun Jeon, M.D., Yun Jae Jung, M.D., Ju Youn Lee, M.D et al. (2012)	korea	Randomized controlled trial	Extracorporeal Shock Wave Therapy (ESWT) in patients with myofascial pain syndrome in the trapezius muscle proves to be equally effective as Trigger Point Injections (TPI) and Transcutaneous Electrical Nerve Stimulation (TENS) in providing pain relief and enhancing cervical range of motion.
5.	Efect of ischemic compression on myofascial pain syndrome	Systematic review and meta-analysis	china	Systematic review and meta-analysis	Ischemic compression, as a noninvasive and conservative therapy, demonstrated an improvement in pain tolerance among individuals with myofascial pain syndrome (MPS) when compared to an inactive control. However, there was no apparent benefit observed in self-reported pain levels.
6.	The effect of therapeutic physical modalities on pain, function, and quality of life in	He, Peijue et al. (2023)	china	Systematic review	indicates that therapeutic physical modalities emerge as a safe and effective therapeutic choice for addressing myofascial pain syndrome (MPS).
7.	Effectiveness of ultrasound therapy for myofascial pain syndrome	Peng Xia, Xiaoju Wang, Qiang Lin et al. (2017	china	Systematic review	suggests that while ultrasound therapy might be effective in addressing pain associated with MPS, its influence on enhancing range of motion may be limited or inconclusive based on current research findings.
8.	Efficacy of low level laser therapy and intramuscular electrical stimulation on myofascial pain syndrome	Sumen, Ahmet et al. (2015)	Turkey	Randomized controlled trial	suggests that low-level laser therapy(LLLT) when integrated with stretching, demonstrated positive outcomes in improving pain-related measures for individuals diagnosed with MPS.
9.	Comparison of the Effectiveness of Transcutaneous Electrical Nerve Stimulation and Interferential Therapy on the Upper Trapezius in Myofascial Pain Syndrome	Dissanayaka, Thusharika Dilrukshi; Pallegama, Ranjith Wasantha et al. (2016)	Sri lanka	Randomized controlled trial	The combination of Transcutaneous Electrical Nerve Stimulation (TENS) with standard care has been observed to promote recovery more effectively compared to the same combination with Interferential Therapy (IFT).
10.	Exercise, especially combined stretching and strengthening exercise, reduces myofascial pain	Juliano Bergamaschine Mata Diz a , Joa˜o Rodolfo Lauton Miranda de Souza et al. (2016	Brazil	Systematic review	a combination of stretching and strengthening exercises appears to yield more substantial effects, indicating that the synergistic approach may be particularly beneficial in managing myofascial pain.

Manual therapies

Manual therapy plays a crucial role in the treatment of Myofascial Pain Syndrome (MPS) and is widely acknowledged as an effective technique for deactivating Myofascial Trigger Points (MTrPs)[10].

Myofascial release(MFR)

Myofascial release techniques are used to ease musculoskeletal pain, and several theories have elucidated their efficacy. According to Gate Control Theory, pressure stimuli move more swiftly along neural pathways than pain signals, disrupting the transmission of pain to the brain and resulting in a "gate-closing" effect that lessens the perception of pain. Furthermore, the release of serotonin and other inhibitory neurotransmitters during myofascial release can impede the transmission of harmful stimuli, thereby leading to pain relief. The treatment approaches can differ in terms of pressure, duration, motion, and tension, leading to varying results and outcomes. Providers typically rely on palpation and the patient's reported symptoms to identify inflamed or fibrotic areas. The objective of these treatments is to alleviate tension and promote relaxation of the affected soft tissues of the body. The goal is to address irritated areas, with the hope that relieving tension in these areas will also alleviate symptoms. When applied correctly and promptly, these techniques targeting soft tissues or myofascial areas have demonstrated effectiveness as a treatment method[13].

Ischemic compression

Ischemic compression involves applying thumb pressure to trigger points for a specific duration. Gradual pressure escalation reportedly leads to a reduction in pain severity and an improvement in muscle range of motion (ROM) within 15 seconds to one minute. Simons et al. suggested incorporating ischemic compression after hot pack therapy and active ROM exercises. Combining ischemic compression with stretching exercises was found to enhance trigger point sensitivity and alleviate pain. Furthermore, the application of ischemic compression in conjunction with hot pack therapy and active ROM resulted in a significant improvement in symptoms associated with myofascial pain syndrome (MPS)1[2.]

Manipulation and Stretching

Manipulation and stretching involve a technique wherein muscles are prompted to move without imposing force or muscle contraction, allowing the patient to undergo the process in a relaxed state. This method facilitates the dilation of vessels, fastens lymph circulation, and enhances the absorption and elimination of inflammatory mediators. Consequently, it aids in reducing muscle inflammation and edema[11].

Massage

Massage is a versatile method widely employed to alleviate musculoskeletal pain, offering notable sedative, myorelaxant, and analgesic effects by enhancing local blood and lymphatic circulation. Its efficacy in managing myofascial pain syndrome (MPS) surpasses that of using hot pack therapy alone. It's important to note that certain massage techniques like friction and petrissage may exacerbate pain, especially when applied directly and intensively to hypersensitive trigger points. A study combining massage with exercise for MPS management demonstrated a significant enhancement in clinical scores[12].

Therapeutic physical modalities

Extracorporeal shock wave therapy (ESWT)

Extracorporeal shock wave therapy delivers mechanical energy to the body through a specific medium, targeting myofascial trigger points (MTrPs) and spasmodic muscle tissue without causing harm to surrounding tissues. This technique aims to alleviate tension in muscles, relax smooth muscles, identify and address superficial MTrPs, and treat expansive or activated areas of connective tissue. Focused shock waves are utilized to address tendon attachment lesions, break down calcification deposits, pinpoint trigger and pain points, induce referred pain, and effectively treat both superficial and deep-seated trigger points[11].

Six studies reported a significant decrease in Visual Analog Scale (VAS) scores and Neck Disability Index (NDI) in the ESWT group compared to baseline. Studies utilized both low-energy and high-energy ESWT, with some using a combination of both. High-energy ESWT was found to be superior to low-energy ESWT in improving neck flexion and extension in one study. Some researchers reported that high-energy ESWT was more effective than a combination of hot packs, TENS, and the US, especially according to the Short Form 36 (SF-36) health survey[2].

Treatment Parameters: The treatment parameters for ESWT included treatment intensity ranging from 0.056 to 0.25 mJ/mm², 1000–2500 pulses, and 3–15 treatment sessions[2].

Ultrasound Therapy (UST)

Ultrasound is a technique that has been proposed to treat myofascial pain by converting electrical energy to sound waves to provide heat energy to muscle8. Ultrasound Therapy (UST) stands out as a commonly employed physical intervention, known for its thermal and non-thermal properties, as well as its ability to penetrate deeper anatomical structures. In a study involving 59 patients, randomized into two groups, conventional UST was administered for six minutes over 15 sessions to one group, while the other received a placebo UST. The results revealed a significant reduction in pain scores, objective pain analysis (using 0–5 scores), depression scores, and improvement in pain tolerance immediately after treatment and at the end of the three-month follow-up. Importantly, those receiving UST reported no need for additional therapy[9].

It is noteworthy that while UST alone is recognized for its modest improvements, long-lasting effects are rarely observed unless complemented with other treatments. Combining UST with approaches such as stretching exercises, ergonomic modifications, medications, or even psychological counseling is often recommended for more comprehensive and sustained management of Mp[9].

Transcutaneous electric nerve stimulation (TENS)

Transcutaneous Electric Nerve Stimulation (TENS) is a therapeutic technique employing an electrical current to activate nerve fibers, aiming to alleviate pain[8]. TENS has been proposed as an effective approach for managing musculoskeletal disorders. It operates by stimulating gate-control mechanisms and sensory nerves, leading to the release of β-endorphins and enkephalins. TENS contributes to pain

relief through local vasodilation and the stimulation of acupuncture points. A study exploring TENS efficacy in addressing myofascial pain and trigger point sensitivity revealed that intensive TENS resulted in short-term improvements in pain scores across all modules. However, no discernible difference in the local sensitivity of trigger points was observed. In another study comparing TENS with placebo TENS specifically for latent trigger points, TENS demonstrated superiority in reducing pain scores[12].

Low laser therapy

Low laser therapy is recognized for its analgesic, microcirculatory, curative, and anti-inflammatory effects. Numerous studies have investigated the effectiveness of laser therapy in managing myofascial pain syndrome (MPS). Simunovic noted a significant improvement in pain and functional scores with low-energy laser treatment. Hakguder et al. observed that combining low-energy laser with stretching exercises proved more effective than using stretching exercises alone. In contrast, Dundar et al. reported that laser therapy did not exhibit superiority over a placebo in MPS patients[12].

Invasive therapy

Dry needling

Dry needling is a well-established and efficient method for deactivating Myofascial Trigger Points (MTrPs) and alleviating associated pain. This technique involves inserting a needle into MTrPs using a back-and-forth motion in multiple directions to deactivate them. Despite the invasive nature of the procedure making Randomized Controlled Trials (RCTs) challenging to design, numerous studies have explored the effectiveness of dry needling. In a specific study, patients underwent dry needling with and without lidocaine, both proving effective in reducing Myofascial Pain Syndrome (MPS). Various studies conducted by different researchers consistently support the notion that dry needling is an effective treatment of MPS[8-10].

DISCUSSION

The diverse array of physiotherapeutic interventions for MPS underscores the complexity of this syndrome and the need for a tailored treatment approach. Manual therapies, such as Ischemic Compression and Manipulation and Stretching, provide non-invasive and patient-friendly options for symptom relief. These techniques not only target the myofascial trigger points directly but also contribute to improved blood circulation and the reduction of inflammatory mediators.

Invasive therapies like Dry Needling, despite their invasive nature, have demonstrated efficacy in deactivating trigger points and alleviating pain. The challenge lies in balancing the effectiveness of such interventions with the potential discomfort associated with the procedure.

Therapeutic physical modalities, including TENS, ESWT, UST, and Low Laser Therapy, offer additional dimensions to MPS management. TENS, through its mechanism of stimulating nerve fibers and releasing endorphins, provides pain relief, while ESWT and UST utilize mechanical energy and sound waves, respectively, to target trigger points and enh--ance overall muscle function. Low Laser Therapy, with its analgesic and anti-inflammatory effects, presents a promising avenue for further exploration.

The variability in research findings, as seen in conflicting results for certain modalities like ESWT and Laser Therapy, highlights the need for more standardized protocols and larger-scale studies. Additionally, considering the multifactorial nature of MPS, a holistic approach that combines various modalities may prove more effective in addressing the diverse aspects of this syndrome. Several articles which studies on behalf of this article was listed below

Ay, S., Evcik, D. & Tur et al (2010) concluded that the combination of exercise with dry needling injections proved effective in reducing pain levels associated with Myofascial Pain Syndrome (MPS).

Jong Hyun Jeon, M.D., Yun Jae Jung, M.D., Ju Youn Lee, M.D et al. (2012) concluded that Extracorporeal Shock Wave Therapy (ESWT) in patients with myofascial pain syndrome in the trapezius muscle proves to be equally effective as Trigger Point Injections (TPI) and Transcutaneous Electrical Nerve Stimulation (TENS) in providing pain relief and enhancing cervical range of motion.

Ilter, Leman MD; Dilek, Banu MD; Batmaz, Ibrahim MD et al. (2015) concluded that Continuous ultrasound therapy demonstrates greater efficacy in reducing pain at rest for patients with myofascial pain syndrome compared to pulsed ultrasound therapy.

Sumen, Ahmet et al. (2015) suggests that low-level laser therapy(LLLT) when integrated with stretching, demonstrated positive outcomes in improving pain-related measures for individuals diagnosed with MPS.

Lugo, L.H., García, H.I., Rogers, H.L. et al. (2016) revealed that there were no differences in pain ratings between the separate treatments (Physical Therapy or lidocaine injection) when compared to the combined treatment involving both Physical Therapy and lidocaine injection.

Dissanayaka, Thusharika Dilrukshi; Pallegama, Ranjith Wasantha et al. (2016) suggest that the combination of Transcutaneous Electrical Nerve Stimulation (TENS) with standard care has been observed to promote recovery more effectively compared to the same combination with Interferential Therapy (IFT).

Peng Xia, Xiaoju Wang, Qiang Lin et al. (2017) suggests that while ultrasound therapy might be effective in addressing pain associated with MPS, its influence on enhancing range of motion may be limited or inconclusive based on current research findings.

Wei Lu1 , Jiong Li2 , Ye Tian et al. (2022) concluded that Ischemic compression, as a noninvasive and conservative therapy, demonstrated an improvement in pain tolerance among individuals with myofascial pain syndrome (MPS) when compared to an inactive control. However, there was no apparent benefit observed in self-reported pain levels.

He, Peijue et al. (2023) indicates that therapeutic physical modalities emerge as a safe and effective therapeutic choice for addressing myofascial pain syndrome (MPS).

Juliano Bergamaschine Mata Diz, João Rodolfo Lauton Miranda de Souza et al. concluded that currently, there is limited and low-quality evidence suggesting that exercise can have mildly to moderately positive effects on pain intensity in individuals with myof-

ascial pain during short-term follow-ups. Enhanced effects seem to be observed when incorporating a combination of stretching and strengthening exercises.

He, Peijue et al. concluded that Transcutaneous electrical nerve stimulation therapy, extracorporeal shock wave therapy, laser therapy, and various other therapeutic physical modalities have been shown to improve pain symptoms, joint mobility, psychological well-being, and overall quality of life in individuals with myofascial pain syndrome. Importantly, no adverse effects have been reported from these treatments.

Lew, J., Kim, et al. concluded that both dry needling (DN) and trigger point manual therapy (TPMT) are effective in improving pain and function for individuals with myofascial pain syndrome in the neck and upper back during the short to medium term. No significant superiority was observed between the two interventions. The efficacy of both interventions provides clinicians and patients with additional options for their treatment strategies.

Wei Lu , Jiong Li et al. concluded that, Ischemic compression as a noninvasive and conservative therapy, showed improved pain tolerance in individuals with myofascial pain syndrome compared to an inactive control. However, there was no clear evidence supporting its benefit in terms of self-reported pain. It's important to note that the study's conclusion is based on a relatively small number of participants, and future research with larger-scale randomized controlled trials (RCTs) will be crucial for a more definitive assessment.

Tugba Aydın, Bahar Dernek, et al. concluded that, Both the combination of dry needling and exercise therapy and exercise therapy alone proved effective in addressing dizziness associated with cervical myofascial pain syndrome. Nevertheless, the combined approach of dry needling and exercise treatment demonstrated greater effectiveness compared to relying solely on exercise treatment.

Lee, J., Jung, K., & Park, Y. et al. suggest that extracorporeal shock wave therapy can be regarded as an effective and efficient treatment option for myofascial pain syndrome in the upper trapezius.

Conclusion:

The management of Myofascial Pain Syndrome (MPS) involves a diverse range of evidence-based physiotherapeutic interventions. The review encompassed various manual therapies, including Myofascial Release (MFR), Ischemic Compression, Manipulation and Stretching, and Massage, all of which have demonstrated effectiveness in alleviating MPS symptoms. Invasive therapies such as Dry Needling were explored, highlighting its efficiency in deactivating Myofascial Trigger Points (MTrPs). Additionally, therapeutic physical modalities like Transcutaneous Electrical Nerve Stimulation (TENS), Extracorporeal Shock Wave Therapy (ESWT), Ultrasound (UST), and Low Laser Therapy were discussed, each presenting unique contributions to MPS management.

The evidence suggests that physiotherapeutic treatments play a pivotal role in addressing the complex nature of MPS, targeting both symptom relief and underlying causes. However, it is crucial to recognize the variability in treatment response among individuals, necessitating a personalized and multifaceted approach. In conclusion, this review emphasizes the significance of physiotherapeutic interventions in the comprehensive management of MPS. Further research and clinical trials are warranted to refine treatment protocols, establish optimal combinations of interventions, and enhance our understanding of the long-term effects of these therapies in diverse patient populations.

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