



EFFECTIVENESS OF CONVENTIONAL PHYSIOTHERAPY AND DRY NEEDLING IN MUSCULOSKELETAL PAIN: A SYSTEMATIC REVIEW

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ABSTRACT

Purpose: This study aimed to systematize and critically analyze the contemporary evidence regarding the effectiveness of conventional physiotherapy approaches combined with dry needling in the management of musculoskeletal pain.

Material/Methods: A systematic search was conducted in the electronic databases MEDLINE (via PubMed), Scopus, and Web of Science to identify relevant English-language publications up to 1 May 2025. The search strategy included combinations of the following descriptors: "dry needling" AND ("physiotherapy" OR "physical therapy") AND ("manual therapy" OR "modalities" OR "electrotherapy"). Study selection followed predefined inclusion and exclusion criteria.

Results: Of the 169 records initially identified, 11 studies met the eligibility criteria and were included in the final analysis. The findings indicate that among various needling techniques, such as traditional acupuncture, Western medical acupuncture, and dry needling, the latter is distinguished by its direct and targeted application to myofascial trigger points. Dry needling was associated with reductions in pain intensity and improvements in functional outcomes, particularly in the short term.

Conclusions: This systematic review suggests that both conventional physiotherapy and dry needling are clinically effective in the management of musculoskeletal pain. Dry needling, in particular, demonstrates significant short-term benefits and shows potential for sustained therapeutic effects when incorporated into multimodal physiotherapy programs.

Keywords: musculoskeletal pain, physical therapy modalities, dry needling, exercise therapy, myofascial pain syndromes,

INTRODUCTION

Musculoskeletal pain (MSK pain) refers to pain that affects bones, joints, muscles, ligaments, tendons, and nerves. It is the most common type of pain both in the general population and in clinical practice [1, 2, 3, 4, 5]. This is a widespread condition, affecting approximately 33% of the adult population, with higher prevalence among the elderly and working-age individuals [4, 5].

MSK pain can result from a variety of etiologies, including trauma, degenerative diseases, inflammatory processes, poor posture, overuse, or immobilization.

Common conditions associated with musculoskeletal pain include myofascial pain syndrome (MPS) and fibromyalgia syndrome (FMS) [1, 2, 3, 4, 5]. MPS is characterized by chronic localized or regional pain, whereas FMS manifests as chronic, widespread pain [1].

Musculoskeletal pain is one of the leading causes of disability worldwide and significantly impacts quality of life and daily functioning [6, 7, 8]. It leads to functional limitations, reduced work capacity, and social isolation [2, 9, 10]. Moreover, it is a major cause of chronic non-cancer pain and disability. The economic burden of MSK pain includes both direct healthcare costs and indirect costs related to lost workdays and decreased productivity [8]. Diagnosing and treating MSK pain is challenging due to its multifactorial nature, which includes both physical and psychosocial aspects [9, 11, 12]. The clinical approach requires thorough history taking and detailed physical examination in order to develop an effective therapeutic plan [13].

Traditional physiotherapy for musculoskeletal pain typically involves a combination of manual therapy, exercise therapy, and patient education. The goal is to relieve pain, improve function, and prevent future disability. Kinesiotherapy is a key therapeutic method, particularly in cases of chronic MSK pain, aiming to improve physical function and manage secondary conditions [14]. Techniques such as manual mobilization and massage may enhance stability and reduce pain, al-

though their long-term effectiveness still requires further investigation [15].

Patient motivation to actively cooperate with therapists, to be compliant and disciplined, as well as to receive information about the nature of the pain and the benefits of kinesiotherapy, can significantly improve therapeutic outcomes [16]. An internet-based pain education and exercise program has also been described in a randomized trial protocol [17]. Alongside traditional approaches, dry needling (DN) can also have a positive effect by helping to reduce pain and improve functional capacity in patients with musculoskeletal complaints [18, 19]. Dry Needling is a therapeutic technique used in physiotherapy to treat musculoskeletal pain and dysfunction by targeting myofascial trigger points (MTrPs) with thin needles [18, 19].

Musculoskeletal pain is a widespread and complex condition that requires a comprehensive and individualized treatment approach. Understanding the underlying causes, its impact on patients, and effective therapeutic strategies is crucial for improving outcomes and quality of life.

The medical and social significance of the problem is the primary motivation for conducting this study.

This study aimed to systematize and critically analyze the contemporary evidence regarding the effectiveness of conventional physiotherapy approaches combined with dry needling in the management of musculoskeletal pain.

REVIEW RESULTS

Literature search

Two researchers independently conducted a systematic search of scientific publications in the electronic databases MEDLINE (PubMed), Scopus, and Web of Science. The aim was to identify relevant articles published up to 1 May, 2025, in English, focusing on physiotherapeutic interventions for musculoskeletal pain.

The following combined keywords and phrases were used for the search:

“dry needling” AND (“physiotherapy” OR “physical therapy”) AND (“manual therapy” OR “modalities” OR “electrotherapy”).

The included materials comprised original research articles and review papers published in peer-reviewed journals, presenting real clinical applications of physiotherapy methods.

Inclusion and Exclusion Criteria

After the initial search, predefined selection criteria were applied.

Inclusion criteria:

- Publications from the last 25 years;
- Studies focusing on the application of Dry Needling in clinical physiotherapy practice;

- Articles published in English.

Exclusion criteria:

- Publications not related to physiotherapy;
- Articles based solely on theoretical models without empirical or clinical application.

Quality Assessment

The quality of the included studies was evaluated by the authors (S. F., M. M., and P. M.-B.), following the protocol for systematic search and selection of studies [20].

The assessment involved an evaluation of the applied methodology, the potential risk of bias, and the compliance of each publication with the eligibility criteria. A comparison between studies was conducted to identify duplicate publications and avoid data overlap.

Selection and Organization of Sources

The search results were organized in a database, with each publication identified via its DOI number.

In the first screening stage, duplicates were removed by comparing DOI entries.

In the second stage, the sources were filtered by title, authors, journal, year of publication, volume, and issue.

Only unique publications that met all criteria were included for further analysis.

Data Processing

The collected data were processed to transform them into usable and interpretable information. The process began with raw data, which were structured and analyzed in the context of the study objectives.

This enabled the extraction of well-founded conclusions and the formation of clinical recommendations. Proper data processing was essential for the reliability and validity of the results.

Review findings

A total of 169 scientific publications were identified. After applying the eligibility criteria, 11 articles were included in the systematic review.

Throughout the course of the present study, conducted according to the predefined methodology, it was found that the most effective therapeutic strategies for musculoskeletal pain involve a combination of pharmacological and non-pharmacological approaches, tailored to the individual needs and clinical condition of each patient. A multimodal approach remains the most effective strategy for achieving sustainable therapeutic outcomes.

The results of the analysis reveal a prevailing consensus among authors that the treatment of musculoskeletal pain is a complex process that often requires a multimodal and multidisciplinary approach, combining both pharmacological and non-pharmacological interventions [2] (Table 1).

Table 1. Summary of Multimodal and Multidisciplinary Approaches in the Treatment of Musculoskeletal Pain

Type of Treatment	Examples	Effectiveness
Pharmacological	NSAIDs, opioids, muscle relaxants, SNRIs, topical medications	Commonly used for musculoskeletal pain; therapy should be individualized to the patient [21, 22].
Interventional	Corticosteroid injections, prolotherapy, transarterial embolization	Provides short-term relief; requires careful consideration of potential side effects [21, 23, 24]. Promising effectiveness for specific conditions [25, 26].
Non-Pharmacological	Physical therapy, kinesiotherapy, manual therapy, acupuncture, dry needling	Effective in reducing pain and improving function [14, 21, 27, 28].
Psychological Approaches	Cognitive-behavioral therapy (CBT), focus and stress management techniques	Support pain management by changing the patient's perception and behavioral response [27]. Suitable for chronic pain – osteoarthritis, neck and low back pain.

Pharmacological therapies, including non-steroidal anti-inflammatory drugs (NSAIDs), opioids, and adjuvant medications, remain a core component in the management of musculoskeletal pain. However, current guidelines emphasize the need for an individualized approach tailored to the specific characteristics and needs of the patient [21, 22].

Interventional methods-such as corticosteroid injections and prolotherapy-demonstrate temporary effectiveness and are often applied in specific clinical conditions. Nevertheless, increased vigilance is required regarding potential adverse effects and long-term safety [23, 24, 25].

Among non-pharmacological interventions, particular attention is given to physiotherapeutic approaches such as kinesiotherapy, manual therapy, acupuncture, and dry needling. These have been established as effective methods for reducing pain and improving functional activity in patients with chronic musculoskeletal pain [14, 27, 28].

Psychological interventions, such as cognitive behavioral therapy (CBT), contribute to reshaping the perception of pain, reducing stress levels, and improving patients' coping strategies. They are especially effective in individuals with knee osteoarthritis, chronic low back

pain, and neck pain [27].

In the present review, we systematically summarized contemporary physiotherapeutic approaches, including novel techniques, key differences between methods, and challenges associated with their application. Physiotherapy has been shown to be an effective and long-term approach for the treatment of musculoskeletal disorders, leading to improvements in quality of life and patients' functional independence [29].

Common Physiotherapeutic Techniques

Common physiotherapeutic techniques for the treatment of musculoskeletal pain include a wide range of methods, generally categorized into passive (e.g., physical and manual therapy) and active (e.g., kinesiotherapy) interventions. These treatments are typically non-pharmacological, non-invasive, and aim to reduce pain and restore functional activity [27, 28].

In recent years, physiotherapeutic strategies have increasingly relied on the biopsychosocial model, which incorporates active exercise, educational strategies, and behavioral advice for long-term symptom management [14, 16, 29]. The most commonly used physiotherapy techniques in non-pharmacological treatment of musculoskeletal pain are presented in Table 2.

Table 2. Comparison of the Most Commonly Used Physiotherapy Techniques in Non-Pharmacological Treatment of Musculoskeletal Pain

Technique	Description	Indications
Electrotherapy	TENS – Transcutaneous Electrical Nerve Stimulation: stimulates nerves and reduces pain [23].	Knee osteoarthritis; chronic neck and low back pain
	Ultrasound therapy – may provide short-term pain relief, particularly in knee osteoarthritis [27].	
Manual Therapy	Manipulation and mobilization – includes spinal manipulation and mobilization techniques [23, 27, 28]. Myofascial release – relieves fascial tension [27].	Limited joint function, muscular tension

Muscle Energy Techniques	Require active muscle contraction by the patient against resistance, in specific positions and controlled movements .	Muscle imbalance, limited range of motion
Massage	Reduces muscle tension and improves circulation, contributing to pain reduction [27].	General muscular discomfort, chronic pain
Kinesiotherapy	Strengthening exercises – improve muscle strength and joint stability [14, 21].	Muscular weakness, joint instability

Multimodal Approach

In cases of chronic musculoskeletal pain, a multimodal approach is recommended, combining non-pharmacological interventions such as exercise, cognitive-behavioral therapy (CBT), spinal manipulation, acupuncture, massage, and multidisciplinary rehabilitation [21, 27].

These methods, often used in combination, aim not only to relieve pain but also to restore function and improve quality of life [27]. Integrating physical therapy, psychological support, and pharmacological treatment often leads to better outcomes. When implemented responsibly, these strategies are effective in managing various pain conditions.

Techniques such as traditional and Western medical acupuncture, as well as dry needling, involve targeting muscle tissue with needles and show good results in treating musculoskeletal pain. Needle-based therapy for muscle pain and dysfunction is particularly suitable for myofascial pain syndrome [18, 28].

DISCUSSION

In summary, musculoskeletal pain can be caused by numerous factors, including lifestyle, age, and specific conditions affecting the musculoskeletal system. The underlying physiological mechanisms involve complex interactions between peripheral, central, and psychological factors, as well as a bidirectional relationship between immune cells and neurons. Musculoskeletal pain significantly impacts daily functioning and quality of life.

Various treatment options exist, generally classified into two major categories: pharmacological and non-pharmacological. Pharmacological therapies-including non-steroidal anti-inflammatory drugs, opioids, topical agents, and interventional methods-are not the focus of this review.

This review emphasizes non-pharmacological approaches, particularly physiotherapy interventions such as physical therapy, manual therapy, and kinesiotherapy. Physiotherapy is a core component of the multidisciplinary approach to managing musculoskeletal pain, working in synergy with medical interventions, occupational therapy, and lifestyle modifications [29]. Physiotherapy techniques are based on non-pharmacological and non-invasive methods, including exercise therapy, manual techniques, and multimodal interventions aimed at reducing pain and restoring optimal physical function-

ing [27]. Contemporary interventions are guided by the biopsychosocial model, which integrates active exercises, education, and behavioral advice to manage symptoms. The holistic approach addresses not only the physical but also the psychological and social aspects of pain [29].

Kinesiotherapy is a key component in the treatment of musculoskeletal pain. It includes strengthening, stretching, and stabilization exercises tailored to individual needs [21, 27]. Regular active exercises are recommended to improve mobility, motor control, strength, and endurance [29]. Despite the fear of pain during physical activity, graded exercise helps gradually increase activity levels without worsening symptoms.

Physiotherapy has proven effective in managing conditions such as chronic low back pain and patellofemoral pain syndrome. Individualized treatment plans tailored by physiotherapists contribute to better long-term outcomes. Studies support an integrated treatment model that combines medical care with physiotherapy, leading to improved clinical results and higher patient satisfaction [29].

Physiotherapy is evolving through innovative care models aimed at more effective interventions and better resource utilization. Evidence-based recommendations include non-pharmacological therapies such as psychotherapy, biofeedback-based exercises, manual therapy, electrophysical agents, and graded activity [24].

Manual therapy, including spinal manipulation, massage, and myofascial release, may result in moderate improvements in pain and function [27, 28]. Joint and soft tissue mobilizations have also been used, although the evidence supporting their efficacy is mixed. These techniques are often combined with kinesiotherapy for short-term pain relief.

Motion style acupuncture treatment (MSAT) for acute low back pain with severe disability has been described in a randomized controlled trial protocol [30].

Dry needling is a physiotherapeutic technique involving the insertion of thin needles into myofascial trigger points. It is used in the treatment of myofascial pain syndrome, subacromial pain syndrome (SAPS), post-stroke spasticity, and chronic neck and low back pain [18, 19].

Research shows that dry needling effectively reduces pain intensity in the short term and improves range of motion and muscle activation. The combination of dry needling and exercise results in significant improvement

in SAPS. However, more long-term, high-quality studies are needed to confirm the lasting benefits of this method and ensure safety through proper training.

Psychosocial interventions, such as cognitive-behavioral therapy (CBT) and mindfulness exercises, show positive effects in chronic pain, including low back pain and fibromyalgia [27]. These approaches help reduce fear of movement and hypervigilance, which can worsen pain and contribute to disability.

CONCLUSION

Dry needling is increasingly established as an effective tool in physiotherapy for short-term relief of musculoskeletal pain and improvement of functional status. Its combination with other therapeutic methods enhances its effectiveness; however, further high-quality research is needed to confirm its long-term benefits and to optimize treatment protocols.

Technological advancements, such as the use of ultrasound guidance, contribute to greater precision of the procedure. Therapist qualification and patient monitoring are key factors for its safe application.

Musculoskeletal disorders are highly prevalent and

have a complex etiology. Physiotherapy, including dry needling, exercise therapy, and other non-pharmacological methods-offers effective solutions. An individualized approach to each patient remains essential for achieving optimal outcomes.

Acknowledgements:

The research study was financed with funds from the state budget, provided through the Ministry of Education and Science (MES) to the Science Fund at the Medical University - Varna for financing the scientific activity inherent in state higher education institutions under project No. 23001.

Abbreviations:

CBT - cognitive behavioral therapy; DN - dry needling; DOI - digital object identifier; FMS - fibromyalgia syndrome; MPS - myofascial pain syndrome; MSAT - motion style acupuncture treatment; MSK - musculoskeletal; MTrPs - myofascial trigger points; NSAIDs - non-steroidal anti-inflammatory drugs; SAPS - subacromial pain syndrome; SNRIs - serotonin–norepinephrine reuptake inhibitors; TENS - transcutaneous electrical nerve stimulation.

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Please cite this article as: Filkova S, Milev M, Mincheva-Bolgurova P. Effectiveness of Conventional Physiotherapy and Dry Needling in Musculoskeletal Pain: A Systematic Review. *J of IMAB*. 2026 Oct-Dec;32(4):7142-7147. [Crossref - <https://doi.org/10.5272/jimab.2026324.7142>]

Received: 17/04/2026; Published online: 12/10/2026



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