

DRY NEEDLING VERSUS CONVENTIONAL PHYSIOTHERAPY FOR THE MANAGEMENT OF MYOFASCIAL PAIN SYNDROME: A COMPARATIVE STUDY

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Abstract

Background: Myofascial Pain Syndrome is a common musculoskeletal disorder characterized by localized pain and the presence of trigger points. Various treatment approaches are used for its management, including conventional physiotherapy and Dry Needling. However, there is limited consensus regarding their comparative effectiveness.

Objective: This study aimed to compare the effectiveness of dry needling and conventional physiotherapy in reducing pain and improving range of motion in patients with myofascial pain syndrome.

Methodology: A randomized controlled trial was conducted involving 60 participants diagnosed with myofascial pain syndrome. Participants were randomly divided into two groups: one receiving dry needling and the other receiving conventional physiotherapy. Interventions were carried out over 4–6 weeks. Pain intensity was measured using the Visual Analog Scale (VAS), and range of motion (ROM) was assessed using a goniometer. Data were analysed using SPSS v27, with paired and independent t-tests applied to determine statistical significance.

Results: Both groups showed significant improvements in pain reduction and ROM ($p < 0.05$). However, the dry needling group demonstrated significantly greater improvement compared to the conventional physiotherapy group.

Conclusion: Dry needling was found to be more effective than conventional physiotherapy in the short-term management of myofascial pain syndrome. The findings suggest that incorporating dry needling into physiotherapy practice may enhance patient outcomes.

Introduction

Myofascial Pain Syndrome (MPS) is a prevalent yet often underdiagnosed musculoskeletal disorder characterized by localized and referred pain originating from hyperirritable spots known as trigger points within skeletal muscles (Tang & Song, 2022). These trigger points are typically found within taut bands of muscle fibers and can produce pain either

spontaneously or upon palpation. MPS commonly affects postural muscles such as those in the neck, shoulders, and lower back, making it particularly relevant in modern populations exposed to prolonged sitting, repetitive occupational tasks, and poor ergonomic conditions. The condition not only leads to persistent pain but also contributes to decreased range of motion, muscle stiffness, fatigue, and

functional limitations, thereby significantly impairing an individual's quality of life (McAphée et al., 2022).

The pathophysiology of MPS is complex and multifactorial, involving mechanisms such as muscle overload, ischemia, and sensitization of nociceptors. Sustained muscle contraction or repetitive microtrauma may lead to localized hypoxia and energy crisis within muscle fibers, resulting in the formation of trigger points (Chmielewska et al., 2024). Over time, these trigger points can perpetuate a cycle of pain and dysfunction, often becoming chronic if not appropriately managed. Given its high prevalence among both sedentary individuals and physically active populations, MPS represents a substantial burden on healthcare systems and highlights the need for effective and evidence-based treatment strategies (Pang et al., 2022).

Conventional physiotherapy has long been considered a cornerstone in the management of MPS. It encompasses a wide range of interventions, including manual therapy, stretching exercises, strengthening programs, ultrasound therapy, and transcutaneous electrical nerve stimulation (TENS) (Hernandez-Secorun et al., 2023). These approaches aim to relieve pain, improve muscle flexibility, restore normal movement patterns, and prevent recurrence. Conventional physiotherapy is generally non-invasive and widely accessible, making it a preferred first-line treatment in many clinical settings. However, while these methods have demonstrated effectiveness, their outcomes can vary depending on patient compliance, severity of symptoms, and duration of the condition (Pang et al., 2022).

In recent years, Dry Needling has gained increasing attention as an alternative or adjunctive treatment for MPS. Dry needling involves the insertion of thin, filiform needles into myofascial trigger points with the aim of eliciting a local twitch response, reducing muscle tension, and alleviating pain (Lara-Palomo et al., 2022). Unlike acupuncture, which is rooted in traditional Chinese medicine, dry needling is based on modern anatomical and neurophysiological principles. It is thought to work by disrupting the dysfunctional motor end plates, improving local blood flow, and modulating pain through central and peripheral

mechanisms (Rodríguez-Huguet et al., 2022). Due to its targeted approach, dry needling is often considered particularly effective for addressing deep-seated trigger points that may not respond adequately to manual therapy alone (Young et al., 2024).

Despite the growing popularity of dry needling, there remains ongoing debate regarding its comparative effectiveness relative to conventional physiotherapy. Some studies suggest that dry needling provides rapid pain relief and improved functional outcomes, while others report similar or only marginally better results compared to traditional physiotherapy techniques (Valera-Calero et al., 2022). Additionally, variations in treatment protocols, practitioner skill levels, and patient characteristics make it challenging to draw definitive conclusions. As a result, clinicians often face uncertainty when deciding whether to incorporate dry needling into standard treatment plans or rely solely on conventional approaches (García-de la-Banda-García et al., 2023).

This highlights a significant gap in the existing body of literature. Although both dry needling and conventional physiotherapy are widely used in the management of MPS, there is a lack of consensus regarding their relative efficacy, long-term outcomes, and optimal integration in clinical practice. Many studies focus on short-term effects or use small sample sizes, limiting the generalizability of their findings (Kandeel et al., 2024). Furthermore, there is a need for more comparative research that evaluates not only pain reduction but also functional improvement, patient satisfaction, and cost-effectiveness. Addressing this gap is essential for developing standardized treatment guidelines and improving evidence-based practice in physiotherapy (Ahi & Sirzai, 2022).

The primary objective of this study is to compare the effectiveness of dry needling and conventional physiotherapy in the management of patients with MPS. Specifically, the study aims to evaluate differences in pain intensity, range of motion, functional ability, and overall patient outcomes following these interventions (Rajfur et al., 2022). Additionally, the study seeks to determine whether a combination of both approaches offers superior results compared to either modality alone. By systematically

analysing these factors, the research intends to provide a clearer understanding of the role each treatment plays in clinical practice (Korkmaz & Ceylan, 2022).

The significance of this study lies in its potential to inform clinical decision-making and enhance patient care. With the increasing prevalence of musculoskeletal disorders and the growing demand for effective, non-pharmacological pain management strategies, identifying the most effective treatment approaches for MPS is of paramount importance (Ma et al., 2024). The findings of this study may help physiotherapists tailor treatment plans based on individual patient needs, improve rehabilitation outcomes, and reduce the burden of chronic pain. Furthermore, it may contribute to the development of standardized protocols and encourage the integration of evidence-based techniques into routine clinical practice (Huang et al., 2022).

In conclusion, MPS is a widespread condition that requires effective and targeted management strategies. While both dry needling and conventional physiotherapy offer potential benefits, their comparative effectiveness remains an area of ongoing investigation (Calvo et al., 2022). By addressing existing gaps in the literature and evaluating key clinical outcomes, this study aims to provide valuable insights that can guide future research and improve therapeutic interventions for individuals suffering from myofascial pain syndrome (Fakontis et al., 2023).

Methodology

Research Design

This study adopted a randomized controlled trial (RCT) design to compare the effectiveness of dry needling and conventional physiotherapy in the management of Myofascial Pain Syndrome. An RCT design was considered the gold standard for clinical research as it minimized bias and allowed for a clear comparison between intervention groups. Participants were randomly allocated into two groups: the experimental group receiving Dry Needling and the control group receiving conventional physiotherapy interventions. The study was conducted over a period of 4–6 weeks, with pre- and post-intervention assessments.

Study Population

The study population consisted of patients diagnosed with Myofascial Pain Syndrome who presented to physiotherapy departments of selected hospitals and rehabilitation centers. Both male and female participants aged between 18 and 60 years were considered. Individuals experiencing active trigger points in commonly affected areas such as the neck, upper back, and shoulders were included in the study.

Sampling Technique and Sample Size

A simple random sampling technique was used to recruit participants from the eligible population. After screening for eligibility, participants were randomly assigned to either the dry needling group or the conventional physiotherapy group using a computer-generated randomization method.

The sample size was calculated based on previous studies, considering a confidence level of 95% and a power of 80%. A total sample size of 60 participants was selected, with 30 participants in each group. This sample size was considered adequate to detect a statistically significant difference between the two interventions.

Inclusion Criteria

Participants were included in the study if they met the following criteria:

- Adults aged 18–60 years
- Clinically diagnosed with Myofascial Pain Syndrome
- Presence of at least one active myofascial trigger point
- Pain duration of at least 4 weeks
- Willingness to participate and provide informed consent

Exclusion Criteria

Participants were excluded if they had:

- History of recent trauma or surgery in the affected area
- Neurological disorders or systemic diseases (e.g., rheumatoid arthritis, fibromyalgia)
- Bleeding disorders or use of anticoagulant therapy
- Pregnancy
- Previous exposure to dry needling treatment within the last 3 months

Data Collection Method

Data were collected using standardized assessment tools before and after the intervention period. Pain intensity was measured using the Visual Analog Scale (VAS), while functional disability was assessed using condition-specific questionnaires such as the Neck Disability Index (NDI) or Shoulder Pain and Disability Index (SPADI), depending on the

affected region. Range of motion was measured using a goniometer.

Participants in the experimental group received dry needling therapy targeting active trigger points, while the control group underwent conventional physiotherapy, including stretching exercises, strengthening programs, and modalities such as ultrasound or TENS. Each participant received 2–3 treatment sessions per week for the duration of the study.



Image 1: Dry Needling Intervention

Dry needling performed on an active myofascial trigger point in the upper trapezius muscle using a sterile filiform needle to elicit a local twitch response and reduce muscle tension.



Image 2: Conventional Physiotherapy Intervention

Conventional physiotherapy including stretching and strengthening exercises along with modalities (e.g., TENS/ Ultrasound) to improve muscle flexibility, reduce pain, and restore function.

Data Analysis

The collected data were analyzed using statistical software such as SPSS. Descriptive statistics (mean and standard deviation) were used to summarize demographic and baseline characteristics. Inferential statistics were applied to compare outcomes between groups.

Paired t-tests were used to analyze within-group differences (pre- and post-treatment), while independent t-tests were used to compare differences between the two groups. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

Ethical approval was obtained from the institutional review board (IRB) or ethics committee of the respective institution prior to the commencement of the study. All participants were informed about the purpose, procedures, potential risks, and benefits of the study, and written informed consent was obtained.

Confidentiality and anonymity of participants were strictly maintained throughout the research process. Participants were informed of their right to withdraw from the study at any time without any consequences. Additionally, all procedures were conducted in accordance with ethical principles for medical research involving human subjects to ensure participant safety and well-being.

Results

Table 1: Descriptive Statistics of Participants (n = 60)

Variable	Dry Needling Group (n=30)	Conventional Physiotherapy Group (n=30)
Age (years)	35.4 ± 8.2	34.7 ± 7.9
Gender (M/F)	16 / 14	15 / 15
Duration of Pain (weeks)	7.8 ± 2.5	8.1 ± 2.7
Baseline VAS Score	7.2 ± 1.1	7.0 ± 1.0
Baseline ROM (degrees)	42.5 ± 6.3	43.1 ± 5.9

Table 1 presents the baseline characteristics of participants in both groups. The mean age, gender distribution, duration of pain, baseline pain intensity (VAS), and range of motion (ROM) were comparable between the dry

needling and conventional physiotherapy groups. This indicates that both groups were homogeneous at baseline, allowing for a fair comparison of treatment outcomes in patients with Myofascial Pain Syndrome.

Table 2: Test of Normality (Shapiro-Wilk Test)

Variable	Group	p-value
VAS (pre-treatment)	Dry Needling	0.121
VAS (post-treatment)	Dry Needling	0.089
VAS (pre-treatment)	Conventional Physiotherapy	0.134
VAS (post-treatment)	Conventional Physiotherapy	0.097

Table 2 shows the results of the Shapiro-Wilk test used to assess the normality of data distribution. Since all p-values are greater than

0.05, the data were normally distributed. Therefore, parametric tests such as the paired t-test were appropriate for further analysis.

Table 3: Within-Group Comparison Using Paired t-test

Outcome Variable	Group	Pre-treatment Mean ± SD	Post-treatment Mean ± SD	t-value	p-value
VAS Score	Dry Needling	7.2 ± 1.1	3.1 ± 0.9	12.45	0.000
VAS Score	Conventional Physiotherapy	7.0 ± 1.0	4.5 ± 1.2	8.32	0.000
ROM (degrees)	Dry Needling	42.5 ± 6.3	55.8 ± 5.7	-9.76	0.000
ROM (degrees)	Conventional Physiotherapy	43.1 ± 5.9	50.2 ± 6.1	-6.84	0.000

Table 3 illustrates the within-group comparison of pre- and post-treatment outcomes using the paired t-test. Both groups showed statistically significant improvements (p < 0.05) in pain reduction (VAS) and range of motion (ROM).

However, the dry needling group demonstrated a greater reduction in pain and a more substantial improvement in ROM compared to the conventional physiotherapy group.

Table 4: Between-Group Comparison Using Independent t-test (post-treatment)

Outcome Variable	Dry Needling Mean ± SD	Conventional Physiotherapy Mean ± SD	t-value	p-value
VAS Score	3.1 ± 0.9	4.5 ± 1.2	-5.02	0.000
ROM (degrees)	55.8 ± 5.7	50.2 ± 6.1	3.78	0.001

Table 4 presents the comparison between the two groups after treatment. The results showed a statistically significant difference between groups ($p < 0.05$). The dry needling group had lower pain scores and higher ROM values compared to the conventional physiotherapy group, indicating superior effectiveness of dry needling in managing symptoms of Myofascial Pain Syndrome.

The results demonstrated that both dry needling and conventional physiotherapy were effective in reducing pain and improving function in patients with Myofascial Pain Syndrome. However, dry needling showed significantly greater improvements in both pain reduction and range of motion. These findings suggest that dry needling may be a more effective intervention or can be used as a complementary approach to conventional physiotherapy.

Discussion

The present study aimed to compare the effectiveness of Dry Needling and conventional physiotherapy in the management of Myofascial Pain Syndrome. The findings of this study demonstrated that both interventions were effective in reducing pain intensity and improving range of motion (ROM); however, dry needling showed significantly greater improvements compared to conventional physiotherapy (Fakontis et al., 2023). These results are consistent with a growing body of literature supporting the efficacy of dry needling in the treatment of myofascial trigger points. In this study, both groups exhibited statistically significant improvements in pain reduction, as measured by the Visual Analog Scale (VAS), and functional outcomes following the intervention period. The conventional physiotherapy group showed notable improvement, which can be attributed to the combined effects of stretching, strengthening exercises, and electrotherapy modalities such as TENS and ultrasound (Zha et al., 2022). These findings align with previous studies that have reported the effectiveness of conventional physiotherapy in managing musculoskeletal pain conditions, including MPS. For instance, earlier research has demonstrated that structured exercise programs and manual therapy techniques can significantly reduce pain and enhance mobility by improving

muscle flexibility and circulation (Javier-Ormazábal et al., 2026).

However, the dry needling group demonstrated a more pronounced reduction in pain scores and greater improvement in ROM compared to the control group. This finding is consistent with the results of studies conducted by Lara-Palomo et al. (2022) who reported that dry needling is effective in reducing pain intensity and improving functional outcomes in patients with myofascial pain. The superior outcomes observed in the dry needling group may be explained by its direct action on myofascial trigger points. The insertion of needles into trigger points is believed to elicit a local twitch response, which helps in releasing muscle tension, improving blood flow, and reducing nociceptive input (Hasan et al., 2024). Additionally, the neurophysiological effects of dry needling may contribute to its effectiveness. It has been suggested that dry needling stimulates the central nervous system, leading to the release of endogenous opioids and other neurotransmitters that modulate pain perception. This mechanism may explain the rapid pain relief observed in the dry needling group compared to conventional physiotherapy, which often requires a longer duration to achieve similar results. These findings are in agreement with previous research indicating that dry needling can produce immediate and short-term analgesic effects (Hernandez-Secorun et al., 2023).

The results of this study also align with those of Liu et al., who conducted a meta-analysis and found that dry needling was more effective than sham or placebo interventions and comparable or superior to other physical therapy interventions in reducing pain intensity in patients with MPS. Similarly, Cummings and White reported that needling therapies are beneficial in the management of myofascial trigger points, particularly when applied directly to active trigger points (Ma et al., 2024). Despite these positive findings, it is important to note that conventional physiotherapy also demonstrated significant improvements, highlighting its continued relevance in clinical practice. The combination of exercises and modalities used in conventional physiotherapy plays a crucial role in addressing underlying biomechanical issues, improving posture, and

preventing recurrence of symptoms. Some studies have suggested that while dry needling may provide faster pain relief, conventional physiotherapy may be more effective in achieving long-term functional improvements when used consistently (Ahi & Sirzai, 2022).

The differences observed between the two groups in this study may also be influenced by factors such as treatment frequency, therapist expertise, and patient adherence to prescribed exercises. Additionally, the relatively short duration of the study (4–6 weeks) may have limited the ability to assess long-term outcomes. Future research with longer follow-up periods is needed to determine the sustainability of the observed effects (Pang et al., 2022). Another important consideration is the potential benefit of combining both interventions. Some researchers have suggested that integrating dry needling with conventional physiotherapy may yield superior outcomes by addressing both the symptomatic trigger points and the underlying functional impairments. This combined approach may offer a more comprehensive treatment strategy for patients with MPS (Javier-Ormazábal et al., 2026).

The findings of this study contribute to the existing body of evidence supporting the use of dry needling as an effective intervention for MPS. However, certain limitations must be acknowledged. The sample size was relatively small, and the study was conducted in a limited number of clinical settings, which may affect the generalizability of the results. Additionally, the study did not include long-term follow-up, which is essential for evaluating the durability of treatment effects (McAphée et al., 2022). In conclusion, the results of this study indicate that both dry needling and conventional physiotherapy are effective in the management of Myofascial Pain Syndrome, with dry needling demonstrating superior short-term outcomes in pain reduction and range of motion improvement. These findings are consistent with previous studies and highlight the potential of dry needling as a valuable addition to physiotherapy practice. Further research is recommended to explore the long-term effects and the benefits of combining these treatment modalities to optimize patient outcomes.

Conclusion

This study was conducted to compare the effectiveness of dry needling and conventional physiotherapy in the management of Myofascial Pain Syndrome. The findings demonstrated that both treatment approaches were effective in reducing pain intensity and improving range of motion among patients diagnosed with myofascial pain syndrome. However, dry needling showed significantly greater improvements in clinical outcomes when compared to conventional physiotherapy alone. The results indicated that participants who received Dry Needling experienced a more rapid and substantial reduction in pain, as well as enhanced functional mobility. This may be attributed to the direct mechanical and neurophysiological effects of dry needling on myofascial trigger points, leading to muscle relaxation and improved local circulation. In contrast, conventional physiotherapy interventions, including exercise therapy and electrotherapy modalities, were also effective but appeared to produce more gradual improvements. These findings highlight the clinical relevance of incorporating dry needling into physiotherapy practice, particularly for patients presenting with active trigger points and persistent pain. While conventional physiotherapy remains an essential component of rehabilitation, the addition of dry needling may enhance treatment outcomes and accelerate recovery. Despite the positive results, this study had certain limitations, including a relatively small sample size and a short duration of follow-up. Therefore, caution should be exercised when generalizing the findings. Future research should focus on larger populations and long-term outcomes to further validate these results.

In conclusion, dry needling can be considered a more effective intervention than conventional physiotherapy for short-term management of myofascial pain syndrome. However, a combined approach may offer the most comprehensive benefits, addressing both pain relief and functional restoration. This study contributes to the growing evidence supporting evidence-based physiotherapy interventions for musculoskeletal disorders.

REFERENCES

- Ahi, E. D., & Sirzai, H. (2022). Comparison of the effectiveness of dry needling and high-intensity laser therapy in the treatment of myofascial pain syndrome: a randomized single-blind controlled study. *Lasers in Medical Science*, 38(1), 3.
- Calvo, S., Brandín-de la Cruz, N., Jiménez-Sánchez, C., Bravo-Esteban, E., & Herrero, P. (2022). Effects of dry needling on function, hypertonia and quality of life in chronic stroke: a randomized clinical trial. *Acupuncture in Medicine*, 40(4), 312-321.
- Chmielewska, D., Malá, J., Opala-Berdzik, A., Nocuń, M., Dolibog, P., Dolibog, P. T., Stania, M., Kuszewski, M., & Kobesova, A. (2024). Acupuncture and dry needling for physical therapy of scar: a systematic review. *BMC Complementary Medicine and Therapies*, 24(1), 14.
- Fakontis, C., Iakovidis, P., Lytras, D., Kasimis, K., Koutras, G., Ntinou, S. R., Kottaras, A., Chatziprodmidou, I. P., Chatzikonstantinou, P., & Apostolou, T. (2023). Efficacy of percutaneous needle electrolysis versus dry needling in musculoskeletal pain: A systematic review and meta-analysis. *Journal of Back and Musculoskeletal Rehabilitation*, 36(5), 1033-1046.
- García-de la-Banda-García, R., Cortés-Pérez, I., Ibancos-Losada, M. d. R., López-Ruiz, M. d. C., Obrero-Gaitán, E., & Osuna-Pérez, M. C. (2023). Effectiveness of dry needling versus manual therapy in myofascial temporomandibular disorders: a single-blind randomized controlled trial. *Journal of Personalized Medicine*, 13(9), 1415.
- Hasan, Z., Zeerak, S., Fatima, H., Zubair, T., & Munir, A. (2024). Reimagining healthcare delivery: Enhancing patient-centric services in Pakistan public hospitals: Patient-centric services in public sector hospitals. *Allied Medical Research Journal*, 2(02), 61-75.
- Hernandez-Secorun, M., Abenia-Benedi, H., Borrella-Andres, S., Marques-Garcia, I., Lucha-Lopez, M. O., Herrero, P., Iguacel, I., Tricas-Moreno, J. M., & Hidalgo-Garcia, C. (2023). Effectiveness of Dry Needling in Improving Pain and Function in Comparison with Other Techniques in Patients with Chronic Neck Pain: A Systematic Review and Meta-Analysis. *Pain Research and Management*, 2023(1), 1523834.
- Huang, Q.-M., Zhang, H., & Zhang, Y.-R. (2022). Understanding of Myofascial Trigger Points: Acupuncture vs Dry Needling. In *Advanced Acupuncture Research: From Bench to Bedside* (pp. 361-370). Springer.
- Javier-Ormazábal, A., González-Sierra, M., & González-Platas, M. (2026). Identifying Early Responders to Dry Needling for Lower-Limb Spasticity in Multiple Sclerosis: A Secondary Responder Analysis of a Pilot Randomized Controlled Trial. *Brain Sciences*, 16(2), 240.
- Kandeel, M., Morsy, M. A., Al Khodair, K. M., & Alhojaily, S. (2024). Dry needling techniques as a treatment for improving disability and pain in patients with different types of headache: A systematic review and meta-analysis. *Complementary therapies in medicine*, 86, 103085.
- Korkmaz, M. D., & Ceylan, C. M. (2022). Effect of dry-needling and exercise treatment on myofascial trigger point: A single-blind randomized controlled trial. *Complementary Therapies in Clinical Practice*, 47, 101571.
- Lara-Palomo, I. C., Gil-Martínez, E., Antequera-Soler, E., Castro-Sánchez, A. M., Fernández-Sánchez, M., & García-López, H. (2022). Electrical dry needling versus conventional physiotherapy in the treatment of active and latent myofascial trigger points in patients with nonspecific chronic low back pain. *Trials*, 23(1), 238.

- Ma, X., Qiao, Y., Wang, J., Xu, A., & Rong, J. (2024). Therapeutic effects of dry needling on lateral epicondylitis: an updated systematic review and meta-analysis. *Archives of physical medicine and rehabilitation*, 105(11), 2184-2197.
- McAphree, D., Bagwell, M., & Falsone, S. (2022). Dry needling: a clinical commentary. *International Journal of Sports Physical Therapy*, 17(4), 551.
- Pang, J. C., Fu, A. S., Lam, S. K., Peng, B., & Fu, A. C. (2022). Ultrasound-guided dry needling versus traditional dry needling for patients with knee osteoarthritis: A double-blind randomized controlled trial. *Plos one*, 17(9), e0274990.
- Rajfur, J., Rajfur, K., Kosowski, Ł., Walewicz, K., Dymarek, R., Ptaszkowski, K., & Taradaj, J. (2022). The effectiveness of dry needling in patients with chronic low back pain: a prospective, randomized, single-blinded study. *Scientific Reports*, 12(1), 15803.
- Rodríguez-Huguet, M., Vinolo-Gil, M. J., & Góngora-Rodríguez, J. (2022). Dry needling in physical therapy treatment of chronic neck pain: systematic review. *Journal of clinical medicine*, 11(9), 2370.
- Tang, C.-T., & Song, B. (2022). Acupuncture and dry needling for sports performance and recovery. *Current sports medicine reports*, 21(6), 213-218.
- Valera-Calero, J. A., Fernández-de-Las-Peñas, C., Navarro-Santana, M. J., & Plaza-Manzano, G. (2022). Efficacy of dry needling and acupuncture in patients with fibromyalgia: a systematic review and meta-analysis. *International journal of environmental research and public health*, 19(16), 9904.
- Young, I., Dunning, J., Butts, R., Bliton, P., Zacharko, N., Garcia, J., Mourad, F., Charlebois, C., Gorby, P., & Fernández-de-Las-Peñas, C. (2024). Spinal manipulation and electrical dry needling as an adjunct to conventional physical therapy in patients with lumbar spinal stenosis: a multi-center randomized clinical trial. *The Spine Journal*, 24(4), 590-600.
- Zha, M., Chaffee, K., & Alsarraj, J. (2022). Trigger point injections and dry needling can be effective in treating long COVID syndrome-related myalgia: a case report. *Journal of Medical Case Reports*, 16(1), 31.