REVIEW

Nr 2023;13 (4):564-573

Unveiling the Potential of Trigger Point Therapy: Exploring its Efficacy in Managing Muscular Spasticity - A Scoping Review

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DOI:
10.32098/mltj.04.2023.07

LEVEL OF EVIDENCE: 5

SUMMARY

Background. Dry needling is a therapeutic technique that involves the insertion of fine needles into specific trigger points to alleviate muscle pain and improve function. This review aims to summarize the evidence on the effectiveness of dry needling in the treatment of neurological conditions, with a specific focus on trigger point targeting.

Methods. A comprehensive literature search was conducted to identify relevant studies investigating the use of dry needling for neurological conditions. Studies examining the effects of dry needling on trigger points in conditions such as post-stroke spasticity, shoulder pain, and finger flexor spasticity were included.

Results. The reviewed studies consistently demonstrated positive outcomes regarding the efficacy of dry needling in targeting trigger points for neurological conditions. Dry needling at specific trigger points, including the infraspinatus, teres minor, posterior deltoid, pectoralis major, and flexor digitorum superficialis muscles, resulted in significant improvements in spasticity and range of motion.

Conclusions. The evidence suggests that dry needling targeted at trigger points can be an effective intervention for improving muscle tone and function in neurological conditions. This technique holds promise as an adjunctive treatment option, offering targeted relief and improved outcomes. However, further research is needed to optimize treatment protocols, investigate long-term effects, and compare dry needling with other interventions. Integration of trigger point-focused dry needling into clinical practice has the potential to enhance the management and rehabilitation of neurological conditions, providing patients with improved symptom control and functional outcomes.

KEY WORDS

Dry needling; trigger points; neurological conditions; muscle spasticity; rehabilitation.

INTRODUCTION

Muscular spasticity is a condition characterized by increased muscle tone, involuntary contractions, and spasms that can significantly limit functionality and quality of life for patients (1). Over the years, trigger point treatment has gained increasing attention as a promising therapeutic approach to address muscular spasticity. Trigger points are hyperirritable areas in the muscles that can cause referred pain and alterations in muscle function (2). This selective review aims to critically examine the available evidence on the effectiveness of trigger point treatment in managing muscular spasticity. Although the existing literature is predominantly based on observational and non-randomized experimental studies, this review seeks to explore the selected studies to provide an overview of the potential therapeutic implications of trigger points in the management of muscular spasticity (3, 4). Through the analysis of the included study results, we will attempt to assess the effectiveness of trigger point treatment in reducing muscle tone and improving motor functionality. Additionally,

we will examine any side effects and potential limitations associated with this treatment modality. This non-systematic review aims to provide an updated overview of the currently available evidence on trigger point treatment for muscular spasticity. We hope that the presented results and conclusions can inform clinicians in their daily practice and provide guidance for the planning of further controlled and randomized clinical studies in the future. As recommended by the Joanna Briggs Institute (JBI) (5), the scoping review approach can be used to map and clarify key concepts, identify gaps in the research knowledge base, and report on the types of evidence that address and inform practice in the field. These aims correspond to the objectives of this project. For this reason, other types of review, such as systematic reviews, umbrella reviews or rapid reviews, were not considered methodologically effective.

This scoping review aimed to:

1. Identify and map the existing literature on trigger point treatment for muscular spasticity.
2. Determine the extent and nature of research conducted in this area.
3. Provide an overview of the different methodologies and approaches used in studying trigger point treatment for muscular spasticity.
4. Summarize the main findings and key themes from the identified studies.
5. Identify any gaps or areas where further research is needed.
6. Offer insights into the potential benefits and limitations of trigger point treatment for muscular spasticity.
7. Provide recommendations for future research directions and potential implications for clinical practice.

By conducting this scoping review, we aimed to provide a comprehensive understanding of the current state of knowledge regarding trigger point treatment for muscular spasticity and lay the groundwork for future research and evidence-based interventions in this field.

METHODS

The present scoping review was conducted following the JBI methodology (5) for scoping reviews. The Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (6) Checklist for reporting was used.

Research team

To support robust and clinically relevant results, the research team included authors with expertise in evidence synthesis, quantitative and qualitative research methodology, sport and musculoskeletal rehabilitation.

Review question

We formulated the following research question: "*What is the current evidence regarding the effectiveness of trigger point treatment in managing muscular spasticity?*".

This research question guided our scoping review and served as a framework to identify relevant studies, analyze their findings, and synthesize the available evidence. By addressing this research question, we aimed to gain insights into the potential benefits and limitations of trigger point treatment for muscular spasticity and provide a comprehensive overview of the existing literature on this topic.

Eligibility criteria

Studies were eligible for inclusion if they met the following Population, Concept, and Context (PCC) criteria.

Concept:

1. Studies evaluating trigger point treatment as an intervention for managing muscular spasticity.
2. Studies investigating the effectiveness, safety, or outcomes of trigger point treatment.
3. Studies exploring different techniques, modalities, or approaches related to trigger point treatment for muscular spasticity.
4. Studies assessing the impact of trigger point treatment on muscle tone, functionality, range of motion, pain, or other relevant outcomes.

Context:

1. Studies conducted in any healthcare or research setting (*e.g.*, hospitals, rehabilitation centers, outpatient clinics).
2. Studies published in peer-reviewed journals.
3. Studies published in English language.
4. Studies with full-text availability.

By applying these PCC criteria, we aimed to ensure that the included studies focused on the relevant population, explored the concept of trigger point treatment for muscular spasticity, and were conducted within appropriate contexts to provide meaningful insights for our scoping review.

Exclusion criteria

Studies that did not meet the specific PCC criteria were excluded.

Search strategy

An initial limited search of MEDLINE was performed through the PubMed interface to identify articles on the topic and then the index terms used to describe the articles were used to develop a comprehensive search strategy for MEDLINE. The search strategy, which included all identified keywords and index terms, was adapted for use in Cochrane Central, Scopus, PEDro. In addition, grey literature (*e.g.*, Google Scholar, direct contacts with experts in the field) and refer-

ence lists of all relevant studies were also searched. Searches were conducted on 19 March 2023 with no date limitation.

Study selection

After completing the search strategy, the search results were collected and imported into EndNote V.X9 (Clarivate Analytics). To ensure the accuracy of the dataset, duplicates were removed using the EndNote deduplicator, resulting in a file containing a unique set of records. This file was then made available to the reviewers for further processing. The selection process involved two levels of screening using the Rayyan QCRI online software12. At the first level, titled "title and abstract screening", two authors independently reviewed the articles based on their titles and abstracts. Any conflicts or discrepancies between the reviewers' decisions were resolved by a third author. The goal of this level was to assess the relevance of each article to the research question based on the provided information. The second level of screening, known as "full-text selection", also involved two authors independently reviewing the full texts of the selected articles. The purpose of this level was to assess the eligibility of each article based on its complete content. Again, any conflicts or disagreements between the reviewers were resolved through discussion and, if necessary, consultation with a third author. Throughout the selection process, detailed records were maintained, documenting the reasons for excluding articles that did not meet the inclusion criteria. This documentation followed the latest published version of the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA 2020) flow diagram. The PRISMA flow diagram visually represents the screening process, indicating the number of articles identified, screened, assessed for eligibility, and included in the final analysis. By adhering to these rigorous selection procedures and reporting guidelines, transparency and reliability were ensured in the article selection process, enabling a comprehensive and systematic approach to be taken in the scoping review.

Data extraction and data synthesis

Data extraction was conducted using a pre-designed data extraction form, specifically developed for this scoping review. The form was created based on the JBI (Joanna Briggs Institute) data extraction tool, tailored to capture key information from the selected articles. The extracted data included the following details: authors, country of publication, year of publication, study design, patient characteristics, pertinent findings or outcomes, type of intervention, related procedures, and any relevant additional information. Descriptive analyses were performed on the extracted data to summarize the characteristics of the included studies. The results were presented in a numerical format, using frequencies and percentages to report the studies identified and included in the scoping review. This approach allowed for a concise representation of the distribution and composition of the included studies. The description of the search decision process, including the number of articles identified, screened, assessed for eligibility, and ultimately included in the review, was systematically mapped. This mapping process provides transparency and clarity in documenting the selection process, allowing for a comprehensive understanding of the article selection flow. Importantly, the extracted data were summarized in tabular form, presenting the main characteristics of the included studies. These summary tables provide a structured overview of the key information extracted from each study, facilitating comparison and analysis of the findings across the included articles. Overall, the presentation of the extracted data in this scoping review primarily relies on concise and informative **tables I** and **II**, providing a clear and organized representation of the main characteristics and results of the included studies.

RESULTS

As presented in the PRISMA 2020-flow diagram (**figure 1**), from 37 records identified by the initial literature searches, 32 were excluded and 5 articles were included.

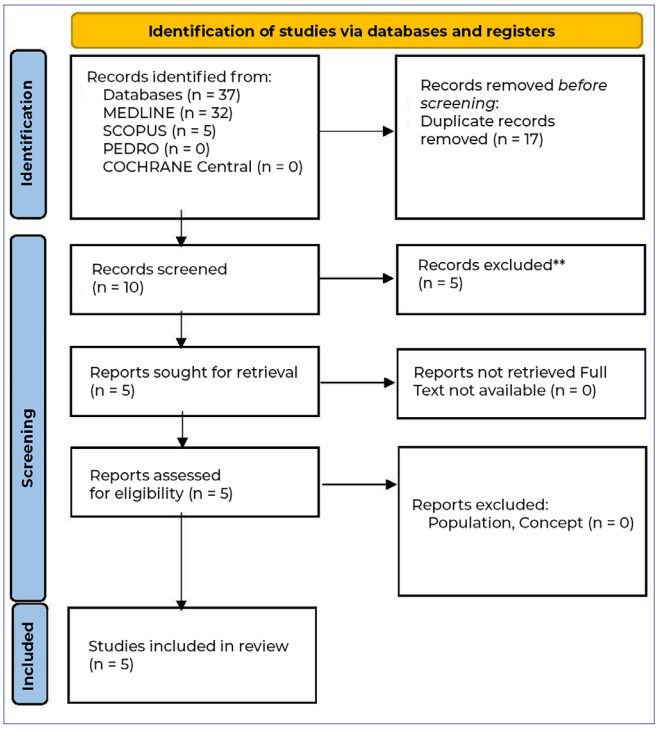

Figure 1. Preferred reporting items for systematic reviews and meta-analyses 2020 (PRISMA) flow-diagram.

Table I. Main characteristics of included studies.

n	Author, year	Title	Country	Study design	Source of evidence
1	Tang *et al.* (7), 2018	Dry needling at myofascial trigger points mitigates chronic post-stroke shoulder spasticity	China	Case report	Traditional
2	Hernández-Ortíz *et al.* (8), 2020	Changes in Muscle Tone, Function, and Pain in the Chronic Hemiparetic Shoulder after Dry Needling Within or Outside Trigger Points in Stroke Patients: A Crossover Randomized Clinical Trial	Spain	Trial	Traditional
3	Lu *et al.* (9), 2020	Are There Trigger Points in the Spastic Muscles? Electromyographical Evidence of Dry Needling Effects on Spastic Finger Flexors in Chronic Stroke	USA	Trial	Traditional
4	Cruz-Montecinos *et al.* (10), 2020	Dry needling technique decreases spasticity and improves general functioning in incomplete spinal cord injury: A case report	Spain	Case Report	Traditional
5	Zhang *et al.* (11), 2021	Immediate Effect of Dry Needling at Myofascial Trigger Point on Hand Spasticity in Chronic Post-stroke Patients: A Multicenter Randomized Controlled Trial	China	Trial	Traditional

Table II. Types of interventions.

Study	Population	Method	Outcome
Case report	The study involved a 62-year-old male patient who had experienced a cerebral hemorrhage in the right frontal lobe. He had chronic post-stroke shoulder spasticity.	The patient received daily dry needling treatments at specific trigger points (infraspinatus, teres minor, posterior deltoid, and pectoralis major) for a total of 9 days.	The effect of the treatment was assessed using the Modified Ashworth Scale (MAS) for spasticity evaluation and measuring the passive range of motion (ROM) of the shoulder. Significant improvement in both spasticity and range of motion of the shoulder was observed after the first and ninth dry needling treatments.
Trial	Nineteen patients with hemiparetic shoulder pain following a stroke event.	Participants received a single multimodal treatment session combined with either trigger point (TrP) or non-TrP dry needling. Neuro-rehabilitation session included modulatory interventions targeting the central nervous system. Outcome Measures: Spasticity (Modified Ashworth Scale), shoulder pain intensity (numerical pain rate scale, 0-10), and upper extremity function (Motor Evaluation Scale for Upper Extremity in Stroke (MESUPES), Reaching Performance Scale (RPS)).	Both TrP and non-TrP dry needling interventions showed similar improvements in muscle tone and upper extremity function. However, shoulder pain reduction was higher in the TrP dry needling group, especially at two and four weeks after treatment.

Study	Population	Method	Outcome
Trial	Ten chronic stroke patients with spasticity in finger flexors.	Dry needling performed on the flexor digitorum superficialis (FDS) muscle under ultrasound guidance for approximately 30 seconds (around 100 times).	Clinical assessment, intramuscular needle electromyography (EMG) readings. immediately after dry needling, the FDS muscle felt less tight to palpation, and the proximal phalangeal joint rested in a less flexed position.
Case report	A single patient with an incomplete spinal cord injury.	Dry needling treatment for a duration of 10 weeks.	Basal spasticity (measured by the modified Ashworth Scale), dynamic stability (assessed by trunk accelerometry), walking velocity, self-independence (scored by the Spinal Cord Independence Measure), and pain (visual analog scale).
Trial	210 stroke patients with hand spasticity.	Dry needling group (DN), sham dry needling group (SDN), and control group. Primary Evaluation Index: Immediate effect of hand spasticity relief. Secondary Evaluation Indicators: Cumulative effect of hand spasticity relief from baseline to week 4, and changes in flexion angles of the wrist, thumb, and fingers 2-5 before, immediately after, and 4 weeks after intervention.	The immediate effective rate of spasticity relief in the DN group was higher than in the control and SDN groups for thumb, fingers 2-5, and wrist. The effective rate of spasticity relief from baseline to 4 weeks was also higher in the DN group compared to the control and SDN groups. Changes in joint flexion angles were higher in the DN group compared to the control and SDN groups. However, no significant difference was found between the control group and SDN group.

FDS: Flexor digitorum superficialis; EMG: Intramuscular needle electromyography readings; MAS: Modified Ashworth Scale; MESUPES: Motor Evaluation Scale for Upper Extremity in Stroke; ROM: Passive Range of Motion; RPS: Reaching Performance Scale, SDN: Sham dry needling group.

In Tang *et al.* (7) the case study focused on a 62-year-old male patient with chronic post-stroke shoulder spasticity caused by cerebral hemorrhage. The patient had received 12 years of rehabilitative treatment but continued to experience shoulder spasticity. The intervention consisted of daily dry needling at trigger points, including the infraspinatus, teres minor, posterior deltoid, and pectoralis major muscles, over a course of 9 days. The effectiveness of the treatment was assessed using the Modified Ashworth Scale (MAS) for spasticity evaluation and passive range of motion (ROM) measurements of the shoulder. Notably, significant improvements in spasticity and range of motion were observed after the first and ninth dry needling treatments. These findings suggest that dry needling at myofascial trigger points can be an effective approach in the treatment of chronic post-stroke shoulder spasticity.

In Hernández-Ortíz *et al.* (8) the study aimed to investigate the effects of dry needling in both trigger point (TrP) and non-TrP areas in patients experiencing shoulder pain following a stroke. Nineteen participants were randomly assigned to receive a single multimodal treatment session combined with either TrP or non-TrP dry needling in a controlled, repeated-measures, crossover, double-blinded randomized trial. Outcome measures included spasticity (assessed using the Modified Ashworth Scale), shoulder pain intensity (measured on a numerical pain rate scale from 0 to 10), and upper extremity function (evaluated using the Motor Evaluation Scale for Upper Extremity in Stroke (MESUPES) (12) and the Reaching Performance Scale (RPS) (13)). The results showed that both TrP and non-TrP dry needling interventions led to similar improvements in muscle tone and upper extremity function at all follow-up periods. However, the reduction in shoulder pain was more significant in the TrP dry needling group, particularly at two and four weeks after treatment. These effects were sustained

at the six-week follow-up, suggesting that dry needling, regardless of its application in a TrP or non-TrP area, can effectively improve muscle tone and upper extremity function in post-stroke patients. However, when targeting shoulder pain specifically, TrP dry needling demonstrated slightly superior outcomes.

Lu *et al.* (9) aimed to examine the immediate effects of dry needling in chronic stroke patients with spastic finger muscles. Ten participants with spasticity in finger flexors were included in the experiment. The intervention involved performing dry needling on the flexor digitorum superficialis (FDS) muscle, guided by ultrasound, for approximately 30 seconds (around 100 times). Clinical assessments and intramuscular needle electromyography (EMG) readings were conducted before and immediately after dry needling. The results showed that immediately after dry needling, the FDS muscle felt less tight to palpation, and the proximal phalangeal joint rested in a less flexed position. The Modified Ashworth Scale (MAS) (14) scores decreased for both the FDS and flexor digitorum profundus (FDP) muscles. Moreover, motor unit action potential (MUAP) spikes reduced significantly, with an 84% reduction in frequency.

The findings suggest that dry needling in spastic finger flexors leads to immediate spasticity reduction, increased active range of motion, and decreased frequency of motor unit firing spikes. This indicates that latent trigger points may exist in spastic muscles and contribute to the hypertonia of finger flexors in chronic stroke patients.

In Cruz-Montecinos *et al.* (10) the study investigated the effects of dry needling treatment in a single patient with an incomplete spinal cord injury. The intervention involved 10 weeks of dry needling treatment. The outcomes were assessed using various measures. Basal spasticity in the upper and lower limbs, as measured by the modified Ashworth Scale (14), showed immediate and short-term improvements. Dynamic stability, evaluated through trunk accelerometry, improved by more than 50% in terms of Root Mean Squared of acceleration, Root Mean Squared of Jerk, and step variability. Gait speed also significantly improved, with a reduction of 24.7 seconds in the time taken to walk 20 meters. Additionally, self-independence, measured using the Spinal Cord Independence Measure, showed a notable improvement of 21 points, and pain, assessed using a visual analog scale, decreased by 4 points. In conclusion, this case report demonstrates that dry needling treatment can have positive effects on spasticity, dynamic stability, walking velocity, self-independence, and pain in patients with incomplete spinal cord injury. However, further research with a larger patient population is needed to gain a deeper understanding of the underlying mechanisms and clinical significance of dry needling treatment for this specific condition.

In Zhang *et al.* (11) the study aimed to evaluate the immediate effects of dry needling on hand spasticity in stroke patients. A total of 210 participants were randomly assigned to the dry needling group (DN), sham dry needling group (SDN), or control group. The DN group received dry needling treatment at myofascial trigger points for four weeks, while the SDN group received sham treatment, and the control group underwent routine rehabilitation treatment. The primary evaluation index was the immediate effect of hand spasticity relief, which was found to be significantly higher in the DN group compared to the control and SDN groups. The cumulative effect of spasticity relief from baseline to four weeks was also greater in the DN group. Changes in flexion angles of the wrist, thumb, and fingers 2-5 were higher in the DN group compared to the control and SDN groups. Based on the findings, the study concludes that dry needling can provide immediate relief for varying degrees of hand spasticity in post-stroke patients. However, further research is needed to explore the long-term effects and clinical significance of dry needling treatment for hand spasticity.

DISCUSSION

This scoping review provides valuable insights into the effectiveness of dry needling, particularly in the treatment of trigger points, for various neurological conditions (15). The findings from the reviewed studies highlight the potential benefits of dry needling in reducing spasticity, improving range of motion, relieving pain, and enhancing functional outcomes in patients with neurological disorders. The results of the included studies suggest that targeted dry needling at specific trigger points can lead to significant improvements in spasticity and range of motion (16). For example, in the case report involving a patient with post-stroke shoulder spasticity, daily dry needling treatments resulted in notable improvements after just the first and ninth sessions. Similarly, in the study with hemiparetic shoulder pain patients, trigger point dry needling demonstrated superior effectiveness in reducing shoulder pain compared to non-trigger point dry needling at two and four weeks post-treatment. Moreover, the review highlights the immediate effects of dry needling on muscle relaxation and joint positioning, as observed in the study involving chronic stroke patients with finger flexor spasticity. The use of ultrasound guidance during the dry needling procedure further enhances the precision and accuracy of treatment, potentially optimizing outcomes. The significance of this review lies in its comprehensive analysis of multiple studies, ranging from case reports to clinical trials, which collectively provide evidence supporting the efficacy of dry needling for neurological conditions. By summarizing the findings and synthesizing the results, this review offers

clinicians and researchers a valuable resource for understanding the potential benefits of dry needling as an adjunctive therapy in the management of spasticity, pain, and functional impairments. However, it is important to acknowledge the limitations of the reviewed studies, such as small sample sizes, variations in treatment protocols, and the absence of long-term follow-up assessments. Therefore, further research is warranted to establish standardized protocols, determine optimal treatment durations, and evaluate the sustained effects of dry needling over extended periods. In conclusion, this review underscores the promising potential of dry needling, specifically in targeting trigger points, as a therapeutic intervention for improving outcomes in patients with neurological conditions. The findings support the integration of dry needling into neurorehabilitation strategies, emphasizing the need for further research to strengthen the evidence base and guide clinical practice.

Research implications and suggestions for clinical practice

The findings of this scoping review have important implications for both research and clinical practice in the field of dry needling for neurological conditions. Firstly, the review highlights the need for further research to build upon the existing evidence base. While the studies included in this review provide valuable insights, there is still a need for larger-scale clinical trials with robust methodologies to validate the effectiveness of dry needling in specific neurological populations. Future studies should aim to address the limitations identified in the reviewed studies, such as sample size, treatment protocols, and long-term follow-up assessments. Additionally, comparative studies comparing dry needling to other treatment modalities would provide valuable information for clinicians and researchers.

Secondly, the review suggests the importance of developing standardized protocols for dry needling interventions. Standardization of treatment parameters, such as the selection of trigger points, frequency and duration of treatment sessions, and the use of guidance techniques like ultrasound, would enhance consistency and comparability across studies. This would enable researchers to better evaluate the efficacy of dry needling and allow for meaningful comparisons between different interventions. In terms of clinical practice, the findings of this review highlight the potential benefits of incorporating dry needling, specifically targeting trigger points, into the management of neurological conditions. Clinicians should consider integrating dry needling as an adjunctive therapy alongside conventional approaches to address spasticity, range of motion limitations, pain, and functional impairments in their patients. However, it is essential that clinicians receive appropriate training and certification in dry needling techniques to ensure safe and effective application. Furthermore, this review emphasizes the importance of individualized treatment approaches. Each patient's unique presentation and needs should be taken into account when determining the selection of trigger points and treatment parameters. Clinicians should consider a multimodal approach, combining dry needling with other neurorehabilitation interventions, to maximize outcomes for their patients. Overall, this review provides a foundation for further research and offers practical implications for clinicians using dry needling in the management of neurological conditions. By addressing research gaps, standardizing protocols, and integrating dry needling into clinical practice, healthcare professionals can enhance the quality of care provided to patients and potentially improve their functional outcomes and quality of life.

Strengths and limitations

Strengths:

1. Comprehensive review: this review encompasses a wide range of studies on dry needling for neurological conditions, providing a comprehensive overview of the current evidence.
2. Inclusion of diverse populations: the review includes studies involving various neurological conditions, such as stroke, spinal cord injury, and cerebral hemorrhage, which enhances the generalizability of the findings.
3. Assessment of multiple outcomes: the review examines various outcome measures, including spasticity, range of motion, pain, and functional outcomes, allowing for a comprehensive evaluation of the effects of dry needling.
4. Identification of trends and patterns: by synthesizing the results of multiple studies, the review identifies common findings and trends, which can help establish a clearer understanding of the potential benefits and limitations of dry needling for neurological conditions.

Limitations:

1. Heterogeneity of study designs: the included studies vary in terms of their designs, sample sizes, treatment protocols, and outcome measures, making it challenging to directly compare the results and draw definitive conclusions.
2. Limited number of high-quality studies: while the review attempts to include all relevant studies, the overall number of high-quality studies available on dry needling for neurological conditions may be limited, which can affect the strength of the conclusions drawn.
3. Potential for publication bias: the review relies on published studies, which may be subject to publication bias, with studies showing positive or significant results being more likely to be published.
4. Lack of long-term follow-up: many of the reviewed studies have short follow-up periods, which restricts our under-

standing of the long-term effects and sustainability of the observed benefits of dry needling.
5. Generalizability limitations: the reviewed studies primarily involve small sample sizes and specific populations, which may limit the generalizability of the findings to broader populations with neurological conditions.

It is important to acknowledge these limitations when interpreting the results of this review and to consider them when designing future research studies on dry needling for neurological conditions.

Answering evidence gap

Identifying the evidence gaps is crucial for guiding future research and clinical practice. Despite the strengths and insights provided by the reviewed studies, there are still several areas that warrant further investigation. Addressing these evidence gaps will enhance our understanding of the efficacy and safety of dry needling for neurological conditions:

1. Large-scale randomized controlled trials (RCTs): conducting well-designed RCTs with larger sample sizes is essential to strengthen the evidence base. These studies should include diverse neurological populations, use standardized treatment protocols, and assess a wide range of outcomes to provide robust evidence on the effectiveness of dry needling.
2. Long-term follow-up: most of the reviewed studies had short follow-up periods, limiting our understanding of the long-term effects of dry needling. Future research should include longer follow-up periods to assess the durability of treatment effects and provide insights into the optimal frequency and duration of dry needling interventions.
3. Comparison of different dry needling approaches: the reviewed studies included both trigger point (TrP) and non-trigger point (non-TrP) dry needling techniques. However, further research is needed to directly compare the efficacy of these approaches and determine their differential effects on spasticity, pain, and functional outcomes in neurological populations.
4. Standardization of outcome measures: the use of standardized outcome measures is crucial for comparability across studies and for generating more robust evidence. Future research should aim to establish consensus on the selection and application of outcome measures specific to dry needling in neurological conditions.
5. Mechanisms of action: understanding the underlying mechanisms of dry needling in neurological conditions is essential for optimizing treatment protocols and improving patient outcomes. Future studies should explore the neurophysiological and neurobiological mechanisms involved in the effects of dry needling, such as its impact on neural plasticity, pain modulation, and muscle tone regulation.

By addressing these evidence gaps, future research can provide more definitive conclusions regarding the effectiveness, optimal protocols, and mechanisms of dry needling in the management of neurological conditions. This knowledge will inform clinical decision-making, enhance patient care, and contribute to the advancement of evidence-based practice in this field.

Methodology

An extensive search strategy in the main databases with very broad inclusion criteria was conducted. Moreover, to conduct the review we followed the JBI manual, to describe the selection process we applied the updated PRISMA 2020, and for reporting we used the PRISMA for Scoping Reviews Checklist.

Clinical practice

The findings from the reviewed studies have important implications for clinical practice in the treatment of neurological conditions using dry needling. Clinicians should consider the following points when incorporating dry needling into their practice:

1. Patient selection: dry needling can be considered as a treatment option for patients with neurological conditions such as post-stroke spasticity, shoulder pain, and finger flexor spasticity. However, careful patient selection and assessment are crucial to identify suitable candidates who may benefit from this intervention. Factors such as the severity of symptoms, treatment goals, and patient preferences should be taken into account (8, 9, 11).
2. Trigger point identification: the identification of specific trigger points, such as the infraspinatus, teres minor, posterior deltoid, and pectoralis major, is essential for effective dry needling treatment. Clinicians should have a thorough understanding of the anatomical landmarks and palpation techniques to accurately locate the trigger points for targeted intervention (16).
3. Treatment frequency and duration: the reviewed studies varied in the frequency and duration of dry needling treatments. Clinicians should consider the individual needs of their patients and the specific condition being treated when determining the optimal treatment frequency and duration. Regular reassessment of the patient's progress and response to treatment should guide any adjustments to the treatment plan (17).
4. Outcome measures: clinicians should incorporate validated outcome measures, such as the Modified Ashworth Scale for spasticity evaluation and functional assessments like the Motor Evaluation Scale for Upper Extremity in

Stroke (MESUPES) and Reaching Performance Scale (RPS), to evaluate the effectiveness of dry needling. Regular monitoring of these outcome measures can provide valuable insights into the progress of treatment and guide treatment modifications, if necessary.

5. Multimodal approach: combining dry needling with other neuro-rehabilitative interventions targeting the central nervous system, as observed in some of the reviewed studies, may enhance treatment outcomes. Clinicians should consider adopting a multimodal approach that combines dry needling with other evidence-based interventions such as physical therapy, occupational therapy, and exercise programs to optimize the benefits for their patients (18).
6. Patient education and informed consent: as with any intervention, it is important for clinicians to provide thorough patient education regarding the potential benefits, risks, and expected outcomes of dry needling. Informed consent should be obtained from patients prior to initiating the treatment, ensuring that they are aware of the procedure, potential side effects, and any alternative treatment options (19).

Overall, the findings from this review suggest that dry needling can be a valuable adjunctive treatment modality for managing neurological conditions. However, it is essential for clinicians to undergo proper training and certification in dry needling techniques and to adhere to best practices and safety guidelines. Continuous professional development and staying updated with the evolving research in this field are essential to provide high-quality, evidence-based care to patients.

CONCLUSIONS

The reviewed studies provide evidence supporting the effectiveness of dry needling in the treatment of neurological conditions such as post-stroke spasticity, shoulder pain, and finger flexor spasticity. Dry needling at specific trigger points has shown significant improvements in muscle tone, upper extremity function, and spasticity relief. However, further research is needed to establish optimal treatment protocols, long-term effects, and comparisons with other interventions. Dry needling can be considered as a valuable adjunctive treatment option in clinical practice, but careful patient selection, trigger point identification, and appropriate outcome measures should be prioritized for optimal outcomes.

FUNDINGS

None.

DATA AVAILABILITY

N/A.

CONTRIBUTIONS

RT: revision project, framework identification, methodology, research strategy. data extraction and analysis, supervision, writing – original draft, writing review & editing.

ACKNOWLEDGMENTS

The author would like to thank Peter Quill for support in the early stages of the project.

CONFLICT OF INTERESTS

The author declares that he has no conflict of interests.

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