

Review Article

Dry Needling for Carpal Tunnel Syndrome: Current Evidence, Clinical Outcomes, and Therapeutic Perspectives

Chiamaka Nwosu¹, Adewale Olusegun Adebayo²

¹Senior Lecturer, Department of Physiotherapy, College of Medicine, University of Nigeria, Enugu Campus, Enugu State, Nigeria

²Lecturer, Department of Physiotherapy, Faculty of Medical Rehabilitation, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria

DOI: <https://doi.org/10.24321/2455.7048.202613>

I N F O

Corresponding Author:

Chiamaka Nwosu, Department of Physiotherapy,
College of Medicine, University of Nigeria, Enugu
Campus, Enugu State, Nigeria

E-mail Id:

nwosumedi@gmail.com

Orcid Id:

<https://orcid.org/0009-0003-3715-0053>

How to cite this article:

Nwosu C, Adebayo A O. Dry Needling for Carpal
Tunnel Syndrome: Current Evidence, Clinical
Outcomes, and Therapeutic Perspectives.
Epidem Int. 2026;11(3):9-14.

Date of Submission: 2026-06-15

Date of Acceptance: 2026-07-18

A B S T R A C T

Carpal tunnel syndrome (CTS) is a common condition caused by compression of the median nerve within the carpal tunnel, resulting in symptoms such as pain, restricted movement, impaired hand function, and reduced finger grip strength. Dry needling has been explored as a therapeutic intervention for CTS, with the aim of relieving pain, reducing muscular and neural tension, and improving functional symptoms.

This review evaluated the effectiveness of dry needling in the management of CTS-related symptoms. Relevant studies published between 2000 and 2021 were identified through searches of PubMed, Google Scholar, and Springer. Retrieved studies were screened according to predefined inclusion criteria, and five studies were ultimately included in the review. The primary outcomes assessed across the studies included pain intensity, range of motion, hand function, and grip strength. Overall, the available evidence suggests that dry needling may provide short-term benefits in reducing pain, improving range of motion, and enhancing finger grip strength among individuals with mild-to-moderate CTS. However, the existing literature remains limited, particularly regarding the effectiveness of dry needling for CTS. Although preliminary evidence indicates beneficial short-term effects, further well-designed randomized controlled trials with robust methodology and standardized, clearly described dry needling protocols are required to establish its effectiveness and long-term clinical benefits.

Keywords: Dry needling, Carpal tunnel syndrome, Needles, Acupuncture, Carpal tunnel pain

Introduction

Dry needling (DN) is a therapeutic technique involving the insertion of needles through the skin and into underlying tissues without injecting or withdrawing any substance or fluid.¹ It is increasingly used by healthcare professionals

for the management of both acute and chronic pain and has also been associated with improvements in motor function, range of motion, and muscle strength.² Protected dry needling involves the use of fine, thread-like needles to stimulate underlying physiological systems and produce changes within the affected tissues.³ The proposed

mechanisms of action include enhancement of local blood circulation, reduction of muscle tension, and modulation of inflammatory processes, thereby improving the mechanical environment of the tissues.⁴

Carpal tunnel syndrome (CTS) is a common entrapment neuropathy caused by compression of the median nerve within the carpal tunnel.^{5,6} The term “carpal tunnel syndrome” was first introduced by Kremer in 1953.⁷ Compression of the median nerve produces a characteristic range of symptoms, including pain, sensory disturbances, and impaired wrist and hand function. These manifestations may interfere with activities of daily living, decrease hand functional capacity, and negatively affect quality of life and overall health status.^{8–10} One study reported that pain reached moderate intensity immediately following the procedure but decreased to nearly zero within 10 minutes and was absent after one week. The findings also suggested that the procedure was relatively safe in relation to the median nerve and was associated with only mild discomfort.¹¹ Clinical evidence further indicates that deep stimulation may provide greater analgesic effects than superficial stimulation. The depth of needle insertion may therefore influence therapeutic outcomes, as deeper needling can affect multiple tissue layers, including the fascia, skin, and muscles, whereas superficial needling primarily influences the skin and superficial tissues.¹²

Although dry needling and acupuncture share certain similarities, they differ considerably in their underlying principles and technical application. Differences include the theoretical framework, needle penetration depth, number of needles used, intensity and pressure of stimulation, and the intentional elicitation of a local twitch response (LTR). An LTR is a localized spinal reflex characterized by a brief involuntary twitch of the muscle at or near the site of needle insertion.¹³ Similar twitch responses may also be produced by less commonly used needling techniques, including neural acupuncture and automated or electrical intramuscular stimulation.¹⁴

Dry needling techniques can also be categorized according to the depth of needle insertion into superficial dry needling (SDN) and deep dry needling (DDN). Baldry’s superficial dry needling technique and Fu’s subcutaneous needling technique are examples of SDN approaches and are generally associated with the myofascial trigger point (MTrP) model.

Baldry developed the superficial approach following an observation made during treatment of the scalene muscle in a patient who subsequently developed pneumothorax. Instead of inserting the needles deeply, he used superficial insertion for a short period and observed spontaneous

pain relief. He subsequently recommended inserting an acupuncture needle into the tissues overlying an MTrP to a depth of approximately 5–10 mm for around 30 seconds. In individuals with reduced strength or poor tolerance, the needle may remain in place for up to two or three minutes.¹⁵

Fu’s Fu’s Subcutaneous Needling (FSN) technique employs a specialized needle consisting of three components: a 31-mm needle with a 1-mm bevelled tip, a smooth tube resembling an intravenous catheter, and a protective cover. The needle is introduced toward the painful region or MTrP at an angle of approximately 20–30° relative to the skin surface, without penetrating the underlying muscle. Instead, the technique is performed within the subcutaneous tissue. The needle is advanced parallel to the skin until the smooth tube is positioned beneath the skin, after which the needle is moved rhythmically from side to side for at least two minutes.¹⁶

The present review therefore focuses on the therapeutic effects of dry needling in patients with carpal tunnel syndrome, with particular emphasis on its effectiveness in reducing pain and improving the associated signs, symptoms, and functional limitations.

Eligibility

The studies in this review included human subjects with CTS conditions who were treated with dry needling by a physical therapist compared to control, sham, or another intervention. Only randomised controlled trials and validations were included. Studies were excluded if they did not show a relationship between dry needling and CTS and if the full text was not published in English.

Methodology

We conducted a literature search of English-language articles published between 2000 and 2021 using PubMed, Google Scholar, and Springer databases. The search was restricted to English-language publications within the specified time period. The primary search terms included “dry needling,” “carpal tunnel syndrome,” and “effect of dry needling in carpal tunnel syndrome.” Only randomized controlled trials (RCTs) and validation studies were considered eligible for inclusion. Articles that were unrelated to the research question or did not specifically examine the association between dry needling and carpal tunnel syndrome were excluded.

Following the removal of duplicate records, a total of 186 articles were identified. No additional studies were obtained from other sources. Screening of titles and abstracts resulted in the exclusion of 162 records, primarily because they investigated acupuncture, evaluated dry needling in conditions other than CTS, were ongoing or

retrospective studies, were published in languages other than English, or were otherwise unrelated to the review topic. Following full-text assessment, five studies were

ultimately considered eligible and included in the review.

Results

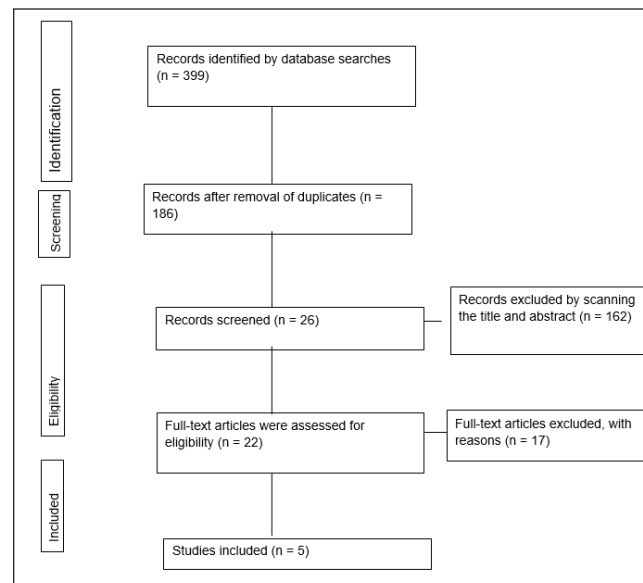


Figure 1. Flowchart Illustrating the Process of the Research, Identification, Inclusion, Eligibility and Exclusion, and Screening

Table 1. Key Characteristics of Studies

Author/ Year	Study Design	Partici- pants	Outcome Meas- ures	Intervention	Conclusion
Vahideh Toop-chizadeh ¹⁷ / July 2020	Ran- domised con- trolled trial (RCT)	Experi- mental (n = 25) and control groups (n = 25)	The outcomes in this study for pain reduction Visual analog scale (VAS) and improvement in hand function Boston Carpal Tunnel Syndrome Questionnaire (BCTQ)	In both groups, the night wrist splint was in a neutral position for 6 weeks. The intervention group received one-session deep DN on forearm trigger points (based on the Travell technique). Needle length was 38 mm and the diam- eter was 0.45 mm.	TrP therapy in CTS is effective in symptom improvement for a short-term period.
Shahin Salehi ¹⁸ / January 2020	RCT	n = 237 Experi- mental group (n = 20), control group 1 (n = 20) control group 2 (n = 20)	Grip strength and ROM (flexion and extension) were assessed with a hand-held Jamar hydraulic dy- namometer and a plastic goniom- eter.	The second group received the splints and special exercises, the third group received electroacu- puncture and an orthosis for 12 sessions totalling 40 minutes, while the control group, received only splints. The study period was 6 weeks. PC-7 was inserted on the flexor compartment of the forearm in the median transverse groove between the palmaris lon- gus muscle and the flexor carpi radialis tendons, and PC-6 was five cm proximal to PC-7..	The results of this study showed that adding exercise or acupuncture to night splinting results in functional improve- ment more in patients with mild to moderate carpal tunnel syn- drome, and this ther- apy could be applied in the treatment of these patients.

Maedeh Rezazadeh ¹⁹ / December 2022	RCT	Experimental group (n = 15) and control group (n = 15)	Boston Carpal Tunnel Syndrome Questionnaire (BCTQ) electrophysiological domains	The group underwent 2 sessions of DN thenar muscles TrP(s) with an interval of 48 hours. The control group received no treatment.	Dry needling of the thenar TrP is effective in the short term in improving function in manual workers with mild to moderate CTS.
Knut Birger Kvist ²⁰ / July 2021	RCT	n = 83 Experimental group (n = 37) and control group (n = 38)	Manometer for fingers grip and pain VAS Scale	37 individuals received IMS in the pronator teres muscle on the forearm with a depth of up to 45 to 50 mm. 38 subjects in the control group were treated with an acupuncture needle at Li11 at a depth of 4–5 mm. Both groups received seven treatments over seven weeks.	IMS to the pronator teres muscle on the forearm showed remarkable improvement in all measured clinical variables compared to the group receiving acupuncture. In addition, the median nerve cross-sectional area decreased over time in both groups. IMS may be a low-risk alternative for patients awaiting surgery.
Jordi Gascon-Garcia ¹¹ / October 2018	Validation study design	Healthy volunteers (n = 18)	VAS for pain	Four needles were applied to the carpal tunnel (using four-pole carpal dry needling technique) and manipulation of the needles was done after the so-called fascial coiling technique. Chinese-style, silver-handled needles were used along with a guide tube with dimensions of 25 x 0.30 mm.	Dry needling with the fascial winding technique in the carpal tunnel involving the use of the 4-pole dry needling technique of the wrist is valid for reaching and releasing the flexible transverse carpal ligament, which can be stretched and relaxed safely concerning the median nerve and ulnar artery, with painless application.

Discussion

This review evaluated the therapeutic effects of dry needling (DN) in patients with carpal tunnel syndrome (CTS). Gascon-Garcia et al. suggested that DN combined with the fascial winding technique may help relax the transverse carpal ligament (TCL). Their findings indicated that the quadrupolar carpal dry needling technique performed within the carpal tunnel may be particularly effective in stretching and relaxing the TCL because the needles come into direct contact with the ligament. It has therefore been proposed that the TCL may tolerate tensile and stretching

forces more effectively when the needles are positioned closer to it. However, the available evidence is currently insufficient to establish this mechanism conclusively, and further studies are required to determine whether direct targeting of the TCL improves treatment efficacy. The technique also appears to be relatively safe, with no reported injury to the median nerve or ulnar artery.¹¹

The close relationship between dry needling and acupuncture should be recognized rather than viewed as a source of professional disagreement. Greater emphasis on appropriate training, research, and clinical practice

may help establish the role of these techniques in the management of musculoskeletal pain, particularly among patients who may benefit from dry needling.²¹ Patients presenting with symptoms suggestive of CTS should also undergo assessment for potential myofascial trigger points and other contributing factors that may be responsible for their pain.^{22,23}

Several studies have reported that DN can reduce CTS-related symptoms in the short term. Improvements in signs and symptoms have been demonstrated within approximately four weeks of treatment.^{17,24} Dry needling of thenar myofascial trigger points has also been reported to produce short-term functional improvements in manual workers with mild-to-moderate CTS.¹⁹ Bubnov and Kalika investigated the therapeutic effects of DN on pain in patients with CTS. They used ultrasonography to identify myofascial trigger points in the muscles of the forearm and hand and assessed patients immediately after treatment and again 24 hours later. However, the neurophysiological evidence required to substantiate the proposed mechanisms remains limited, highlighting the need for further investigation into the local effects of acupuncture and DN on the peripheral nervous system.²⁵

Cummings and White reported that DN was effective in managing myofascial trigger points; however, their review of 23 studies did not establish whether its effects were superior to placebo.²⁶ Their findings suggested that DN did not produce significant improvements in pain or functional status associated with increased wrist flexion. One possible explanation was that DN may primarily act by reducing reflex muscle spasm rather than directly influencing pain and functional outcomes.

Significant improvements in wrist range of motion have been reported with both acupuncture and exercise therapy, whereas splinting alone did not appear to produce comparable improvements. Among these interventions, exercise therapy demonstrated the greatest effect on increasing wrist range of motion. However, evidence regarding the specific effects of acupuncture on movement-related activities in CTS remains limited.¹⁸

Edwards and Knowles found that superficial dry needling (SDN) combined with active stretching was significantly more effective than active stretching alone in addressing contributing myofascial factors. Evidence from pain-threshold studies suggests that SDN may effectively deactivate myofascial trigger points, which may be important before stretching because trigger-point deactivation can promote relaxation of taut muscle bands. Consequently, the combination of SDN and stretching may provide greater reductions in trigger-point sensitivity and pain than stretching alone.²⁷

Superficial dry needling is considered a relatively rapid and minimally invasive method for deactivating myofascial trigger points. Its analgesic effects have been attributed to stimulation of A δ fibres, which may inhibit nociceptive transmission through C fibres via descending pain-modulatory mechanisms and interneuronal activity within the dorsal horn of the spinal cord.²⁸ Previous studies have also demonstrated beneficial effects of acupuncture in the management of carpal tunnel syndrome.²⁹

Conclusion

We concluded that dry needling may be effective for a short period in relieving signs and symptoms of CTS, but further studies need to be conducted on it with adequate sample size, as there is very little evidence of dry needling in CTS.

Conflict of Interest: None

Source of Funding: None

References

1. Dommerholt J, Fernández-de-las-Peñas C. Trigger point dry needling e-book: an evidence and clinical-based approach. 2nd ed. Elsevier; 2018. [Google Scholar]
2. Garrido FV, Muñoz FM. Advanced techniques in musculoskeletal medicine & physiotherapy-e-book: using minimally invasive therapies in practice. Elsevier; 2015. [Google Scholar]
3. Nasr AJ, Zafereo J. The effects of dry needling and neurodynamic exercise on idiopathic peripheral neuropathy: a case report. *J Bodyw Mov Ther.* 2019;23(2):306-10. [PubMed] [Google Scholar]
4. Anandkuma S. Effect of dry needling on radial tunnel syndrome: a case report. *Physiother Theory Pract.* 2019;35(4):373-82. [PubMed] [Google Scholar]
5. Padua L, Coraci D, Erra C, Pazzaglia C, Paolasso I, Loreti C, Caliendo P, Hobson-Webb LD. Carpal tunnel syndrome: clinical features, diagnosis, and management. *Lancet Neurol.* 2016;15(12):1273-84. [PubMed] [Google Scholar]
6. Mondelli M, Giannini F, Giacchi M. Carpal tunnel syndrome incidence in a general population. *Neurology.* 2002;58(2):289-94. [PubMed] [Google Scholar]
7. Amadio PC. History of carpal tunnel syndrome. In: Luchetti R, Amadio P, editors. *Carpal tunnel syndrome.* Berlin, Heidelberg: Springer; 2007. p. 3-9. [Google Scholar]
8. Bugajska J, Jedryka-Goral A, Sudol-Szopinska I, Tomczykiewicz K. Carpal tunnel syndrome in occupational medicine practice. *Int J Occup Saf Ergon.* 2007;13(1):29-38. [PubMed] [Google Scholar]
9. Jarvik JG, Comstock BA, Kliot M, Turner JA, Chan L, Heagerty PJ, Hollingworth W, Kerrigan CL, Deyo RA. Surgery versus non-surgical therapy for carpal tunnel

- syndrome: a randomised parallel-group trial. *Lancet*. 2009;374(9695):1074-81. [PubMed] [Google Scholar]
10. Mirzaei F, Reihani MD, Salehpour F, Marahem M. A brief review of recent advances in carpal tunnel syndrome. *Cresc J Med Biol Sci*. 2019;6(3):267-70. [Google Scholar]
11. Gascon-Garcia J, Bagur-Calafat C, Girabent-Farrés M, Balius R. Validation of the range of dry needling with the fascial winding technique in the carpal tunnel using ultrasound. *J Bodyw Mov Ther*. 2018;22(2):348-53. [PubMed] [Google Scholar]
12. Ceccherelli F, Rigoni MT, Gagliardi G, Ruzzante L. Comparison of superficial and deep acupuncture in the treatment of lumbar myofascial pain: a double-blind randomized controlled study. *Clin J Pain*. 2002;18(3):149-53. [PubMed] [Google Scholar]
13. Cagnie B, Dewitte V, Barbe T, Timmermans F, Delrue N, Meeus M. Physiologic effects of dry needling. *Curr Pain Headache Rep*. 2013;17(8):348. [PubMed] [Google Scholar]
14. Frobb MK. Neural acupuncture: a rationale for the use of lidocaine infiltration at acupuncture points in the treatment of myofascial pain syndromes. *Med Acupunct*. 2003;15(1):18-22.
15. Baldry PE. Acupuncture, trigger points, and musculoskeletal pain. Edinburgh: Churchill Livingstone; 1989. p. 84-95. [Google Scholar]
16. Fu ZH, Chen XY, Lu LJ, Lin J, Xu JG. Immediate effect of Fu's subcutaneous needling for low back pain. *Chin Med J*. 2006;119(11):953-6. [PubMed] [Google Scholar]
17. Toopchizadeh V, Karimnia S, Sadat BE, Jahanjoo F, Pezeshki MZ. Effects of forearm myofascial trigger point dry needling on pain and function of patients with carpal tunnel syndrome. *Cresc J Med Biol Sci*. 2020;7(3):362-7. [Google Scholar]
18. Salehi S, Hesami O, Esfehiani MP, Khosravi S, Rashed A, Haghighatzadeh M, Hassabi M, Yekta AH. The effectiveness of exercise therapy and dry needling on wrist range of motion, pinch and grip force in carpal tunnel syndrome: a randomized clinical trial. *Asian J Sports Med*. 2020;10(4). [Google Scholar]
19. Rezazadeh M, Aminianfar A, Pahlevan D. Short-term effects of dry needling of thenar muscles in manual laborers with carpal tunnel syndrome: a pilot, randomized controlled study. *Physiother Theory Pract*. 2022;38:1-11. [PubMed] [Google Scholar]
20. Kvist KB, Hilland R, Enehaug R, Schjelderup J, Lie SA, Halse AK. The treatment effect of intramuscular stimulation on carpal tunnel syndrome: a blinded randomized trial on 75 patients. *J Bodyw Mov Ther*. 2021 Jul 1;27:522-8. [PubMed] [Google Scholar]
21. Zhou K, Ma Y, Brogan MS. Dry needling versus acupuncture: the ongoing debate. *Acupunct Med*. 2015;33(6):485-90. [PubMed] [Google Scholar]
22. Azadeh H, Dehghani M, Zarezadeh A. Incidence of trapezius myofascial trigger points in patients with the possible carpal tunnel syndrome. *J Res Med Sci*. 2010;15(5):250-5. [PubMed] [Google Scholar]
23. Qerama E, Kasch H, Fuglsang-Frederiksen A. Occurrence of myofascial pain in patients with possible carpal tunnel syndrome - a single-blinded study. *Eur J Pain*. 2009;13(6):588-91. [PubMed] [Google Scholar]
24. Kietrys DM, Palombaro KM, Azzaretto E, Hubler R, Schaller B, Schlusell JM, Tucker M. Effectiveness of dry needling for upper-quarter myofascial pain: a systematic review and meta-analysis. *J Orthop Sports Phys Ther*. 2013;43(9):620-34. [PubMed] [Google Scholar]
25. Bubnov RV, Kalika L. Dry needling under ultrasound guidance effective for hand pain and carpal tunnel syndrome. *Pain Pract*. 2018;18(S1):54.
26. Cummings TM, White AR. Needling therapies in the management of myofascial trigger point pain: a systematic review. *Arch Phys Med Rehabil*. 2001;82(7):986-92. [PubMed] [Google Scholar]
27. Edwards J, Knowles N. Superficial dry needling and active stretching in the treatment of myofascial pain—a randomized controlled trial. *Acupunct Med*. 2003;21(3):80-6. [PubMed] [Google Scholar]
28. Baldry P. Superficial dry needling at myofascial trigger point sites. *J Musculoskel Pain*. 1995;3(3):117-26. [Google Scholar]
29. Maeda Y, Kettner N, Lee J, Kim J, Cina S, Malatesta C, Gerber J, McManus C, Im J, Libby A, Mezzacappa P, Morse LR, Park K, Audette J, Napadow V. Acupuncture-evoked response in somatosensory and prefrontal cortices predicts immediate pain reduction in carpal tunnel syndrome. *Evid Based Complement Alternat Med*. 2013;795906. [PubMed] [Google Scholar]