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Review Article

Effects of Dry Needling in Carpal Tunnel Syndrome: A Mini-review

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A B S T R A C T

Carpal Tunnel Syndrome (CTS) is a complicated ailment in which there is compression of the median nerve in the carpal tunnel and which can lead to pain, disrupt the range of motion, hand function, and finger grip force. Dry needling treatment is used for CTS by inserting the needle to reduce pain and lowering the tension over the nerve to improve symptoms.

This review aimed to determine whether dry needling is useful in treating carpal tunnel syndrome symptoms. Studies published between 2000 and 2021 were identified by searching PubMed, Google Scholar, and Springer. Studies identified by the electronic search were screened against a set of predetermined inclusion criteria. Five studies were included in this review. The main variables measured were pain, range of motion, hand function, and grip strength. Results show that dry needling is effective in the short term for pain relief and increased range of motion and improved finger grip in patients with mild to moderate carpal tunnel syndrome. There is less literature on the treatment of carpal tunnel syndrome associated with dry needling. As there is some evidence of a positive effect in the short term and in mild to moderate CTS, further randomised clinical trials of good methodological quality using standardised and well-described procedures for the application of dry needling are needed.

Keywords: Dry Needling, Carpal Tunnel Syndrome, Needles, Acupuncture, Carpal Tunnel Pain

Introduction

Dry Needling (DN) is a treatment that involves the insertion of different types of needles into the skin and body, without injection or removal of the substance or fluid.[1] Indeed, more and more professionals are using dry needling to effectively reduce acute and chronic pain, as well as improve motor performance, range of motion, and strength.[2] Protected dry needling using fine threadlike needles to stimulate basic systems aims at inducing alternation within tissues.[3] It is hypothesised that DN improves blood flow, reduces tension, and resolves inflammation in order to have a beneficial effect on the mechanical interface.[4]

Carpal Tunnel Syndrome (CTS) is a complicated ailment in which there is compression of the median nerve in the carpal tunnel.[5,6] The term "carpal tunnel syndrome" was first coined by Kremer in 1953.[7] This disorder ends

in entrapment on the median nerve of the hand, so it shows signs and symptoms which include nerve aches and barriers to wrist function and results in troubles in performing everyday routines and reduced capacity of functions of the hand, affecting the quality of life and preferred health.[8,10] A study showed that immediately after finishing the technique, the pain gained moderate intensity, after 10 minutes it was almost zero, and after one week it was non-existent. This process is also safe concerning the median nerve and mild pain.[11] Clinical results demonstrated that deep stimulation had a better analgesic effect compared to surface stimulation. It seems obvious that extraordinary effects can be expected from superficial or deeper insertion. Deeper insertion of the needle affects several systems: fascia, skin, and muscle layers, while superficial insertion affects only the skin and a few superficial layers.[12]

There are a few similarities between acupuncture and DN, but more importantly, many significant variations. No longer only inside core philosophies and explanatory models, but furthermore within "technical" information, one or more needles applied needle penetration depth, amount and pressure of stimulation, and 'local twitch reaction' induction. Local Twitch Response (LTR) is a localised spinal reflex which shows twitching where the needle is inserted.[13] Similarly, there are other much less common spot-needling procedures, along with neural acupuncture and automated or electrical intramuscular stimulation that elicit twitches.[14]

Some other types are based on the depth of the needling and are distinguished as Superficial Dry Needling (SDN) and Deep Dry Needling (DDN). Examples of SDN include Baldry's SDN technique and Fu's Subcutaneous Needling, which fall under the Trigger Point (TrP) model.

During the treatment for scalene muscle in a pneumothorax patient, Baldry inserted needles superficially instead of deep, left them for a brief duration, and observed spontaneous pain relief. He recommended placing an acupuncture needle into the tissues overlying each Myofascial Trigger Point (MTrP) at an intensity of 5-10 mm for 30 seconds. In weak patients, the needle can be left for up to two or three minutes.[15] Fu's FSN subcutaneous needle consists of 3 parts: a 31 mm needle with a 1 mm diameter bevelled tip, a smooth tube similar to an intravenous catheter, and a cover. The needle is directed closer to the painful site or MTrP at an angle of 20-30° with the skin but does not penetrate the muscle groups. The method works entirely in the subcutaneous layers. The needle is advanced parallel to the surface of the skin until the smooth tube is also under the skin and the needle moves smoothly and rhythmically from side to side for at least 2 minutes.[16] In this review, we evaluated the effects of dry needling in carpal tunnel syndrome and its efficacy in relieving its signs and symptoms.

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 searched all English articles using the following databases: PubMed, Google Scholar, and Springer. Filters were added to ensure the inclusion of articles that were in English and were between 2000 and 2021. The following keywords were used in the searches - dry needling, carpal tunnel syndrome, and effect of dry needling in carpal tunnel syndrome. Only RCT and validation studies were included. The articles which were not relevant to the topic and did not show a relation between dry needling and CTS were excluded. By searching after removing duplicates, we identified 186 records. No other records from other sources were identified. After screening the titles and abstracts, we excluded 162 records mainly because of studies being related to acupuncture and dry needling in other diseases, ongoing studies, retrospective studies, non-English publications, and completely irrelevant articles. After further assessment, five studies were deemed to meet the inclusion criteria for the review.

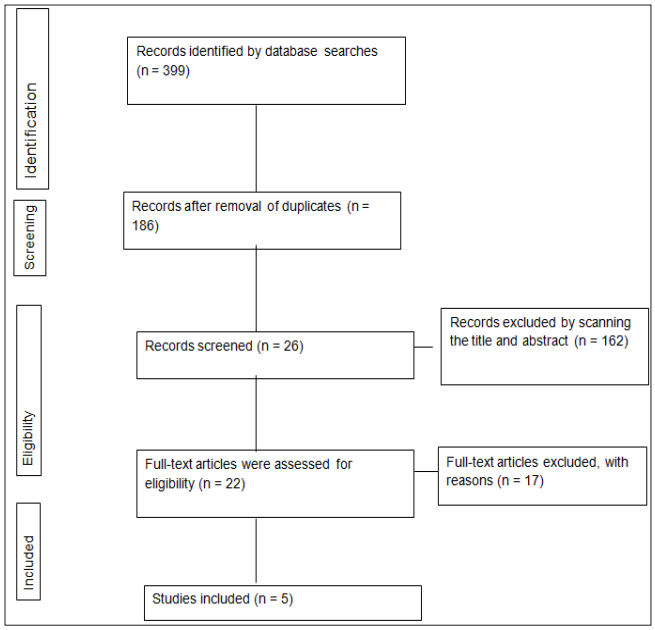

Figure 1 .Flowchart Illustrating the Process of the Research, Identification, Inclusion, Eligibility and Exclusion, and Screening

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Table 1.Key Characteristics of Studies

Author/Year	Study Design	Participants	Outcome Measures	Intervention	Conclusion
Vahideh Toop-chizadeh17/ July 2020	Randomised controlled trial (RCT)	Experimental (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 diameter was 0.45 mm.	TrP therapy in CTS is effective in symptom improvement for a short-term period.				
Shahin Salehi18/ January 2020	RCT	n = 237			
Experimental 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 dynamometer and a plastic goniometer.	The second group received the splints and special exercises, the third group received electroacupuncture 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 longus 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 improvement more in patients with mild to moderate carpal tunnel syndrome, and this therapy could be applied in the treatment of these patients.		

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Maedeh Rezazadeh19/ 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 Kvist20/ 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-Garcia11/ 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		

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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.					

Results

Discussion

This review examined the effects of dry needling in carpal tunnel syndrome. Gascon-Garcia et al. believed that DN with the fascial winding method is useful for relaxing the Transverse Carpal Ligament (TCL). Inside the carpal tunnel, using a quadrupole version of carpal dry needling is much more effective in terms of stretching and relaxing the Transverse Carpal Ligament (TCL) as the needles come in contact with it. So, it makes sense to conclude that the TCL can withstand tensile and stretching forces better the closer it is to the needles, but at present, there are not enough facts to say so categorically. Future research needs to be done to decide the efficacy in achieving TCL or otherwise. Similarly, it is also safe as it no longer damages the median nerve and/or ulnar artery.[11] A close relationship between DN and acupuncture together, instead of disputes between acupuncturists and other health professionals, must be supported with recognition for training, research, and practice of acupuncture for the benefit of musculoskeletal pain patients who require dry needling therapy.[21] Any patient representing potential symptoms of CTS has to be assessed for trigger factors as a probable cause of their pain.[22,23] DN decreased patients' symptoms at the short-term assessment. Dry Needling remedy in patients with CTS can enhance the effectiveness of improvement of signs and symptoms in short phases (4 weeks).[17,24] Dry needling of thenar TrP(s) is effective in a short-term improvement of function in manual workers with moderate to mild CTS.[19] Bubnov and Kalika studied the therapeutic results of DN on the ache of patients with CTS. They used ultrasound for the identification of MTrPs within the forearm and hand muscular tissues and evaluated patients at once and 24 hours after the intervention. Neurophysiological testing to support these theories is still lacking, and there is a further need to investigate the local effects of acupuncture on the peripheral nervous system.[25] Cummings and White found that dry needling was very effective in the treatment of TrP, but an effect superior to placebo was neither proven nor disproved in the 23 pieces of literature that they reviewed. According to this study, dry needling did not affect pain and the functional status of patients on increasing flexion. This was explained by the use of dry needling to eliminate reflex spasms.[26]

There are significant results in wrist range of motion in both acupuncture and exercise therapy, but the use of only splint did not affect their improvement. However, exercise therapy had the greatest effect on increasing the range of motion,

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whereas there was no study evaluating the effectiveness of acupuncture on movement activities in the treatment of CTS.[18] Edwards and Knowles determined that superficial DN plus active stretching was considerably more effective in suppressing the cause factors as compared to active stretching only. Pain threshold measurement literature suggests that superficial DN is an effective approach for deactivating TrP, as the TrPs require deactivation before stretching, with the likely relaxation of tight muscle bands. Therefore, no treatment is as effective as superficial dry needling and stretching in reducing TrP sensitivity. But superficial DN with stretching became significantly more effective in reducing pain.[27] Surface DN is a particularly quick and painful method of deactivating TrP. It is performed by needle stimulation of Aδ fibres, which inhibits C fibre pain via descending mechanisms and dorsal horn interneurons.[28] Studies have shown that acupuncture is effective in the treatment of CTS.[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.

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Conflict of Interest: None

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