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Effect of Dry Needling on Pain and Hand Grip Strength in Trigger Finger

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ABSTRACT:

Trigger finger is a prevalent condition characterized by hand pain and functional impairment, significantly impacting the affected person's quality of life. This study aims to investigate the effectiveness of dry needling in treating trigger finger. The condition primarily affects adults between the ages of 40 and 60, with a higher incidence observed among females and individuals with diabetes. Trigger finger is caused by inflammation and hypertrophy of the reticular sheath, resulting in the progressive restriction of flexor tendon movement. The study enrolled 20 participants (experimental group) with unilateral trigger finger, and dry needling sessions were conducted at the site of the nodule located at the metacarpophalangeal joint level. Pain severity, finger locking and clicking, and hand grip strength were assessed before and after the intervention. The results demonstrated a significant decrease in pain, improvement in finger locking and clicking, and an increase in hand grip strength after one week of dry needling. These positive outcomes can be attributed to the suppression of pain impulses and the activation of pain inhibitory pathways through the needling treatment. Dry needling effectively reduces the thickness of the pulley and the volume of the tendon, improving the gliding and movement of the flexor tendon within the tendon sheath.

Key words: Trigger Finger, Dry Needling

Introduction

Trigger finger is prevalent condition that can result in hand pain and functional impairment, significantly impacting the affected person's quality of life [1]. It is common cause of wrist pain that primarily affects adults between ages of 40 and 60, with higher incidence observed among females and individuals with diabetes as predisposing factor .The overall prevalence of trigger finger is estimated to be around 2-3% [2].Trigger Finger ia caused by inflammation and hypertrophy of the reticular sheath, resulting in the progressive restriction of flexor tendon movement. The sheath forms pulley system in each finger for enhancing the efficiency and force production of the tendon .The first annular pulley (A1) at metacarpal head is most commonly affected but can also occur at other pulleys (A2 and A3).The A1 pulley experiences the highest forces and pressure gradients during normal and power grip ,suggesting that repetitive friction and compression between flexor tendon and inner layer of the A1 pulley may lead to fibro cartilaginous metaplasia in that area [3,4] .The cause for trigger finger is not clear, local trauma, repetitive finger movements and occupational factors are the potential contributors. Trigger finger is complex entity with multiple causes and predisposing factors [5, 6].patients with trigger finger present with painless clicking, catching or popping during finger movement and is associated with stiffness, loss of full flexion or extension and painful nodule in palm area. Advanced stages can lead to secondary contractures and stiffness in finger whereas in acute cases patient might complain of pain, swelling and avoidance of finger motion [7].There are multiple clinical interventions are available to treat trigger finger, which span from conservative approaches to more invasive procedures such as injections and surgical procedures .Conservative treatment options primarily focus on non surgical methods and include Physical therapy, icing, rest, splinting and the avoidance of activities involving gripping[2]. Dry needling(DN) is a specialized technique employed by physiotherapists to address musculoskeletal pain. It involves the precise insertion of a thin needle through the skin to target specific trigger points, muscles, and connective tissues. This approach aims to alleviate neuromusculoskeletal pain and improve movement limitations [8]. While numerous studies have investigated the impact of dry needling on trigger point release in various muscular pains and sports injuries, limited research has been conducted on the effectiveness of dry needling in treating trigger finger. Therefore, the primary objective of this study is to examine the effects of dry needling on trigger finger.

Methodology

After having written consent group of 40 participants were selected randomly between the age group of 35 to 75 years with mean age of 57.75±10.23 yrs diagnosed with unilateral trigger finger based on Quinnell classification system, which consists of four grades: Grade 1 indicating uneven movement, Grade 2 indicating movement that can be actively corrected, Grade 3 indicating movement that can be corrected passively, and Grade 4 indicating a fixed deformity during finger flexion and extension [9] were included in the study. Inclusion Criteria: 1. having unilateral idiopathic trigger finger persisting for more than one month 2. Pain and tenderness in area of A1 pulley with palpable nodule in the region of MCP joint 3. Pain and discomfort on movement of finger flexion and extension 4.Clicking sound during finger movement and occurrence of locking of the finger. Exclusion criteria: Diabetes mellitus, recent infection or payogenic condition affecting finger or hand ,allergy to mettle or latex, epilepsy, history of trauma, rheumatoid arthritis, gout, fear of needles, use of blood thinning agents, bleeding disorders, psychotic conditions, tumors, osteoarthritis .The participants were randomly assigned two groups 20 participants were assigned experimental group and 20 to control group. Experimental group participants underwent two dry needling sessions (1st day and 4th day) per week at the site of the nodule located at the MCP joint level. The procedure followed basic precautions for dry needling, utilizing disposable stainless steel needles. The needle was inserted at a 45-degree angle using the Hong's fast in and fast out needling method [10], with a total duration of approximately 2 minutes. During the first 30 seconds after needle insertion, the needle was kept stationary within the nodule. Subsequently, for 1 minute, the needle was manipulated using the Hong technique. In the final 30 seconds, needling of the nodule was combined with the participant performing finger flexion and extension movements. At the end of needling session the fingers were stretched in flexion and extension for about one minute. In contrast, the 20 participants in the control group did not receive any intervention beyond being provided with a trigger finger splint and thumb spica for trigger thumb. Prior to the intervention severity of pain and finger locking and clicking was measured using Visual analog scale as patient self assessment measure for the severity and hand grip strength was measured using hydrolicdynamometer . One week later the efficacy of the treatment was measured using same method.

Results

Total of 52 patients were screened for unilateral trigger finger(Grade I,II,III) out of which 40 patients satisfied the eligibility criteria (n=40; mean± SD age 57.75±10.23 yrs; 70% Female) with11 participants had Grade I, 22 participants had Grade II and 7 participants had Grade III trigger finger (Ring finger 55%,Middle finger 30% and Thumb 15%) . The participants were randomized into two groups: the control group (n=20; mean± SD age 57.65±9.89 years, 60% female) and the experimental group (n=20; mean± SD age 57.85±10.83 years, 65% female). The statistical analysis of the data assessed the efficacy of the dry needling intervention compared to the control group.

Table: 1.Pre intervention and Post intervention analysis of VAS score after one week for Experimental Group (n=20)

VAS Score (Severity of Pain and Finger Locking and Clicking)	Pre Intervention	Post Intervention	Mean Difference	Sum of Positive Ranks	Sum of Negative Ranks	z	p
	6.9±1.20	**3.9±0.91**	**3.9**	**210**	**0**	**-3.91**	**< .01**

Table: 2.Pre intervention and Post intervention analysis of VAS score after one week for Control Group (n=20)

VAS Score (Severity of Pain and Finger Locking and Clicking)	Pre Intervention	Post Intervention	Mean Difference	Sum of Positive Ranks	Sum of Negative Ranks	z	p
	6.65±1.18	**6.5±1.23**	**5.89**	**30**	**15**	**-0.88**	**Not significant**

Table: 3.Pre intervention and Post intervention analysis of Hand Grip strength after one week in Experimental Group

Hand Grip Strength	Pre Intervention	Post Intervention	t	p
	16.4±1.34	**17.86±1.22**	**17.98**	**< .001**

Table: 4.Pre intervention and Post intervention analysis of Hand Grip strength after one week in Experimental Group

Hand Grip Strength	Pre Intervention	Post Intervention	t	p
	16.3±1.27	16.3±1.17	1.005	< .327

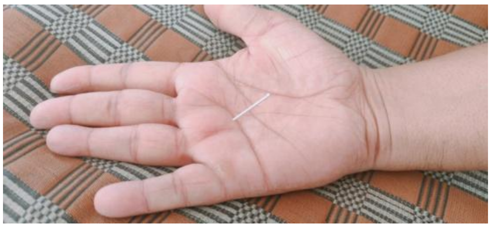

Fig 1 Dry needling

Discussion:

As per the results of the study there is significant decrease in pain post intervention at the end of one week could be attributed to the fact that dry needling (DN) results in the suppression of pain impulses carried by the C fibers responsible for myofascial trigger point (MTP) pain. This suppression occurs as a consequence of two factors: firstly, the activation of A-delta fibers upon needle penetration through the skin, and secondly, the relaxation of the taut muscle band associated with the MTP[11]. Dry needling induces activation of the pain inhibitory pathways within the spinal segments and triggers descending pain control mechanisms. The manipulation of the needle stimulates the release of natural pain-relieving substances known as endogenous opioids. This process is regarded as one of the most potent mechanisms for pain suppression, operating at both the peripheral and spinal cord levels during the course of needling treatment[12]. In contrast to the findings of the current study, there have been other studies that did not observe significant results in terms of pain relief through dry needling [13,14]. It is hypothesized that this discrepancy could be attributed to factors such as the chronicity of the underlying pathology, fear of needling, and anticipation of pain, patient-clinician interaction or any underlying psychological conditions among the subjects. Consequently, further research is warranted to gain a better understanding of the underlying mechanisms involved and to advance our knowledge in pain management and improvement of range of motion for patients suffering from trigger finger. The findings of this study demonstrate a significant improvement in the occurrence of finger locking and clicking after one week of post intervention. This improvement can be attributed to the noteworthy impact of dry needling on trigger finger, achieved by reducing the thickness of the pulley and the volume of the tendon. Unlike tendons that consist of a dense collagen structure, the pulley comprises a combination of a loose connective layer and a dense normal connective layer. These less dense components are particularly susceptible to the effects of dry needling, in contrast to the denser tissues like tendons. Moreover, dry needling primarily targets the tendon sheath rather than the tendon itself due to the lower density of connective tissue in the sheath. Consequently, dry needling enhances the smooth gliding and movement of the flexor tendon within the tendon sheath, leading to improved finger function. The present study observed a significant enhancement in hand grip strength, which aligns with the results reported in other studies. Which consistently demonstrated that dry needling contribute to a decrease in pain severity, improvement in the DASH Score, and an increase in pinch strength among patients with trigger finger[15]. Previous research findings parallel to the present study demonstrate similar outcomes, revealing a notable decrease in pain, enhancement in general functional capacity assessed through the DASH Score, and an increase in pinch strength among patients with trigger finger who underwent shock wave therapy[16]. The findings of the present study are further corroborated by a previous study, which found that dry needling of myofascial trigger points in the infraspinatus muscle led to an immediate augmentation in muscle thickness, accompanied by a simultaneous increase in muscle strength[17].

Conclusion:

In conclusion, this study aimed to examine the effects of dry needling on trigger finger. Dry needling was found to suppress pain impulses and activate pain inhibitory pathways, leading to pain relief. It also reduced the thickness of the pulley and improved tendon movement, resulting in improved finger function. Further research is needed to understand the underlying mechanisms and optimize pain management strategies for trigger finger.

Limitation:

The study assessed the efficacy of dry needling after one week of intervention, which may not capture long-term outcomes or potential relapses.

Future studies should aim to investigate the long-term effects of dry needling on trigger finger by implementing prolonged treatment periods. there is a need for research that delves deeper into the underlying mechanisms of action of dry needling in treating trigger finger. Investigating the physiological and biochemical changes induced by dry needling can provide valuable insights into how it affects the inflammatory and hypertrophic processes in the reticular sheath, leading to improved finger function and pain relief.

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Conflicts of Interest: Nil

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