

The Effectiveness of Physiotherapy Intervention in De Quervain's Tenosynovitis

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ABSTRACT

Background: More than 25% of all sports-related injuries involve the wrist and hand. One type of injury that can occur in the wrist and hand region is De Quervain's tenosynovitis (DQT). Overuse of the wrist and increased repetitive activity are common causes of DQT, resulting in microdamage due to frequent slipping of the central dorsal compartment tendon, causing pain. Conservative management of DQT cases differs based on the severity of the condition. Various types of physiotherapy interventions can be applied to DQT cases, such as ultrasound therapy, low-level laser therapy, extracorporeal shock wave therapy, splinting, Kinesio Taping (KT), and various types of exercise. The study aims to determine the effectiveness of providing physiotherapy interventions in the case of DQT tenosynovitis.

Methods: This research is a literature review study that uses secondary data from several research journals related to the effectiveness of physiotherapy interventions in the case of DQT tenosynovitis.

Results: Several studies have shown that physiotherapy interventions in the form of modalities, such as low-level laser therapy, ultrasound therapy, extracorporeal shock wave therapy, various types of exercises such as eccentric exercise, strengthening exercise, thumb splinting, and manual therapy in the form of deep friction massage is effective in reducing signs and symptoms in DQT tenosynovitis.

Conclusion: Physiotherapy interventions in the form of modalities combined with several types of exercises, thumb splinting, and manual therapy in the form of deep friction massage have proven to be effective in reducing symptoms in patients with DQT tenosynovitis.

Keywords: De Quervain's tenosynovitis, intervention, physiotherapy.

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Introduction

Sports injuries are a common condition that occurs primarily in athletes, one of which is due to repetitive movements. It is estimated that more than 25% of all sports-related injuries involve the wrist and hand.¹ One type of injury that can occur in the wrist and hand region is De Quervain's tenosynovitis (DQT). DQT tenosynovitis is a common painful condition that often occurs in the upper extremities and causes pain in the wrist and hand regions.²⁻⁴

The condition of DQT was first described by the Swiss surgeon Fritz de Quervain in 1895, who described it as a painful stenosing tenosynovitis of the first dorsal compartment of the hand.⁴⁻⁷ Wrist overuse and increased repetitive activity are common causes of DQT resulting in microdamage due to overuse of slipping of the main dorsal compartment tendons, namely the abductor pollicis longus (APL) and extensor pollicis brevis (EPB) beneath the extensor

retinaculum sheath and above the radius styloid process, causing pain.⁸⁻¹¹

DQT is the most common type of tendinopathy in athletes.¹¹ The prevalence of DQT was around 53.8% in bowling athletes, where 52.4% and 42.9% felt pain symptoms, respectively, during and after practice.¹² This condition also occurs in about 0.3% to 2.1% of the general population, especially in people who perform repetitive hand activities, such as twisting and bending.¹³ The prevalence of DQT is estimated to be around 0.5% in males and 1.3% in females.^{14,15} The highest prevalence occurs in the age group of 30 to 55 years and most often occurs in the female sex, presumably because women have a large radius styloid process angle.¹⁶

Diagnosis of DQT can be made based on clinical manifestations and test results, such as the Finkelstein test.^{8,16} This test involves the metacarpophalangeal thumb flexion with a closed fist combined with active or passive

ulnar deviation. Which results from the test can cause a pain response in the radial styloid process and a soft nodule above the radial styloid process.¹⁶ The Finkelstein test was first described in 1930 and has recently been described as being performed in four stages: first, by application of gravity assistance, gently ulnar deviation is active at the wrist; second, the patient is actively deviating towards the ulna; third, the ulnar deviation is passively by the examiner; and fourth, the examiners passively flexed the thumb to the palm.⁴ Apart from that, other diagnostic tests can also be carried out, such as radiography which is used to distinguish other causes of wrist pain, such as osteoarthritis and fractures.⁸

DQT conditions show inflammatory processes and histopathological signs similar to degenerative changes in the tendon, such as fibrocartilagenous metaplasia, mucopolysaccharide deposition, and neurovascularisation. Patients who experience DQT generally complain of pain in the wrist in the first dorsal compartment, which is located above the radial styloid process and is exacerbated by lifting objects or ulnar deviation of the wrist. This sharp and debilitating pain causes difficulty and limits carrying out daily activities.²

Conservative management of DQT cases differs based on the severity of the condition. In addition to general treatments such as anti-inflammatory drugs and corticosteroid injections, in this condition, the provision of physiotherapy interventions can also play a role in reducing the symptoms caused.¹⁶ Different physiotherapy interventions can be applied to DQT cases, such as ultrasound therapy modalities, low-level laser therapy, extracorporeal shock wave therapy, splinting, Kinesio Taping (KT), and various types of exercise.^{8,9,15,16} However, of the many physiotherapeutic interventions, the evidence to support the effectiveness of these interventions is still limited, so in this research journal, researchers would like to review further the effectiveness of providing physiotherapy interventions in the case of DQT.

Methods

The method used in this research is a literature review study, which uses secondary data from several research journals related to the effectiveness of physiotherapy interventions in the case of DQT obtained through Google Scholar searches, ResearchGate, and PubMed. The literatures were searched with the following keywords 'De Quervain's tenosynovitis', 'De Quervain's disease', 'exercise for De Quervain's tenosynovitis', and 'physiotherapy intervention for De Quervain's tenosynovitis'. The inclusion criteria: 1) published in English and between 2016-2022, 2) reported about DQT, 3) reported about exercise or home-based exercise for DQT. The exclusion criteria: 1) the result of the study is not reported, and 2) exercises for DQT are not reported.

Results

Lilian Albert Zaky et al. (2016) assessed the effectiveness of eccentric exercises in treating DQT. Thirty

female patients with DQT were randomly assigned to one of two equal experimental groups. For four weeks, each patient had twelve sessions of phonophoresis (group A) or a combined regimen of phonophoresis and eccentric exercises (group B). A visual analogue scale (VAS) was used to measure the intensity of the pain, the Disability of Arm, Shoulder, and Hand Outcome Questionnaire (DASH) was used to assess the hand's functionality, and Jamar's dynamometer and pinch gauge were used to measure the hand's grip and pinch strength. Patients from both groups significantly improved on all of the assessed metrics. Group B significantly outperformed group A in all the assessed factors when comparing the between-group differences.⁶

Kamalakannan M. et al. (2020) evaluated the effectiveness of KT and low-level laser therapy in reducing pain and enhancing the quality of life in DQT compared to conventional therapy. Thirty individuals were randomly divided into the experimental (A) and control groups (B). For two weeks, group A received treatment using KT and low-level laser therapy, while group B received treatment using standard therapy (ultrasound and strengthening exercises). Statistical analysis of both pre-test and post-test data and VAS and Patient-Rated Wrist Evaluation (PRWE) scores revealed a statistically significant difference between the two groups ($p < 0.0001$).¹⁶

Shuka Haghghat et al. (2021) studied the effectiveness of extracorporeal shockwave therapy in treating DQT through a clinical trial. Twenty-six DQT patients were divided into two groups: intervention and sham. The intervention group received extracorporeal shock wave therapy, while the sham group received no treatment. Both groups received the same conservative treatments for three weeks, which included a thumb spica splint and 200 mg celecoxib once daily. Patients were evaluated before and after treatment using the DASH questionnaire, VAS, and hand-grip strength test. The result showed that DASH and VAS scores decreased after treatment, while hand-grip strength increased significantly in both groups. After treatment, the intervention group's DASH and VAS scores were significantly lower than the sham group's ($p < 0.05$).⁸

Onur Armağan et al. (2021) evaluated the effectiveness of wrist splints with thumb support and low-level laser therapy (LLLT) in patients with DQT compared to splints alone. This study comprised 35 female patients with radial styloid discomfort and a positive Finkelstein test. The patients were divided into two groups: LLLT combined thumb support wrist splint (group 1) and splint-only (group 2). The splint was worn constantly for three weeks, and LLLT was given five times per week (a total of 15 sessions). Evaluations were conducted using the VAS, grip-strength, and Verbal Scale of Global Evaluation (VSGI). Both groups' VAS post-treatment values showed considerable improvement compared to the pre-treatment values. Only group 1 showed improvement in grip strength and VSGI after therapy. When the groups were compared, there was no posttreatment difference in any measure ($p > 0.05$).¹⁵

Maria Mustafa et al. (2022) assessed the efficiency of therapeutic ultrasound in treating DQT with and without a spica splint. Thirty patients were randomly assigned into one of two groups. The control group received a therapeutic ultrasound, while the experimental group received thumb spica splinting in addition to ultrasound. The subjects' information was gathered using the DASH questionnaire. The intervention resulted in significant changes within both groups ($p < 0.05$). Furthermore, after the intervention, there were significant differences in some instrument items between the experimental and control groups ($p < 0.05$).⁹

Discussion

Injuries to the wrist and hand are prevalent in sports, especially those involving using the hands, one of which is DQT. Sports athletes, such as bowling, skiing, and golf, have a high risk of developing DQT due to repetitive motion activities that require sideways hand movements while holding the thumb.⁹ Due to these repetitive movements, symptoms of DQT will arise, such as swelling, pain, and difficulty doing hand activities.

Giving exercise in DQT conditions is one of the physiotherapy interventions that can be given. Zaki et al. (2016) compared the administration of a combination of phonophoresis with eccentric exercise and the administration of phonophoresis alone, in which the results of the study showed that it was more significant in patients who were given a combination of phonophoresis and eccentric exercise interventions seen from the increased grip and pinch strength in DQT patients. This research also proved significant results for functional ability, as indicated by a decrease in the DASH score in DQT patients who were given a combination of phonophoresis and eccentric exercise intervention. The concept of eccentric exercise as an intervention in tendinopathy has been described by Stanish et al. based on the belief that tendon injuries often occur during working muscles in the eccentric phase. During eccentric exercise, the tendons are subjected to greater forces than concentric exercise and, therefore, more remodelling stimuli. The mechanism by which eccentric loading is the effective pattern of loading the tendon, with the fluctuation of the force rather than the magnitude of the force. These force fluctuations can provide an essential stimulus for tendon remodelling.⁶

Another study by Kamalakannan et al. (2020) used exercise as a DQT intervention. This study compared the administration of KT and low-level laser therapy (LLLT) interventions with conventional therapy, which consisted of ultrasound therapy and strengthening exercises. His research proved that 80% was better in the group that received the combination of KT and LLLT interventions in terms of decreasing the development of DQT disease and improving the quality and functional abilities of the hands. KT has been used as a prevention and intervention in sports injuries. KT can enhance the process of soft tissue healing, facilitate proprioception, reduce muscle fatigue, delay the onset of muscle soreness (DOMS), and contribute to pain inhibition. It

is characterised by the ability to stretch specific muscles up to 120 – 140% of their length and then return to their original size after applying KT.¹⁶

The application of LLLT was also implemented by Armağan et al. 2021 who compared the combination of LLLT and splint administration alone in the DQT condition. The results were more significant in patients who were given the LLLT combination. The application of LLLT can reduce the level of oedema and fibrinogen and the number of inflammatory cells. Reduction of this inflammatory process is thought to provide analgesia. In addition to increasing endorphin synthesis, LLLT modifies chemical mediators, vasodilates, and increases protein and cortisol synthesis throughout the inflammatory process. So that in DQT conditions, the signs and symptoms that arise, such as pain and swelling, can be reduced after the application of functional LLLT in the patient's hand increases.^{15,16}

Providing other modalities in the form of extracorporeal shock wave therapy can also be applied to DQT conditions. Haghghat et al.'s 2020 study used extracorporeal shock wave therapy on DQT patients and proved that giving this intervention can reduce pain. Extracorporeal shock wave therapy has been widely used in musculoskeletal disorders because its benefits are established based on research results. Large areas and deep tissues can be targeted by shock waves and do not rely on imaging-based guidance system reports to determine target areas making utilization easier. Since it does not stimulate pain in the target area, and local anaesthetics may block its effect, it is applied without local anaesthesia. It is believed that chronic pain caused by many conditions, such as DQT, is caused by modification of synaptic thresholds that create reflex memories. Shock wave therapy can erase these memories, resulting in reduced pain.⁸

The modality that is also widely used in the treatment of DQT is ultrasound therapy. Mustafa et al.'s 2022 study compared giving ultrasound therapy, thumb splinting, and deep friction massage with just giving ultrasound and thumb splinting. The result is that after two weeks of intervention, the two groups received significant ultrasound therapy, with most DQT patients stating that the pain they felt was reduced.⁹ Ultrasound therapy for DQT is non-thermal and is used to heal injured tendons. This modality is used to increase tissue extensibility, help relieve pain and enhance the wound-healing process through high-frequency sound waves.^{9,16} Giving a combination of ultrasound therapy with splinting, exercise, and deep friction massage can further improve the healing process and reduce complaints in patients with DQT.^{7,9,16}

Conclusion

Providing physiotherapy interventions has a good effect on the case of DQT. Providing interventions in the form of modalities, such as low-level laser therapy, ultrasound therapy, and extracorporeal shock wave therapy combined with several types of exercises, such as eccentric exercises, strengthening exercises, installing thumb splinting, and giving

manual therapy in the form of deep friction massage has proven effective in reducing symptoms in patients with DQT.

Conflict of interest

No conflict of interest in this study.

Funding

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Ethical consideration

This review of the literature used data from publicly accessible records and did not require institutional ethics approval.

Author contributions

NLPMA revised the paper and conducted a literature search, whereas NMR came up with the study concept, prepared the article, and conducted the literature review.

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