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Physiotherapy Management of Right Trigger Finger with Transcutaneous Electrical Nerve Stimulation (TENS) and Active Exercise: a Case Report

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Abstract: *Background: Trigger finger is a stenosing tenosynovitis characterized by pain, locking, and restricted finger movement due to thickening of the flexor tendon and narrowing of the A1 pulley. Persistent symptoms can impair hand function, limit daily activities, and reduce quality of life. Conservative physiotherapy is commonly used to alleviate symptoms and restore functional movement. Objective: This case report aimed to evaluate the clinical outcomes of Transcutaneous Electrical Nerve Stimulation (TENS) combined with active exercise in the physiotherapy management of right trigger finger. Methods: A 46-year-old woman with right trigger finger received four physiotherapy sessions at the Physiotherapy Department of RSUD Gondo Suwarno Ungaran. The intervention consisted of TENS followed by active exercise. Clinical outcomes were assessed using the Visual Analogue Scale (VAS) for pain, goniometry for finger range of motion, Manual Muscle Testing (MMT) for muscle strength, and the Wrist Hand Disability Index (WHDI) for functional status. Assessments were performed before and after the intervention. Results: Pain decreased progressively, with movement pain declining from 4/10 to 3/10, tenderness from 5/10 to 3/10, and resting pain from 2/10 to 1/10. Finger mobility improved, particularly at the proximal and distal interphalangeal joints, while muscle strength remained at grade 5. The WHDI score decreased from 24 (48%, severe disability) to 11 (22%, minimal disability). Conclusion: TENS combined with active exercise improved pain, finger mobility, and hand function in this patient with right trigger finger and may serve as a practical conservative physiotherapy intervention.*

INTRODUCTION

Trigger finger, also known as stenosing flexor tenosynovitis, is a common musculoskeletal disorder characterized by impaired gliding of the flexor tendon beneath the A1 pulley due to tendon thickening and/or narrowing of the pulley. This pathological interaction increases friction between the flexor tendon and the pulley, resulting in pain, tenderness, stiffness, clicking, locking, and difficulty extending the affected digit (Makkouk et al., 2008). Repetitive mechanical stress may further aggravate tendon irritation and contribute to fibrocartilaginous changes within the pulley, thereby restricting smooth tendon excursion during finger movement. As the condition progresses, impaired tendon gliding can reduce the normal range of motion and progressively compromise hand function (Makkouk et al., 2008). Patients may experience difficulty performing activities that require grasping, pinching, holding objects, or manipulating small items, potentially interfering with occupational tasks and activities of daily living. Therefore, early recognition and appropriate management are important to prevent persistent symptoms and functional deterioration.

Trigger finger has an estimated lifetime risk of approximately 2%–3% in the general population and occurs more frequently in women than in men, particularly during the fifth and sixth decades of life (Makkouk et al., 2008). Its prevalence increases substantially among individuals with diabetes mellitus, with estimates ranging from approximately 5% to 20%, suggesting that metabolic disorders may contribute to pathological changes in the flexor tendon and pulley system (Knoedler et al., 2025). Other factors associated with trigger finger include rheumatoid arthritis, repetitive hand use, prolonged gripping, repetitive finger flexion, and occupations involving forceful manual activities (Makkouk et al., 2008). Repeated exposure to mechanical stress may increase tendon irritation and contribute to progressive thickening of the tendon or pulley, ultimately impairing normal finger movement. Given its potential effects on hand function and occupational performance, early conservative management may help minimize symptom progression and preserve functional independence.

Clinically, patients with trigger finger commonly present with pain and tenderness over the A1 pulley, finger stiffness, and clicking or locking during flexion and extension of the affected digit (Makkouk et al., 2008). Symptoms are frequently more pronounced in the morning or following periods of inactivity and may worsen with repetitive hand use. As the condition progresses, persistent pain and restricted finger movement can interfere with activities requiring grip strength, precision, and manual dexterity, including writing, fastening buttons, opening containers, and carrying objects. These limitations may reduce work productivity and adversely affect quality of life. Conservative treatment is commonly considered for patients with mild to moderate symptoms because it aims to reduce pain, facilitate tendon gliding, improve finger mobility, and preserve hand function. Physiotherapy is one component of conservative management and may incorporate physical modalities and therapeutic exercise to improve functional outcomes (Salim et al., 2012; Nadar, 2024).

Among the physiotherapy modalities used for pain management, Transcutaneous Electrical Nerve Stimulation (TENS) is commonly applied to reduce pain and improve patient comfort during rehabilitation. Johnson et al. (2022), in a systematic review and meta-analysis involving 381 randomized controlled trials, found that TENS reduced pain intensity during or immediately after treatment compared with placebo across various pain conditions. Although these findings support TENS as a general pain-management modality, evidence specifically addressing its effectiveness in patients with trigger finger remains limited. Adequate pain control may enable patients to participate more comfortably in movement-based interventions. Therapeutic exercise, particularly active movement and tendon-gliding exercises, is used to maintain joint mobility, facilitate tendon

excursion, preserve soft tissue flexibility, and improve coordinated finger movement (Nadar, 2024). Accordingly, combining pain modulation with active movement represents a potentially useful conservative physiotherapy approach, although its effectiveness in trigger finger requires further investigation.

Pain and restricted movement represent two major clinical problems in patients with trigger finger. Because these impairments frequently occur concurrently, conservative physiotherapy may combine physical modalities with therapeutic exercise to address both symptom relief and functional recovery. Salim et al. (2012) investigated physiotherapy as a conservative treatment for mild trigger finger and reported improvements in clinical outcomes, although corticosteroid injection produced superior short-term results. Similarly, Nadar (2024) examined hand therapy involving stretching, joint mobilization, and tendon-gliding exercises, reporting that the addition of a finger orthosis resulted in better outcomes than hand therapy alone. These findings suggest that exercise-based rehabilitation may contribute to conservative management, while emphasizing that therapeutic outcomes depend on the type and combination of interventions. Nevertheless, direct evidence regarding the combined application of TENS and active exercise for trigger finger remains insufficient.

Although various conservative physiotherapy interventions have been described for trigger finger, published case reports documenting the combined application of TENS and active exercise remain limited. Existing studies have predominantly examined conservative interventions such as physiotherapy, orthoses, and corticosteroid injections, whereas evidence specifically evaluating the combination of TENS and active exercise is less well established (Salim et al., 2012; Nadar, 2024). Individual case reports may provide useful descriptions of clinical presentation, intervention procedures, and changes in patient outcomes, although they cannot establish treatment efficacy or causal relationships. Therefore, this case report aimed to describe the clinical outcomes of physiotherapy management using TENS combined with active exercise in a patient with right trigger finger (trigger finger dextra).

METHODS

Case Study Design and Setting

This case report was prepared in accordance with the CARE (CAse REport) Guidelines to describe the physiotherapy management of a patient diagnosed with right trigger finger (stenosing flexor tenosynovitis). The CARE guidelines provide a structured framework for reporting clinical information, including patient characteristics, clinical findings, therapeutic interventions, timelines, and outcomes (Gagnier et al., 2013). The report was designed to provide a comprehensive description of the patient's clinical characteristics, physiotherapy assessment, rehabilitation program, intervention procedures, and clinical outcomes following conservative physiotherapy management. Clinical information was documented prospectively throughout the rehabilitation period to ensure the accuracy, completeness, and consistency of the patient's records. The case was conducted at the Physiotherapy Department of RSUD Gondo Suwarno Ungaran, Central Java, Indonesia, in February 2026.

Patient Characteristics and Clinical Presentation

The participant was a 46-year-old woman who presented with pain, stiffness, and locking of the right middle finger that had persisted for approximately one month before the initial physiotherapy assessment. The symptoms were primarily aggravated by active finger flexion and extension and progressively interfered with activities involving repetitive hand movements,

including gripping household objects, sweeping, mopping, carrying groceries, and performing other domestic activities. The patient was referred to the Physiotherapy Department after undergoing a medical examination and receiving a diagnosis of trigger finger from the attending physician. Her medical history was notable for hypertension. The patient reported no previous trauma to the right hand, upper-extremity surgery, inflammatory joint disease, neurological disorders, congenital hand deformities, or other musculoskeletal conditions that could affect hand function.

Before treatment initiation, a comprehensive physiotherapy assessment was performed to identify the patient's impairments, activity limitations, and functional restrictions. The assessment included history taking, observation, palpation, evaluation of active, passive, and resisted movements, pain assessment, measurement of finger joint range of motion, muscle strength testing, and functional evaluation. Static observation revealed normal skin coloration without visible swelling, edema, or deformity around the affected finger. Dynamic observation demonstrated incomplete active flexion of the right middle finger and difficulty achieving full extension due to intermittent locking, which occasionally required assistance from the contralateral hand. These movement abnormalities were particularly evident during repetitive finger movements.

Palpation revealed localized tenderness over the third metacarpal region and a palpable nodule along the flexor tendon pathway. No increase in local skin temperature or signs of inflammatory edema were observed. Assessment of active and passive movements demonstrated reduced flexion at the metacarpophalangeal (MCP), proximal interphalangeal (PIP), and distal interphalangeal (DIP) joints. Finger extension was also limited by the locking phenomenon rather than by evidence of structural joint contracture. Resisted flexion reproduced pain, suggesting mechanical irritation of the flexor tendon during contraction. Functional assessment further demonstrated difficulty performing activities involving repetitive gripping, grasping, pinching, and fine hand movements, resulting in reduced independence when performing household activities.

Physiotherapy Intervention and Clinical Timeline

The physiotherapy intervention consisted of Transcutaneous Electrical Nerve Stimulation (TENS) followed by active exercise and was administered over four treatment sessions. Clinical outcomes were evaluated before the initial intervention and after completion of the fourth session. Pain intensity was assessed using the Visual Analogue Scale (VAS), finger joint range of motion was measured using goniometry, and muscle strength was evaluated using Manual Muscle Testing (MMT). These assessment methods are commonly used to evaluate musculoskeletal impairments and functional changes during rehabilitation (Hawker et al., 2011; Cuthbert & Goodheart, 2007). Functional status was assessed using the Wrist Hand Disability Index (WHDI). These outcome measures were selected to evaluate changes in pain, mobility, muscle strength, and functional performance following the physiotherapy intervention. The chronological sequence of clinical events from symptom onset through completion of the rehabilitation program is presented in Table 1.

Table 1. Clinical Timeline

Date	Clinical Event
January 2026	The patient developed pain, stiffness, and intermittent locking of the right middle finger following repetitive household activities.
14 February 2026	The initial physiotherapy assessment was performed, including history taking, physical examination, and baseline outcome measurements using the Visual Analogue Scale (VAS), goniometry, Manual Muscle Testing (MMT), and Wrist Hand Disability Index

	(WHDI). The first treatment session, consisting of TENS and active exercise, was initiated.
18 February 2026	The second physiotherapy session was conducted with continued application of TENS and active exercise. The patient's pain response and tolerance to exercise were assessed before progression of the rehabilitation program.
21 February 2026	The third physiotherapy session was performed, with continuation of the established rehabilitation program. Clinical progress was monitored through repeated physical examination and assessment of exercise performance.
25 February 2026	The fourth physiotherapy session was completed, followed by a post-intervention assessment using the same outcome measures to evaluate changes in pain intensity, finger range of motion, muscle strength, and hand function.

Eligibility Criteria and Treatment Procedures

The eligibility criteria comprised adult patients diagnosed with trigger finger who presented with pain, finger locking, limited range of motion, and functional impairment, were capable of participating in physiotherapy, and provided written informed consent. Patients were excluded if they had a history of hand surgery, acute fractures, neurological disorders, inflammatory arthropathies, or other upper-extremity disorders that could affect hand function.

The patient received four physiotherapy sessions on 14, 18, 21, and 25 February 2026. The rehabilitation program was tailored to the patient's individual clinical condition, particularly the presence of pain, restricted finger mobility, impaired tendon gliding, and functional limitations. Treatment consisted of Transcutaneous Electrical Nerve Stimulation (TENS) followed by active therapeutic exercises, including finger flexion and extension, abduction and adduction, and hook tendon-gliding exercises. A detailed description of the intervention protocol is provided in Table 2.

Table 2. Conservative Physiotherapy Program

Intervention	Frequency (F)	Intensity (I)	Time/Volume (T)	Type (T)
Transcutaneous Electrical Nerve Stimulation (TENS)	Once per session	According to patient tolerance; 125 Hz, continuous mode	15 minutes	Electrotherapy
Finger Flexion–Extension Exercise	Once per session	Active movement within pain tolerance	2 sets × 8 repetitions (3–4 repetitions)	Active exercise
Finger Abduction–Adduction Exercise	Once per session	Active movement within pain tolerance	2 sets × 8 repetitions (3–4 repetitions)	Active exercise
Hook Tendon-Glide Exercise	Once per session	Active movement within pain tolerance	2 sets × 8 repetitions (3–4 repetitions)	Tendon-gliding exercise

Note: F = Frequency; I = Intensity; T = Time/Type.

Outcome Measurements and Data Analysis

Clinical outcomes were assessed at baseline prior to the initial physiotherapy intervention and reassessed following the fourth treatment session to evaluate changes in the patient's clinical condition. Pain severity was measured using the Visual Analogue Scale (VAS), which is widely used for quantifying subjective pain intensity (Hawker et al., 2011). Finger joint range of motion (ROM) was assessed using a universal goniometer, whereas muscle strength was evaluated through Manual Muscle Testing (MMT). Goniometry provides quantitative measurements of joint movement, although the reliability and measurement error of finger goniometry should be considered when interpreting changes between assessments (Ellis et al., 2017). Manual Muscle Testing provides a clinical assessment of muscle performance, with reliability influenced by testing

procedures and examiner consistency (Cuthbert & Goodheart, 2007). Functional performance of the affected hand was assessed using the Wrist Hand Disability Index (WHDI). These assessment tools were selected to provide a comprehensive evaluation of pain intensity, joint mobility, muscle strength, and functional ability associated with trigger finger.

To ensure measurement consistency, all assessments were conducted using standardized procedures at both pre-intervention and post-intervention evaluations. The results were documented at each assessment point and analyzed descriptively by comparing baseline and post-treatment findings. This approach enabled the changes in pain, finger mobility, muscle strength, and hand function following the physiotherapy program to be systematically described. Such reporting is consistent with the CARE guidelines, which emphasize transparent documentation of clinical findings, treatment procedures, follow-up assessments, and patient outcomes (Gagnier et al., 2013).

Ethical Considerations

The case report was conducted in accordance with applicable ethical principles for clinical case reporting. Written informed consent was obtained from the patient prior to treatment and publication of the case report. Patient confidentiality was maintained throughout the reporting process by removing personally identifiable information and using only the patient's initials in the manuscript. These procedures are consistent with the principles of voluntary participation, informed consent, and privacy protection outlined in the Declaration of Helsinki (World Medical Association, 2025).

RESULTS AND DISCUSSION

The patient successfully completed all four scheduled physiotherapy sessions without experiencing any adverse events during the rehabilitation period. Clinical progress was evaluated at each session using standardized outcome measures, including the Visual Analogue Scale (VAS), universal goniometry, Manual Muscle Testing (MMT), and the Wrist Hand Disability Index (WHDI). The initial assessment identified pain during finger movement and palpation, limited flexion of the right middle finger, and functional difficulties associated with repetitive gripping and hand-related activities. Throughout the physiotherapy program, gradual clinical improvements were observed, particularly in pain reduction, finger joint mobility, and overall hand function. The results obtained from each clinical outcome measure are described in the following sections.

Table 3. Pain Intensity Across Four Physiotherapy Sessions

Pain Type	T1	T2	T3	T4
Resting Pain	2	2	1	1
Tenderness	5	5	3	3
Movement Pain	4	4	3	3

Note: T1 = Treatment Session 1; T2 = Treatment Session 2; T3 = Treatment Session 3; T4 = Treatment Session 4. Pain intensity was assessed using the Visual Analogue Scale (VAS), with higher scores indicating greater pain intensity.

Pain intensity showed a gradual improvement across the four physiotherapy sessions. The most substantial change was observed in tenderness, which decreased from 5/10 at baseline to 3/10 by the third session and remained unchanged through the final assessment. Movement-related pain also improved, declining from 4/10 to 3/10, suggesting greater comfort during finger movement as the rehabilitation program progressed. Resting pain, which was relatively mild at baseline,

decreased from 2/10 to 1/10 at the final evaluation.

The reduction in pain was accompanied by improved tolerance to the prescribed therapeutic exercises. During the initial treatment sessions, the patient experienced discomfort during active flexion of the affected finger and tenderness upon palpation of the third metacarpal region. These symptoms became less pronounced from the third session onward, enabling the patient to perform the exercises more comfortably and with fewer pain-related interruptions. No post-treatment exacerbation of pain was reported, indicating that the intervention was well tolerated throughout the rehabilitation period.

Overall, the pattern of improvement indicated a gradual clinical response rather than an immediate effect following a single treatment session. This progression was consistent with the patient's subjective report of decreased discomfort during routine household activities involving repetitive finger movements, such as grasping objects, holding utensils, and performing light domestic tasks. The observed reduction in pain is compatible with the general analgesic potential of TENS reported by Johnson et al. (2022), although the contribution of TENS relative to active exercise cannot be determined from this case.

Finger Joint Range of Motion

Table 4. Finger Joint Range of Motion Measurements

Joint	Movement	T1	T2	T3	T4
MCP III	Active	S. 20°–0°–80°	S. 20°–0°–80°	S. 20°–0°–80°	S. 20°–0°–80°
	Passive	S. 20°–0°–80°	S. 20°–0°–80°	S. 20°–0°–80°	S. 20°–0°–80°
PIP III	Active	S. 20°–0°–100°	S. 20°–0°–100°	S. 20°–0°–100°	S. 20°–0°–100°
	Passive	S. 20°–0°–100°	S. 20°–0°–100°	S. 20°–0°–100°	S. 20°–0°–100°
DIP III	Active	S. 20°–0°–60°	S. 0°–0°–65°	S. 0°–0°–70°	S. 0°–0°–70°
	Passive	S. 0°–0°–70°	S. 0°–0°–70°	S. 0°–0°–70°	S. 0°–0°–70°

Note: T1 = Treatment Session 1; T2 = Treatment Session 2; T3 = Treatment Session 3; T4 = Treatment Session 4; MCP = metacarpophalangeal joint; PIP = proximal interphalangeal joint; DIP = distal interphalangeal joint; III = third digit; S. = sagittal plane.

Evaluation of finger joint mobility revealed a measurable improvement during the rehabilitation period, particularly in active movement of the distal interphalangeal joint. At the initial assessment, movement of the right middle finger was restricted during flexion, while the patient also experienced intermittent locking during active finger movement.

The most notable improvement occurred at the DIP joint. Active motion changed from S. 20°–0°–60° at baseline to S. 0°–0°–70° by the third session, with the improvement maintained at the fourth session. Meanwhile, the recorded active and passive measurements at the MCP and PIP joints remained unchanged throughout the intervention.

Passive range of motion also remained stable across the four treatment sessions. This pattern suggests that the observed improvement was concentrated in active DIP movement rather than representing a generalized increase in finger joint mobility. Impaired tendon gliding and mechanical obstruction are recognized characteristics of trigger finger and may contribute to difficulty performing active flexion and extension (Makkouk et al., 2008).

Clinical observations during rehabilitation indicated smoother finger flexion and extension with fewer reported episodes of locking. Tendon-gliding exercises also became easier to perform as the treatment progressed. These findings are consistent with the clinical rationale for using controlled finger movements to maintain mobility, although improvements in tendon excursion cannot be confirmed directly from goniometric measurements alone (Salim et al., 2012).

Manual Muscle Testing Outcomes

Table 5. Manual Muscle Testing Results

Joint	Movement	T1	T2	T3	T4
MCP III	Extension/Flexion	5	5	5	5
PIP III	Extension/Flexion	5	5	5	5
DIP III	Extension/Flexion	5	5	5	5

Note: T1 = Treatment Session 1; T2 = Treatment Session 2; T3 = Treatment Session 3; T4 = Treatment Session 4; MCP = metacarpophalangeal joint; PIP = proximal interphalangeal joint; DIP = distal interphalangeal joint; III = third digit. Muscle strength was assessed using the Manual Muscle Testing (MMT) scale, where Grade 5 indicates normal muscle strength.

Manual Muscle Testing (MMT) revealed that the flexor and extensor muscles of the MCP, PIP, and DIP joints maintained a muscle strength grade of 5 throughout all four physiotherapy sessions. No clinically measurable changes were observed when comparing baseline and final assessments. Muscle strength remained within the normal range throughout rehabilitation.

These findings indicate that muscle weakness was not a principal measurable impairment in this patient. Instead, the clinical presentation was predominantly characterized by pain, mechanical locking, and limitations in active finger movement. This is consistent with the clinical characteristics of trigger finger described by Makkouk et al. (2008), in which mechanical interference between the flexor tendon and pulley system may restrict movement without necessarily causing a measurable reduction in voluntary muscle strength.

Functional Outcomes

Table 6. Functional Outcomes Based on the Wrist Hand Disability Index (WHDI)

WHDI Indicator	T1	T2	T3	T4
Pain Intensity	4	4	3	3
Numbness and Tingling	2	1	1	0
Self-Care	1	1	1	1
Muscle Strength	3	2	2	0
Writing and Typing Tolerance	2	2	2	1
Work Activities	4	3	3	2
Driving	2	2	2	2
Sleep	0	0	0	0
Household Activities	4	3	3	2
Recreation or Sports	2	2	1	0
Total Score	**24**	**20**	**18**	**11**

Note: T1 = Treatment Session 1; T2 = Treatment Session 2; T3 = Treatment Session 3; T4 = Treatment Session 4. Lower WHDI scores indicate better functional status and fewer activity limitations.

The Wrist Hand Disability Index (WHDI) score decreased progressively from 24 at the initial assessment to 11 after the fourth physiotherapy session. This reduction indicates fewer self-reported limitations in activities involving the affected hand.

Improvements were observed in pain intensity, numbness and tingling, perceived muscle strength, work-related activities, household activities, and recreation. Meanwhile, self-care, driving, and sleep scores remained unchanged.

At the final evaluation, the patient reported fewer difficulties performing daily activities involving repetitive hand use. Tasks such as grasping household objects, carrying lightweight items, and

performing domestic activities could be completed more comfortably than at baseline. These improvements are clinically relevant because trigger finger can interfere with grasping, object manipulation, and other functional hand movements (Makkouk et al., 2008).

Discussion

The present case demonstrated favorable clinical changes following four physiotherapy sessions combining Transcutaneous Electrical Nerve Stimulation (TENS) and active exercise in a patient with right trigger finger. Improvements were observed in pain intensity, active DIP joint mobility, and self-reported hand function, while muscle strength remained within the normal range. These findings suggest that the rehabilitation program was accompanied by improvements in several impairments associated with trigger finger, although the individual contributions of TENS and active exercise could not be determined.

The Visual Analogue Scale (VAS) indicated gradual reductions in resting pain, movement-related pain, and tenderness. This improvement may be partly associated with pain modulation during TENS treatment. TENS delivers electrical stimulation through surface electrodes and can influence nociceptive processing through segmental inhibitory mechanisms and descending pain-modulatory pathways. Johnson et al. (2022), in a systematic review and meta-analysis of 381 randomized controlled trials, found moderate-certainty evidence that TENS reduces pain intensity during or immediately after stimulation compared with placebo. However, the review included multiple pain conditions and did not establish the effectiveness of TENS specifically for trigger finger. Therefore, the reduction in pain observed in this case should be interpreted as a clinical change occurring during combined treatment rather than as an effect attributable solely to TENS.

The reduction in pain may also have contributed to improved tolerance of active exercise. Trigger finger is characterized by mechanical interference between the flexor tendon and A1 pulley, which can produce tenderness, painful clicking, and restricted finger movement (Makkouk et al., 2008). When pain decreases, patients may experience greater comfort during voluntary movement, allowing participation in therapeutic activities with fewer interruptions. In the present case, improvements in exercise tolerance were observed alongside reduced tenderness and movement-related pain.

Improvements in active finger movement were also documented during rehabilitation, particularly at the DIP joint. Active movement increased from S. 20°–0°–60° at baseline to S. 0°–0°–70° by the third session, whereas MCP and PIP joint measurements remained unchanged. The improvement may be associated with repeated active movements performed during finger flexion–extension and tendon-gliding exercises. Such exercises are intended to maintain tendon excursion and joint mobility, although the relationship between exercise and improvements in mechanical triggering remains incompletely established.

Salim et al. (2012) investigated physiotherapy as a conservative intervention for mild trigger finger in a randomized study involving 74 patients. At three months, the reported treatment success rate was 68.6% in the physiotherapy group compared with 97.4% in the corticosteroid injection group. These findings suggest that physiotherapy can have a role in conservative management, while also demonstrating that its outcomes may differ from those of other treatments. The results provide contextual support for rehabilitation approaches but do not establish the effectiveness of the particular TENS and active exercise protocol used in the present case.

Further evidence regarding conservative hand therapy was provided by Nadar (2024), who compared a proximal interphalangeal joint-blocking orthosis with hand therapy in patients with idiopathic trigger finger. The trial found greater improvements with orthotic intervention, while

hand therapy alone did not produce comparable treatment success. This finding is important because it indicates that active exercise should not automatically be regarded as sufficient to resolve the mechanical symptoms of trigger finger. Rather, the selection of conservative treatment should consider symptom severity, clinical presentation, and the patient's response to rehabilitation.

In the present case, the patient demonstrated smoother active finger movements and fewer episodes of locking during the treatment period. Although the changes in measured joint mobility were relatively modest, improved movement comfort may have supported activities involving grasping and manipulating objects. Nevertheless, these observations do not establish that the structural relationship between the tendon and pulley was altered by the intervention.

Manual Muscle Testing showed that strength remained at grade 5 throughout all four treatment sessions. This finding suggests that the patient retained normal clinically assessed voluntary strength despite experiencing pain and mechanical restrictions during finger movement. Consequently, the primary objective of rehabilitation in this case was not to increase muscle strength, but to reduce pain, improve movement tolerance, and support functional hand use.

The absence of measurable strength changes also highlights the distinction between muscle performance and functional ability. Patients may experience limitations in hand activities despite normal MMT scores when movement is affected by pain or triggering. In this case, improvement in the patient's reported activity performance occurred without a corresponding change in MMT grades. This pattern is compatible with the clinical presentation of trigger finger, in which mechanical symptoms and discomfort may interfere with functional activities (Makkouk et al., 2008).

Functional assessment using the WHDI showed a reduction in total score from 24 at baseline to 11 following the fourth treatment session. Improvements were observed in several domains involving pain, perceived muscle strength, work-related tasks, household activities, and recreation. These changes suggest that the patient experienced fewer difficulties during routine hand use. However, the interpretation of the total score requires confirmation of the instrument's scoring system and measurement properties.

The observed improvement in self-reported hand function may be understood in relation to the concurrent reduction in pain and improved active DIP movement. Patients with trigger finger commonly experience difficulty with grasping and repetitive finger movements because of mechanical catching and pain during tendon excursion (Makkouk et al., 2008). In this case, reduced discomfort and smoother movement may have allowed the patient to perform daily tasks more comfortably despite unchanged MMT scores.

Overall, the findings demonstrate favorable clinical changes during a short physiotherapy program combining TENS and active exercise. Pain intensity decreased, active DIP joint movement improved, reported locking episodes became less frequent, and WHDI scores indicated fewer self-reported limitations. However, because this report describes a single patient without a control condition, it cannot establish a causal relationship between the intervention and the observed outcomes. The absence of longer-term follow-up also limits conclusions regarding the persistence of improvement. Further studies involving larger samples, validated functional outcome measures, longer follow-up periods, and comparative treatment protocols are required to evaluate the effectiveness of TENS combined with active exercise in patients with trigger finger.

CONCLUSION

This case report demonstrates that a physiotherapy program combining Transcutaneous Electrical Nerve Stimulation (TENS) and active exercise was associated with favorable clinical

and functional outcomes in a patient with right trigger finger. Following four treatment sessions, the patient experienced reduced pain intensity, improved finger range of motion, maintained normal muscle strength, and enhanced functional hand performance. These findings suggest that the selected interventions may effectively address the primary impairments associated with trigger finger while supporting progressive recovery of hand function.

The observed improvements indicate that integrating pain-relieving modalities with therapeutic exercise may facilitate more comfortable finger movement and improve the performance of daily activities. Although complete recovery had not been achieved by the end of the intervention, the progressive clinical changes suggest that conservative physiotherapy may provide beneficial short-term outcomes during the early management of trigger finger and potentially reduce functional limitations before more invasive treatment is considered. However, interpretation should be limited by the single-case design and short intervention period. Further research involving larger populations, longer follow-up periods, and comparative study designs is needed to establish the effectiveness and long-term benefits of combined TENS and active exercise for trigger finger.

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REFERENCES

Cuthbert, S. C., & Goodheart, G. J., Jr. (2007). On the reliability and validity of manual muscle testing: A literature review. *Chiropractic & Osteopathy, 15*, Article 4. https://doi.org/10.1186/1746-1340-15-4

Gagnier, J. J., Kienle, G., Altman, D. G., Moher, D., Sox, H., Riley, D., & CARE Group. (2013). The CARE guidelines: Consensus-based clinical case reporting guideline development. *Journal of Medical Case Reports, 7*, Article 223. https://doi.org/10.1186/1752-1947-7-223

Hawker, G. A., Mian, S., Kendzerska, T., & French, M. (2011). Measures of adult pain: Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). *Arthritis Care & Research, 63*(S11), S240–S252. https://doi.org/10.1002/acr.20543

Johnson, M. I., Paley, C. A., Jones, G., Mulvey, M. R., & Wittkopf, P. G. (2022). Efficacy and safety of transcutaneous electrical nerve stimulation (TENS) for acute and chronic pain in adults: A systematic review and meta-analysis of 381 studies (the meta-TENS study). *BMJ Open, 12*(2), e051073. https://doi.org/10.1136/bmjopen-2021-051073

Knoedler, T. G., Gaertner, A. P., Wilkinson, P. J., & Salvapongse, A. N. (2025). Incidence,

prevalence, and outcomes of hand manifestations in patients with diabetes mellitus: A comprehensive literature review. *HAND, 20*(2), 163–169. https://doi.org/10.1177/15589447231219522

Makkouk, A. H., Oetgen, M. E., Swigart, C. R., & Dodds, S. D. (2008). Trigger finger: Etiology, evaluation, and treatment. *Current Reviews in Musculoskeletal Medicine, 1*(2), 92–96. https://doi.org/10.1007/s12178-007-9012-1

Nadar, M. S. (2024). Orthosis vs. exercise for the treatment of adult idiopathic trigger fingers: A randomized clinical trial. *Prosthetics and Orthotics International, 48*(6), 713–719. https://doi.org/10.1097/PXR.0000000000000294

Salim, N., Abdullah, S., Sapuan, J., & Haflah, N. H. M. (2012). Outcome of corticosteroid injection versus physiotherapy in the treatment of mild trigger fingers. *Journal of Hand Surgery (European Volume), 37*(1), 27–34. https://doi.org/10.1177/1753193411415343

van Kooij, Y. E., Fink, A., Nijhuis-van der Sanden, M. W., & Speksnijder, C. M. (2017). The reliability and measurement error of protractor-based goniometry of the fingers: A systematic review. *Journal of Hand Therapy, 30*(4), 457–467. https://doi.org/10.1016/j.jht.2017.02.012

World Medical Association. (2025). World Medical Association Declaration of Helsinki: Ethical principles for medical research involving human participants. *JAMA, 333*(1), 71–74. https://doi.org/10.1001/jama.2024.21972