Traditional Physiotherapy vs. Fascial Manipulation for the Treatment of Trigger Finger: A Randomized Pilot Study

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ABSTRACT **Background:** Physiotherapy can help treat of trigger fingers (TF).
Objectives: To compare efficacy of fascial manipulation (FM) and traditional physiotherapy (TP) techniques in treatment of TF.
Methods: Nineteen patients were randomized in the FM group and 15 in the TP group. All patients underwent eight physiotherapy sessions. The Disabilities of the Arm, Shoulder, and Hand (QuickDASH) and visual analogue scale (VAS) scores, staging of stenosing tenosynovitis (SST) classification, triggering frequency, grip and pinch strength were recorded before and after treatment. We surveyed participants at 6 months for recurrence, further treatment, and the VAS and QuickDASH scores. The primary outcome measure was reduction in QuickDASH and VAS scores.
Results: Both FM and TF improved the QuickDASH and VAS scores at 6 months follow-up, without a significant difference. The QuickDASH score in the FM group improved from 28.4 ± 17.1 to 12.7 ± 16.3; TF scores improved from 27 ± 16.7 to 18.8 ± 29.4 (P = 0.001). The VAS score improved from 5.7 ± 2.1 to 1.2 ± 2.1 and from 4.8 ± 1.8 to 2 ± 2.6 for both groups, respectively (P < 0.001). SST and grip strength also improved following treatment, regardless of modality. At 6 months, four patients (22%) with an SST score of 1, three (30%) with a score of 2, and two (40%) with a score of 3A underwent additional treatment.
Conclusions: Both FM and TP techniques are effective for the treatment of TF and should be considered for patients who present with SST scores of 1 or 2.
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KEY WORDS: fascial manipulation, physiotherapy, trigger finger, stenosing tenosynovitis (SST)

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Trigger finger is a relatively common disorder affecting the hand. A lifetime incidence of 2% has been reported [1], which may increase up to 10% in diabetic patients [2]. Splinting, steroid injections, and surgery have been used to manage this condition with good results.

Physiotherapy is an acceptable treatment for trigger finger. It is an alternative to splinting or invasive procedures. Physical agents such as cryotherapy, thermotherapy, and ultrasound are used in conjunction with manipulations, gliding exercises, and patient education and have been reported to be efficient for the treatment of this condition [3,4]. However, the evidence regarding the efficacy of the treatment is limited. A single prospective study compared corticosteroid injection to physiotherapy in patients with mild triggering [5]. A successful outcome was reported in 68.6% of the patients in the traditional physiotherapy group and in 97.4% of the patients in the corticosteroid injection group.

Fascial manipulation is gaining momentum as a manual therapy method, which was described by Stecco [6] more than 15 years ago. The anatomy of the fascial envelope of the upper limb is well defined [7-9]. The fascia has a dual role, both connecting the elements of the joints and contributing to the coordination of the activation of the motor units. Application of fascial manipulation techniques, specifically deep kneading of muscular fascia at specific points (e.g., centers of coordination and centers of fusion) along myofascial units, sequences, and spirals are effective in the treatment of chronic shoulder pain [10]. We performed a pilot study to investigate and compare the efficiency of both of fascial manipulation techniques and traditional physiotherapy therapy in the treatment of trigger finger.

PATIENTS AND METHODS

Our institution is a community-based physiotherapy center. All patients referred to us for treatment of a trigger finger were further assessed by the primary investigator, a trained hand surgeon, to confirm the diagnosis. The diagnostic criteria were a history

of catching of the involved finger accompanied by pain over the A1 pulley on the volar aspect of the hand. All adult patients were eligible for enrolment. Exclusion criteria included patients with a locked finger (staging of stenosing tenosynovitis [SST] Grade IV on the Quinell classification as modified by Green [18]), age younger than 18 years, traumatic trigger fingers (post-surgery or fracture in the distal forearm or hand), trigger thumbs, multiple (more than 1 finger), recurrent trigger fingers or additional treatments for this finger in the past year, motor vehicle or work accidents or patients with additional compensation claims, conditions that may cause secondary catching including tumors involving the finger or the joint, inflammatory conditions especially rheumatoid arthritis, pregnancy, and osteoarthritis involving the specific metacarpal-phalangeal joint. Patients who could not commit to attend the planned therapeutic sessions were also excluded from the study.

After obtaining informed consent, the patients were randomized in two groups. All patients underwent hand X-rays to rule out metacarpophalangeal joint osteoarthritis. Each eligible patient underwent eight sessions of therapy over a period of 6 weeks.

Group A protocol received fascial manipulation including deep kneading of muscular fascia at three centers of coordination (C.C): C.C above the pronator teres muscle. (M.F unit of INTRA-CUBITUS), C.C above proximal part of pronator quadratus muscle between the palmaris longus and the flexor carpi radialis tendons (M.F unit of INTRA-CARPUS), and C.C in the mid-palmar region between metacarpus 3-4 (M.F unit of INTRA-DIGIT) [Figure 1]. The deep kneading was preformed by applying deep pressure directed by the therapists two metacarpal phalangeal joints for the superficial C.Cs and by the therapists elbow for the proximal deep C.C. Pressure was applied perpendicular to the fascia layer direction, as described by Stecco [6]. To the best of our knowledge, no previous studies have examined the effect of fascial manipulation on TF; therefore, manipulation points were chosen based on upper limb C.Cs as described by Day and co-authors [10], which provided anatomical explanation for this treatment technique.

Group B protocol included U.S. treatment delivered to the A1 pulley area (3 MHz, over 1 cm², for 5 minutes), MP and PIP joint mobilization (for 5 minutes), eccentric stretching, and self exercises at home (self-stretch and self-massage).

Demographic data including the age, sex, and previous medical history were recorded. The duration of the symptoms and the fingers involved were noted. The patients underwent a brief assessment including the determination of the SST according to the modified Quinell classification, and the determination of the triggering frequency as the number of triggering events occurring in 10 active flexion/extension cycles. The grip power (average of three times) and pinch was measured using dynamometers. An X-ray of the involved hand was obtained to rule out concomitant conditions in the hand. The patients completed a Disabilities of the Arm, Shoulder, and Hand (QuickDASH) questionnaire and a visual analogue scale (VAS) chart.

A similar assessment was repeated at 6 weeks by an independent assessor, blinded to the protocol that was used. The post-treatment assessment was identical to the pretreatment except for the adaptation of the SST scale. Since there is no designed classification of normal fingers on the SST scale, we defined the combination of VAS score of ≤ 1 and no catching on 10 flexion/extension cycles as SST 0.

Six months from the end of the treatment a survey was sent to the participants. The survey included information about recurrence of the condition (no recurrence, occasional pain or catching, or full recurrence), further treatment (injection, surgery, other), and VAS scale and the QuickDASH questionnaire scores.

Figure 1. Fascial manipulation three centers of coordination (C.C):

I = C.C above the pronator teres muscle. (M.F unit of INTRA-CUBITUS)
II = C.C above proximal part of pronator quadratus muscle, between the palmaris longus and the flexor carpi radialis tendons (M.F unit of INTRA-CARPUS)
III = C.C in the mid-palmar region between metacarpus 3 and 4 (M.F unit of INTRA-DIGIT)

STATISTICAL ANALYSIS

Continuous variables are presented as average and standard deviations. Ordinal and nominal variables are presented as absolute and relative frequencies. Nonparametric Fisher's exact tests were used to compare categorical variables and the Welch *t*-test for continuous variables. We used a repeated measured mixed-design model analysis to compare grip, pinch, VAS, QuickDASH score, SST score, and triggering frequency at baseline after the intervention and at 6 months follow-up for VAS and QuickDASH.

RESULTS

Thirty-four patients were included in the study, 19 were randomized in the fascial manipulation group (Group A) and 15 in the traditional physiotherapy group (Group B). All patients completed the treatment. One patient did not present to the post-intervention evaluation; however, he returned the follow-up questionnaire at 6 months. In total, 33 (97%) patients returned the follow-up questionnaire. Two questionnaires were incomplete and missing the QuickDASH and the VAS data. In one patient with an old traumatic amputation of the contralateral hand, we miss the contralateral grip and pinch strength data.

There was no significant difference regarding the age, sex, presence of diabetes, SST classification, triggering frequency, grip strength, pinch strength, and VAS and QuickDASH scores between the treatment groups (A and B) at baseline [Table 1]. There was a trend for a longer delay to presentation in group B, 3.9 ± 2.9 months, compared to 2.3 ± 1.3 months for group A.

A repeated measured mixed-design model analysis [Figures 2A and 2B] shows a significant improvement of both QuickDASH and VAS scores with treatment in both groups ($P = 0.001$). We did not detect a significant difference between the treatment groups; however, there was a trend for a lesser VAS score ($P = 0.125$ with a partial-Eta-squared of 0.143) in the fascial manipulation group.

There was a significant improvement in grip strength and SST score at the end of treatment [Table 2, Figures 2C and 2D] as well as pinch strength. There was a trend toward an improvement in triggering frequency [Figure 2E]. However, no difference between treatment methods was noted for these results.

In the fascial manipulation group 21% of the patients required additional treatment as did 35% in the traditional physiotherapy group ($P = 0.442$). Seven patients (20%) had diabetes. Due the small subgroup size, a statistical analysis for the influence of diabetes on patient outcome could not be performed.

DISCUSSION

Physiotherapy is used extensively for a variety of tendinopathies, such as Dequervain tenosynovitis, and lateral epicondylitis, with good results. This treatment did not gain popularity for the treatment of trigger fingers despite being used occasionally.

Table 1. Patient characteristics at presentation

	Fascial manipulation (n=19)	Traditional physiotherapy (n=15)	*P*-value
Age in years, mean ± SD	69.6 ± 12.2	66.4 ± 15.7	0.508
Sex, n (%)			
Male	11 (57.9)	7 (46.7)	0.515
Female	8 (42.1)	8 (53.3)	
Time to presentation, in months, mean ± SD	2.3 ± 1.3	3.9 ± 2.9	0.060*
Dominant hand involved, n (%)	7 (36.8)	10 (66.7)	0.084
QuickDASH, mean ± SD	28.0 ± 17.0	29 ± 17.9	0.862
VAS, mean ± SD	5.8 ± 2.1	5.0 ± 1.9	0.281
SST score, mean ± SD**	1.5 ± 0.6	1.7 ± 0.9	0.342*
Triggering frequency, mean ± SD**	2.1 ± 3.9	2.3 ± 3.8	0.864
Grip strength, mean ± SD			
Index hand	48.1 ± 24.7	45.8 ± 18.2	0.767
Contralateral hand	67.8 ± 31.0	59.2 ± 19.7	0.369
Pinch strength, mean ± SD			
Index hand	6.2 ± 2.9	5.0 ± 2.5	0.214
Contralateral hand	7.7 ± 3.7	6.4 ± 2.9	0.284
Diabetes, n (%)	5 (26.3)	2 (13.3)	0.426

*_P_-value from Welch's _t_-test as the two groups have unequal variances (checked by Levene's test)
**SST score and triggering frequency were analyzed as continuous variables, as we assumed that the differences between each two successive values are fixed

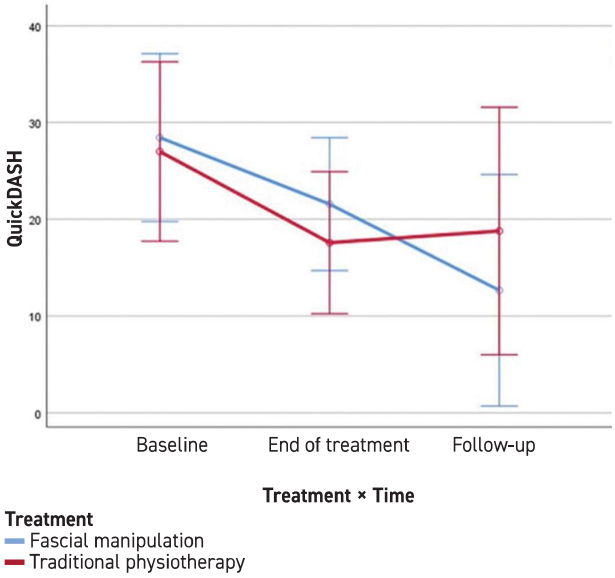
QuickDASH = Disabilities of the Arm, Shoulder, and Hand, SD = standard deviation, SST = staging of stenosing tenosynovitis, VAS = visual analogue score

Moreover, the efficacy of physiotherapy in this setting has not been thoroughly investigated. We are aware of only one previous study [5], which compared physiotherapy and steroid injections. In this prospective pilot study, we compared two physiotherapy modalities: fascial manipulation and traditional physiotherapy.

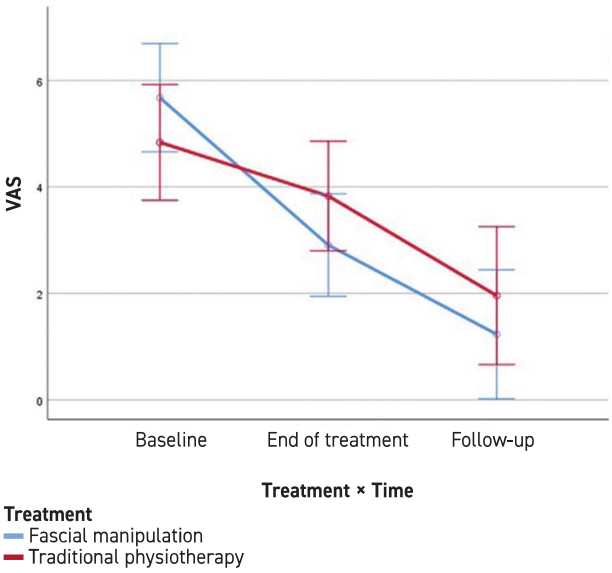
Fascial manipulation assumes to produce a beneficial consequence through a reflex effect on the autonomic nervous system, induced by manipulating the fascial layers within and beneath the skin [11]. As in trigger finger, histologically the A1 pulley exhibits fibrocartilaginous metaplasia [12], fascial manipulation tempts to reduce abnormal fibrous adhesions by realigning the normal soft tissue fibers [13]. In animal studies, fascial manipulation was found to have a time-dependent increase in fibroblast cell body cross-sectional area [14] and effect the distribution of α- and β-actin in subcutaneous fibroblast tissue [15]. Other

Figure 2. QuickDASH score, VAS score, grip strength, SST score, and triggering frequency
QuickDASH = Disabilities of the Arm, Shoulder, and Hand, SST = staging of stenosing tenosynovitis, VAS = visual analogue score

[A] The QuickDASH score improved following physiotherapy treatment, regardless of treatment type



[B] The VAS score improved following physiotherapy treatment, regardless of treatment type



studies have shown manual therapies to be effective for alleviating systemic and localized acute inflammation [16]. However, traditional physiotherapy includes heating and stretching, which present a synergistic beneficial effect through increased blood flow and collagen tissue extensibility [17].

In this study, fascial manipulation was compared to a conventional physiotherapy regimen for the treatment of trigger fingers. While one method was not found to be superior to the other, there were slight advantages for the fascial manipulation group for most parameters. Moreover, the VAS reduction might have been significant for a larger cohort, and only 21% of patients in this group needed additional treatment at 6 months compared to 35% in the traditional physiotherapy group.

Overall, both treatments, either in the immediate period or in the long-term follow-up, were found to improve functional outcomes, to reduce pain, and to be related with improved DASH score.

Some claim that trigger finger can spontaneously resolve, making dedicated treatment modalities unnecessary. McKee and colleagues [18] found that even left alone, trigger finger eventually resolved in 52% of 343 patients; however, it required latency period of 8 months and outcomes were often evaluated solely through phone interviews. The results may not have accurately reflect the symptomatology. Murphy and co-authors [19] reported 20% resolution of trigger finger within 4 months following normal saline injections to the A1 pully; however, this effect was demonstrated on a small group of patients. Last, Schofield et al. [20] found trigger thumb to spontaneously resolve after an average of 7 months in 83% of 30 patients, yet they reported a mild loss of function with prolonged conservative treatment, which might have been preventable with earlier intervention. So, while spontaneous recovery can occur, it takes a prolonged time period, sometimes more than a year, in which patients experience significant pain and disability [1]. However, patients who enrolled in our study and completed a physiotherapy program, improved and regained function within 6 weeks of therapy. Last, Döring et al. [21] reported that an option of no treatment is least preferred by patients. They also found that patients preferred a less aggressive approach compared to surgery.

Steroid injections to the A1 pully are an accepted and useful treatment for trigger finger. They reduce swelling of the A1 pully, along with the synthesis of type 1 collagen and proteoglycans and reduce tenocytes proliferation [22]. Adverse effects are rare, but may include skin depigmentation, fat necrosis, and a dose dependent spontaneous rupture of the flexor tendon [23,24]. Success rates vary and are reported to be between 35–80% with long term follow-up, influenced by the number of finger involved, thumb involvement (better prognosis), sex, and diabetic status of the patient [22]. To the best of our knowledge, only Salim and colleagues [5] compared steroid injection therapy to physiotherapy for the treatment of trigger finger. They found that while pain relief was superior in the injection group, recurrence rate was also higher. Their other results were similar to ours, as in both

Figure 2[C] Grip strength improved following treatment in the effected hand and remained the same in the contralateral hand

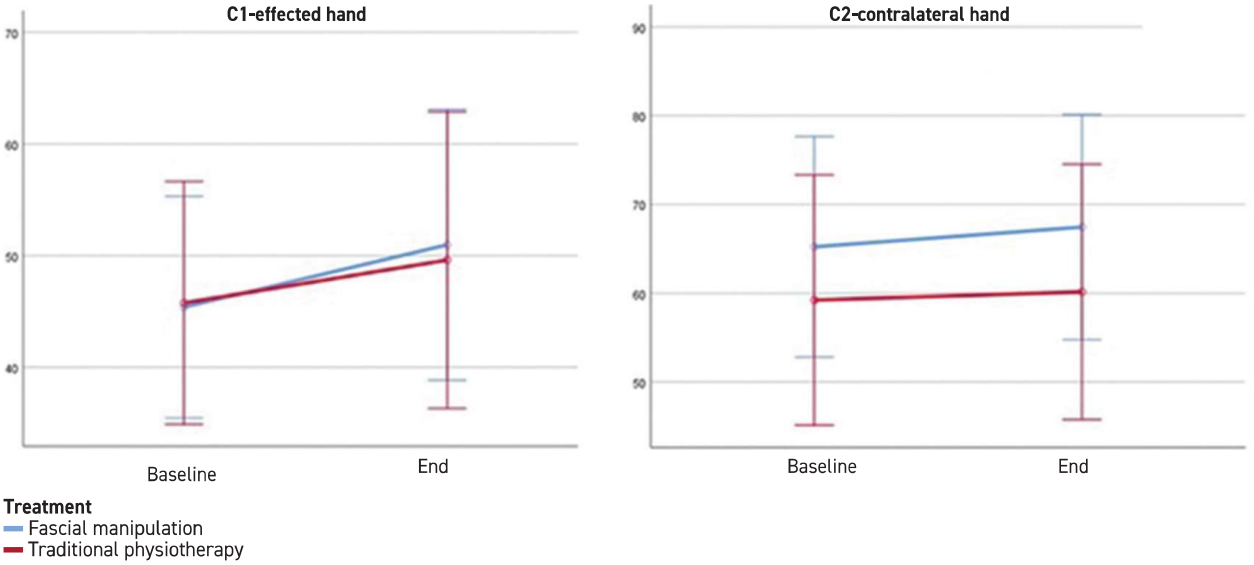


Figure 2[D] SST score improved following physiotherapy treatment, regardless of treatment type

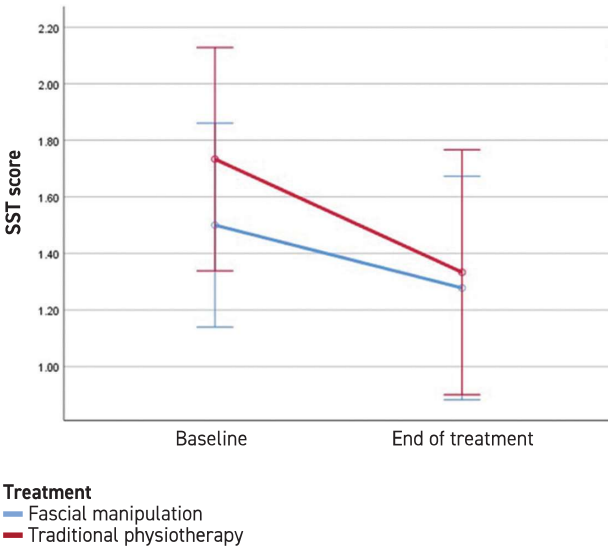
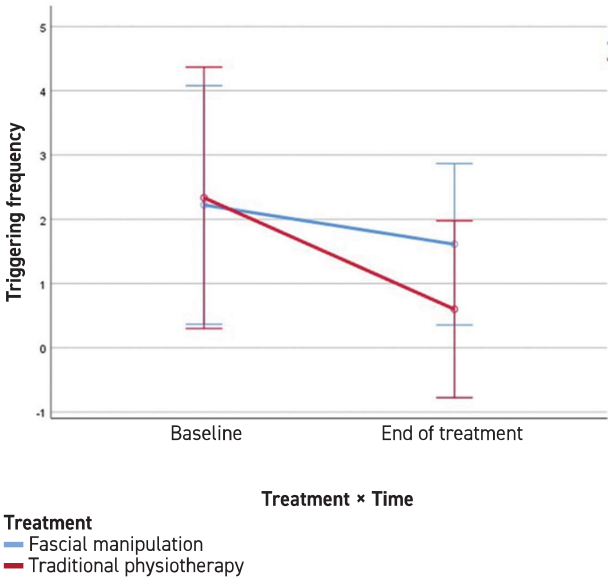


Figure 2[E] Triggering frequency did not significantly change following treatment, regardless of treatment type



cohorts, a significant VAS decrease was noted at 3 months and grip strength was improved. Unlike Salim et al. we also noted a significantly improved QuickDASH score at 6 months.

The relatively low number of participants is the main limitation of this study, and achieving statistical significance was challenging. However, as this pilot study described a new therapeutic technique, we believe our results are of value. Physiotherapy for trigger finger includes a variety of treatment techniques, and not all of the modalities were utilized in this study. For example, most studies demonstrated a positive benefit of orthosis for the management of TF, with success rates according to the patient report ranging between 47% and 93%, regardless of orthosis type [25].

In our practice we offer physiotherapy, both traditional and fascial manipulation, for patients with SST score of 1 or 2 who desire a less aggressive approach, especially in elderly patients with stiff fingers when we fear splinting may increase stiffness. We believe that observation only is better [18] as it shortens symptomatology and does not prevent future injections or surgery.

Table 2. Grip, pinch strength, SST and triggering frequency change following treatment

	Fascial manipulation, mean (SD)		Traditional physiotherapy, mean (SD)		Time effect		Interaction effect	
	Baseline	End of treatment	Baseline	End of treatment	*P*-value	Partial Eta squared	*P*-value	Partial Eta squared
Grip (kg)								
Index hand	45.4 ± 22.5	51.0 ± 28.4	45.8 ± 18.2	49.6 ± 20.7	0.020	0.162	0.652	0.007
Contralateral hand	65.7 ± 29.7	67.4 ± 29.7	59.2 ± 19.7	60.1 ± 21.2	0.229	0.048	0.618	0.008
Pinch (kg)								
Index hand	6.2 ± 3.0	7.0 ± 3.5	5.0 ± 2.5	5.6 ± 3.5	0.053	0.115	0.640	0.007
Contralateral hand	7.7 ± 3.8	8.1 ± 4.1	6.4 ± 2.9	7.0 ± 3.6	0.070	0.105	0.677	0.006
SST score	1.5 ± 0.6	1.3 ± 0.9	1.7 ± 0.9	1.3 ± 0.7	0.037	0.133	0.538	0.012
Triggering frequency	2.2 ± 3.9	1.6 ± 3.3	2.3 ± 3.8	0.6 ± 1.5	0.100	0.085	0.423	0.021

Values are given in terms of means ± standard deviations
P-values and partial-Eta squared are from repeated measured mixed-design models, including treatment × time as main effect and treatment as an interaction effect
Partial-Eta squared: 0.02 = small, 0.13 = medium, 0.26 = large
SST = staging of stenosing tenosynovitis

CONCLUSIONS

Fascial manipulation, as traditional physiotherapy program, is beneficial for the treatment of trigger finger.

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