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Can Myofascial Release Techniques Have Remote Effects? A systematic Review

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SUMMARY

Background. According to the Anatomy trains theory, different parts of myofascial tissue are connected by meridians. Many studies based on anatomy trains theory have examined the remote effects of myofascial release techniques. This study aimed to systematically review and evaluate the therapeutic efficacy of remote myofascial techniques.

Methods. We used all English papers published in electronic databases including PubMed, Scopus, and Web of Science from 2000 to February 2022 using the following keywords: "remote myofascial release", "remote release", "anatomy trains", "line structures myofascial release", "myofascial chains", and "fascial meridians release". The articles directly related to the remote effects of myofascial release were selected to review. The PEDro scale was used to assess the quality of these trials.

Results. 5 randomized controlled trials were selected for our review. Randomized clinical trials that studied the comparative effect of remote myofascial release techniques with different methods, control/sham, and other soft tissue release techniques like stretching were included. This review showed little evidence proving the additional effectiveness of remote myofascial release technique treatment.

Conclusions. Myofascial release is a good technique to increase flexibility. However, further studies are recommended to evaluate the effect of myofascial release techniques in patients with musculoskeletal problems by examining more outcome variables.

KEY WORDS

Remote myofascial release; myofascial chain; anatomy trains; systematic review; superficial backline.

INTRODUCTION

Studies have shown that the forces produced by muscles are not entirely transmitted to their tendons; they are transmitted to muscle tissue and the surrounding tissue, such as myofascial pathways (1-3). The myofascial pathways allow the forces produced by the muscles to be sent to extra-muscular structures that are not directly related to that muscle (4). Myofascial tissue is the part of the body that distributes and transmits forces and plays a crucial role in movement coordination and joint stability by having pain nociceptors and proprioception receptors (5-8). There is growing evidence of a link between body organs, suggesting that musculoskeletal structures and fascia tissue forms an integrated system in the distribution and transmission of forces (9, 10). The connection and expansion of myofascial tissue in different parts of the body and its effect on remote areas have been confirmed in several studies (9, 11-13). Many years ago, Gracovetsky showed that the central nervous system attempts to regulate muscle activity to minimize spine and joint tensions. According to his theory, the muscles should act as an integrated system and interconnected and integrated network; the myofascial system can provide these connections (14-17).

By developing the "Anatomy Trains" theory, Myers introduced muscles, joints, and fascia tissue as a complex and interconnected structure that could transmit forces to remote regions (18). This theory uses myofascial pathways to force transmission (18, 19). Various manual therapy techniques can affect myofascial tissue. However, myofascial

release (MFR) by applying direct pressure to this tissue can have a significant and influential effect on the structures of myofascial tissue (20, 21). Myofascial release has biomechanical and biochemical effects on reducing pain, increasing flexibility, and improving tissue stiffness and functions (22-24).
In many cases, it is not possible to perform myofascial techniques in the position of pain or dysfunction, due to surgery, skeletal disorders, *etc*. In these cases, remote treatments can be an alternative therapy. Several studies have examined the effects of remote myofascial release therapies. However, there is no systematic review to summarize the results in this field. The present study aimed to systematically review and evaluate the effectiveness of remote myofascial release techniques.

MATERIALS AND METHODS

Search strategy
Three electronic databases, Scopus (title/abstract/keyword), PubMed (title/abstract), and Web of Science (topic), were searched for articles with titles and or abstracts containing one or more of our keywords which published on January 01, 2000, to February 01, 2022. The keywords were "remote myofascial release", "remote release", "anatomy trains", "line structures myofascial release", "myofascial chains", and "fascial meridians release". The titles and abstracts were used to identify the studies using specifically remote myofascial release as a treatment modality. Duplicate papers were checked and removed.

Study selection

The method of selection studies followed the proposed guidelines for conducting systematic reviews (25). Full texts of English papers were included if the remote myofascial release techniques were their therapeutic intervention.

Inclusion/exclusion criteria

Type of studies

All published randomized clinical trials (RCTs) in the English language that reported the effect of remote myofascial release were included in this systematic review. All selected studies must have at least one control group receiving sham MFR, exercise, massage, or no intervention.

Type of participants

All patients with musculoskeletal disorders and healthy individuals with muscle shortness were considered inclusion criteria for this systematic review. Also, there were no specific age or gender restrictions for participants.

Type of intervention

The authors included all the trials that examined the effects of remote myofascial release techniques. Stretching techniques and other manual therapy methods that directly impacted muscle tissue and joints (such as muscle energy techniques, mobilization, *etc*.) did not enter the systematic review.

Outcome measurements

Any type of outcome measurement was accepted for the current study.

Screening and data extraction

Two authors listed the relevant publications independently by endnote 8X software. Alpha equal to or less than 0.05 was considered a level of significance. The qualified studies were selected for full-text screening and extracting the information such as the name of the first author, year of publication, patients' characteristics (sample size, gender, and age of the participants), characteristics of the intervention and control groups, primary and secondary outcomes, and results of studies.

Quality assessment of studies

Studies quality score was assessed by 2 independent authors using the PEDro scale. This is a valid 11-item scale commonly used to assess the methodological quality of clinical trials involving physiotherapeutic interventions (26). Two researchers read the selected full texts independently, appraised them critically, and scored their quality based on the PEDro quality assessment tool (23, 24). The authors discussed any disagreement, and a final quality score was obtained.

RESULTS

Eighty-four abstracts were identified based on the keywords and the selected international databases. After the initial review, eight potentially relevant abstracts were selected to be fully retrieved. Finally, five studies were selected by two separate researchers according to the exact correspondence with the subject. A total of 79 studies did not meet the inclusion and exclusion criteria and were excluded from our study. One of the most important exclusion criteria was the existence of other interventions (such as stretching exercises and muscle energy techniques) and the evaluation of their therapeutic effects, which was not consistent with the purpose of the present study (11, 27). Finally, five manuscripts were selected for our study, and no other research was included by hand search. The search flowchart for studies and how to select them is shown in **figure 1**.

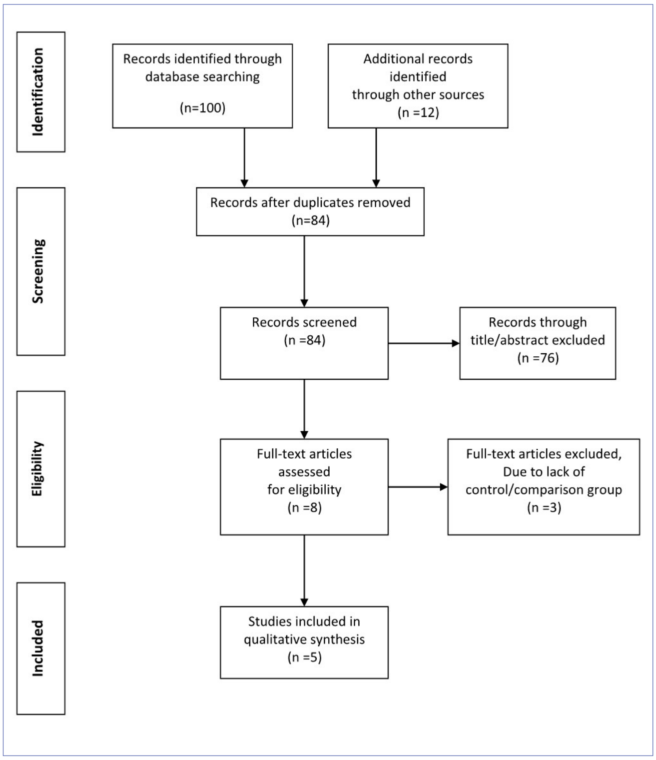

Figure 1. Flowchart for the identification of the eligible studies evaluating the effect of Remote-MFR.

Quality of the selected studies

The PEDro scale reviewed the studies. The results and details of the study are shown in **table I**. Pedro scores for the reviewed articles ranged from 5 to 9, and none of the articles scored less than 5.

Characteristics of the selected studies

A summary of the methodological properties of included studies is presented in **table II**. All studies fully stated the inclusion criteria and performed between-group change analyses. All manuscripts performed random distribution of participants. Baseline variables were also reported in all studies. Depending on the type of intervention, the blinding of the participants and the therapists were not easy; however, three studies used blind-outcome measurements (13, 24, 28). One study compared the effects of SMFR with stretch (13). The control group received no intervention in two trials (24, 29). One study used sham treatment as a control group (30). Moreover, one study used both sham and control groups (28).

MFR procedure of the selected studies

Three studies used the Self-myofascial release (SMFR) by foam roller and or tennis ball (24, 29, 30). In one study, a therapist performed the MFR (28). Moreover, in one study, both SMFR and MFR were used by the therapist

Table I. Quality assessment of included articles based on PEDro scale.

Item	Study ID				
	Grieve *et al.* (22)	Joshi *et al.* (11)	Do *et al.* (26)	Cathcart *et al.* (27)	Fauris *et al.* (28)
Eligibility criteria specification	Yes	Yes	Yes	Yes	Yes
Proper random allocation	Yes	Yes	Yes	Yes	Yes
Allocation concealment	Yes	No	No	No	Yes
Groups similarity at baseline	No	Yes	No	Yes	Yes
Subjects blinding	No	No	No	Yes	No
Therapists blinding	No	No	No	Yes	Yes
Assessor blinding	Yes	Yes	No	Yes	Yes
Outcome measure obtaining from 85% subjects initially allocated to groups	Yes	Yes	Yes	Yes	Yes
Use of intention to treat analysis	Yes	Yes	No	No	Yes
Reporting between-group statistical comparisons	Yes	Yes	Yes	Yes	No
Reporting point measures and measures of variability	Yes	Yes	Yes	Yes	Yes
Total	**8**	**8**	**5**	**9**	**9**

Table II. Characteristics and data of the included studies.

Authors	No. of subjects	Types of MFR	Control/ Comparison Group	Treatment area	Remote area to be assessed	Outcome measures	Results
Grieve *et al.* (22)	24 healthy	Self-MFR (Tennis ball)	Inactive control	Plantar fascia (SBL)	Hamstring and lumbar	Sit and reach test	Hamstring & lumbar flexibility increased in SMFR group
Joshi *et al.* (11)	58 asymptomatic	MFR/Self-MFR (Tennis ball)	Static stretch	Plantar fascia and Suboccipital muscles (SBL)	Hamstring, lumbar, and knee	Sit and reach test- Passive knee extension test	Both MFR and static stretch were effective-MFR significantly effective than SMFR
Do *et al.* (28)	31 healthy	Self-MFR (Foam roller)	Passive ankle mobilization	Plantar fascia (SBL)	Hamstring and lumbar	Toe touch test-passive SLR	Hamstring and lumbar flexibility increased in SMFR group
Cathcart *et al.* (26)	12 healthy	MFR	Inactive control	Thoracic erector spinae muscles-T6 to T12 (SBL)	Lower limb and cervical	Digit inclinometer-digit algometer-ECG	ROM and PPT improved after MFR
Fauris *et al.* (27)	94 healthy	Self-MFR (Foam roller)	Inactive control	Plantar/calf/ lumbar and epicranial fascia	Hamstring and ankle	Sit and reach test- Lunge test	Hamstring and lumbar flexibility increased in SMFR group

were performed (13). Also, in all studies, MFR techniques were performed on the superficial back line (SBL) region, and the effects of the techniques on the remote area were investigated.

Outcome measures and results

In all studies, hamstring and lumbar flexibility were considered as outcome measures. Three studies used the Sit and Reach test (SRT) (13, 24, 29). One study used toe-touch and passive SLR tests to evaluate hamstring flexibility (30). Moreover, in one study, a digital inclinometer examined the range of motion of the upper spine and lower limbs and the amplitude of pain pressure threshold in the tibialis anterior muscle and the erector spine muscles at levels T10 and C7 was also examined (28).

Grieve and Do, in their studies, examined the effect of bilateral SMFR on the plantar fascia, the hamstring, and lumbar flexibility in 24 and 31 healthy individuals. Both studies showed a significant increase ($p = 0.03$; $p \leq 0.05$) in the flexibility of these areas in the SMFR group compared to the control group.

Do *et al.* compared the baseline variables with passive SLR and Toe-Touch test, but no significant difference was observed between the SMFR and control groups. Immediately after plantar fascia SMFR, the results of the mentioned tests were examined in the two groups. The results of the Toe-Touch test in the SMFR group improved significantly (17.88 to 13.22, $p = 0.05$), and the results of the passive SLR test in both legs showed a significant increase (Left 45.60 to 54.13, $p \leq 0.05$ and Right 45.27 to 53.73, $p \leq 0.05$). However, no significant change was observed in the control group that did not receive the intervention ($p \geq 0.05$) (30).

In the study of Grieve *et al.*, despite the difference in the initial variables (21.5 cm and 17.92 cm) in SRT between SMFR and control groups, this difference was not statistically significant ($p = 0.43$). Immediately after the plantar fascia SMFR, the SRT was performed. The results of the ANCOVA test showed significant changes between groups (F = 5.51, p = 0.03); the study had a large effect size (partial eta squared = 0.21) (24) according to Cohen's study (31).

Joshi *et al*. divided 58 participants whose hamstring tightness was confirmed (by passive knee extension angle ≥ 20 degrees) into three groups. The first group performed remote MFR (plantar and suboccipital fascia), the second group performed static stretch, and the third group performed both interventions for seven sessions in ten days. Also, after completing the interventions, SMFR and self stretch taught the participants to perform for two weeks. Participants underwent three stages of evaluation (passive knee ext and SRT): 1) starting the study, 2) after the seventh session, and 3) after two weeks of self-intervention. Analysis of baseline variables did not show a significant difference between treatment groups. Repeated measure ANOVA test showed a significant improvement in the SRT in the therapist-administered techniques across all three groups, whereas, in the self-administration of techniques, only the MFR group and MFR and static stretch have shown significant change. Additionally, there was a significant improvement from baseline to post-therapist-administered intervention in the passive knee extension test, but no improvement in the participant-performed techniques (13).

Cathcart *et al*. conducted a randomized triple-blind, crossover study. Twelve healthy individuals into counterbalanced sequences of three conditions, a control, a sham, and the MFR, were included in their repeated-measure study. The therapist performed MFR in areas T6 to T12. The duration of the technique was 120 to 300 seconds and was done according to previous studies (23). Also, the control group did not receive any intervention, and the sham group included manipulation without applying pressure on the ribs. For randomization, participants were assigned to their intervention group sequence which was selected on the basis of six possible sequence combinations in order to balance any order effects: [1, 2, 3]; [1, 3, 2]; [2,1, 3]; [2, 3, 1]; [3,1, 2]; [3, 2, 1]. To do this, the second researcher randomly allocated each participant into one of the six sequences via a computer randomized number generator (32). The outcomes measurement tools were a digital inclinometer was used to measure the range of motion of the upper spine (above T6) and lower limbs (below S2). Pain pressure threshold (PPT) (at tibialis anterior, T10, and C7 sections) and interoceptive sensitivity (IS) were also other outcome measures tools of the study. ANOVA test results showed significant increases in ROM and PPT (both local and distal) post MFR intervention. There was also a positive correlation between baseline IS and post-MFR ROM and a negative correlation between baseline IS and post-MRF PPT. IS did increase post-MFR, but this was non-significant. Findings concluded that the MFR may have caused a biomechanical change in tissue elasticity and increased tissue flexibility. The increase in both local and distal sites of the PPT suggests an overall systemic response to the therapy (28).

In the Fauris *et al*.'s study, 94 volunteers were randomly assigned to a control group or one of the five intervention groups. In the intervention groups, SMR was applied to one of the five segments of the SBL (plantar fascia, posterior part of the sural fascia, posterior part of the crural fascia, lumbar fascia, and epicranial aponeurosis) for 10 minutes. The analyzed variables were hamstring flexibility at 30 s, 2, 5, and 10 min, and dorsiflexion range of motion before and after the intervention. Baseline variables were not significantly different (p ≥ 0.05).

The results of SRT (for hamstring flexibility) and lunge test (for ankle dorsiflexion) significantly improved when SMFR was performed on SBL segments. The intervention group improved 5.22 cm, while the control group improved 2.93 cm in SRT. The segments with the greatest effect were the posterior part of the sural fascia when the intervention was brief (30 s to 2 min) or the posterior part of the crural fascia when the intervention was longer (5 or 10 min). In general, 50% of the flexibility gain was obtained during the first 2 min of SMFR. Findings demonstrated that the SBL could be considered a functional structure, as applying SMFR on any of its component segments improved hamstring flexibility and ankle dorsiflexion (29).

DISCUSSION

This study was designed as a systematic review to evaluate the effects of Myofascial Release (MFR) performed along with Superficial Back Line structures and compare it with other techniques. Five manuscripts met our inclusion criteria, including 129 healthy participants. The primary outcome variable was flexibility in all studies; however, one study also examined the pain pressure threshold, and the superficial back line was considered the target tissue for remote MFR, and in all trials, the remote effects of MFR were examined. All study participants were healthy (asymptomatic) and individuals over 18 years of age. The Pedro scale was also used to rank the methodological quality of the studies, all of which received well scores, and none of them were of poor quality. In 4 present studies in our systematic review, the effect of MFR of the SBL compared with the sham group and the inactive control group was investigated, all of which favored the MFR group. In these studies, more attention has been paid to the thoracolumbar fascia as an important part of SBL (33).

In one study, the MFR group was compared to a static stretch group and the combined group of static stretch and MFR. The results showed that the flexibility improvement in all three groups was statistically significant, but the group that received a combination of the two techniques demonstrated additional benefits. Also, the effects of MFR performed by a therapist were compared with SMFR. The results showed that MFR by the therapist is more effective than SMFR.

In addition to examining the ROM, one study also examined the pain pressure threshold (PPT) and interception sensitivity (IS) as outcome variables. The results showed that following MFR, ROM and PPT increased significantly compared to the control and sham groups. The amount of IS was also increased, but this increase was not statistically significant.

We could clearly find that MFR had more and/or equal effects than other trial methods. Also, examining the effects of MFR on the SBL shows the undoubted effects on increasing the flexibility and ROM of different parts of the SBL. The findings confirm that the MFR techniques are reliable in improving the flexibility of individuals and can improve ROM. It should be noted that improving flexibility and increasing the optimal ROM are important factors in preventing musculoskeletal injuries as well as reducing stress on the joints (34).

However, there is still a lack of strong consensus about remote MFR efficacy, as the number of studies we included was small. Further studies are needed to overcome limitations with the following recommendations. First, more RCTs with enlarged sample sizes that compared the effect of remote MFR with other interventions (such as PNF, other manual therapy techniques, electrotherapy, *etc*.). Second, studies should pay more attention to study design, use sham MFR, and perform blinding, allocation concealment, proper randomization, and proper statistical analysis. Moreover, explaining the complete procedure of the MFR methods is very important. Third, we need more studies evaluating the efficacy of remote MFR. Fourth, objective outcome measures such as electromyography evaluation, pain severity, elastic modulus coefficiency, and myofascial thickness should be assessed. Fifth, in all studies, participants were healthy and asymptomatic individuals. It is recommended that the effects of remote MFR on patients with musculoskeletal disorders such as low back pain, neck pain, *etc*., be examined. Sixth, in most studies, the self-MFR technique was used, and less attention was paid to the implementation of MFR by the therapist. Due to the possibility of not performing the self-MFR correctly in terms of the pressure applied to the tissue, the duration of the intervention, and the exact area of the technique. Seventh, in the present studies, only the SBL has been studied to investigate the effects of remote MFR. It is recommended that the effects of remote MFR on other myofascial meridians be examined. Eighth, in the studies studied, Sit and Reach and Toe touch tests were used to examine the flexibility, which generally examines the flexibility of the lumbar region and the hamstrings (35, 36). It is recommended to use more specialized tests for each area to check the flexibility of the lumbar and hamstring area.

CONCLUSIONS

In summary, few available relevant evidence cautiously suggested that the remote MFR techniques (performed on the superficial backline) can effectively improve the flexibility in healthy individuals. The limited number of eligible studies and lack of applied MFR techniques did not let the authors provide a meta-analysis to clarify better.

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DATA AVAILABILITY

N/A.

CONTRIBUTIONS

Both authors contributed equally to this work.

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CONFLICT OF INTERESTS

The authors declare that they have no conflict of interests.

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