

COMPARISON OF MANUAL LYMPH DRAINAGE THERAPY AND CONNECTIVE TISSUE MASSAGE IN WOMEN WITH FIBROMYALGIA: A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

Objective: This study analyzed and compared the effects of manual lymph drainage therapy (MLDT) and connective tissue massage (CTM) in women with primary fibromyalgia (PFM).

Methods: The study design was a randomized controlled trial. Fifty women with PFM completed the study. The patients were divided randomly into 2 groups. Whereas 25 of them received MLDT, the other 25 underwent CTM. The treatment program was carried out 5 times a week for 3 weeks in each group. Pain was evaluated by a visual analogue scale and algometry. The Fibromyalgia Impact Questionnaire (FIQ) and Nottingham Health Profile were used to describe health status and health-related quality of life (HRQoL). Wilcoxon signed rank test and Mann-Whitney *U* test were used to analyze the data.

Results: In both groups, significant improvements were found regarding pain intensity, pain pressure threshold, and HRQoL ($P < .05$). However, the scores of FIQ-7 ($P = .006$), FIQ-9 ($P = .006$), and FIQ-total ($P = .010$) were significantly lower in the MLDT group than they were in the CTM group at the end of treatment.

Conclusions: For this particular group of patients, both MLDT and CTM appear to yield improvements in terms of pain, health status, and HRQoL. The results indicate that these manual therapy techniques might be used in the treatment of PFM. However, MLDT was found to be more effective than CTM according to some subitems of FIQ (morning tiredness and anxiety) and FIQ total score. Manual lymph drainage therapy might be preferred; however, further long-term follow-up studies are needed. (*J Manipulative Physiol Ther* 2009;32:127-133)

Key Indexing Terms: *Fibromyalgia; Massage; Pain; Quality Of Life; Randomized Controlled Trial*

When chronic pain becomes widespread (ie, involving most of the body), which patients commonly attribute to originating in their muscles, it is called *fibromyalgia* (FM).¹ It is an enigmatic disorder that is usually referred to as a syndrome in view of the fact that these patients often have multiple other symptoms such as musculoskeletal aches, pain, stiffness,

and exaggerated tenderness at specific sites.^{1,2} An abnormal autonomic nervous system may explain the multisystem symptoms of FM.^{3,4} There is also mounting evidence for central pain processing abnormalities in almost all FM patients.⁵ The perceived symptoms and disability in FM can impact the person's activities, abilities, and self-esteem. In other words, it affects negatively every dimension of life, especially health-related quality of life (HRQoL).^{6,7}

The lack of specific disease mechanisms is reflected in the fact that no cure has been found for the disease. Thus, the many interventions that are advocated in FM are targeted against the more general characteristics of pain and disability. Current pharmacologic interventions have limited efficacy. There is an increasing consensus that therapy should also include nonpharmacologic approaches.¹

According to the literature about nonpharmacologic treatment approaches for FM, there are different management approaches such as exercise, electrotherapy, patient education,⁸ manual therapy techniques, acupuncture, spa therapy, cognitive-behavioral therapy, and chiropractic care.^{9,10} Nonpharmacologic treatment for patients with chronic pain aims to enhance body functions, activity, and overall health.⁶ These treatment approaches also focus on temporary alleviation of symptoms.^{11,12}

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Manual therapy techniques are composed of a variety of procedures directed at the musculoskeletal structures in the treatment of pain. Two major subcategories exist: those that produce joint motion and those that do not. The first subcategory includes manipulation, mobilization, and manual traction. The second subcategory involves both generalized soft tissue therapies, such as the many types of massage, and focal soft tissue therapy.¹³

The development of manual lymph drainage therapy (MLDT) by the Vodder method for lymph edema in cancer treatment has recently been described.¹³ In this technique, the lymph vessels are gently massaged to mobilize lymphatic fluid. It stimulates the lymphatic system, helps regulate the immune system and clears blockages, eliminates metabolic waste and toxins from the body, and reduces excess fluid.¹⁴

According to Kurz,¹⁵ when the skin is stroked during MLDT near the pain stimulus, touch receptors in the skin perceive this. After switching stations in the spinal cord, the impulse goes from there to the cerebrum and registers the touch, which we then consciously perceive. However, in the spinal cord, the nerve fiber has collateral (lateral pathway) to an inhibitory cell. This inhibitory cell is connected to the switch-cell of the pain pathway. If the inhibitory cell receives an impulse, it passes this on as an inhibition. In this technique, several neighboring touch receptors are stroked in succession. Each of these receptors sends action potentials at the beginning and end of contact. Each of these action potentials causes an inhibition of the pain transmission. Therefore, with MLDT, the “stroking” can cause a reduction in pain.¹⁵ Unfortunately, there appears to be only 1 article about the effects of MLDT on FM. This preliminary study showed pain relief effect of MLDT.¹⁶

There are few studies about sensory treatments (such as massage).⁶ Connective tissue massage (CTM) is a reflex therapy that uses a shear force at connective tissue interfaces in the skin in a specific sequence. Stimulation of the mechanoreceptors by CTM may also close the “pain gate” via pre- and postsynaptic inhibition. Moreover, it has been found to induce release of endogenous opiates.^{17,18} Connective tissue massage leads to reduced tension in the autonomic nervous system with secondary increased circulation, giving a sense of warmth, muscle relaxation, pain relief, and increased mobility by inducing segmental and suprasegmental reflex.¹⁸⁻²³

Consequently, there is currently no recognized effective treatment for FM patients.²⁴ In addition, there are a limited number of studies dealing with the effect of manual therapy techniques on FM. Although there are some studies about MLDT¹⁶ and CTM^{10,23} in FM, there do not appear to be any studies comparing the effects of MLDT and CTM. In this study, MLDT and CTM were used for primary fibromyalgia (PFM); these are included in the second subcategory of manual therapy techniques.

Based on positive results of some studies about MLDT¹⁶ and CTM^{10,23} in FM, this study was planned to test and compare the effects of MLDT and CTM in women with PFM using a randomized controlled trial.

METHODS

Subjects

The Ethics Committee of Hacettepe University, Faculty of Medicine, Ankara, Turkey, approved the protocol; and the study was conducted in accordance with the rules of the Declaration of Helsinki. It was also registered with the clinical trial registry. Before any volunteer participated in this study, written informed consent was obtained after all procedures had been fully explained. The study began in June 2006 and ended in October 2007.

Patients were eligible for the study if they (*a*) were female outpatients, (*b*) were at least 25 years or older, (*c*) met the criteria for PFM as defined by the American College of Rheumatology,² (*d*) had moderate pain (≥ 4 based on visual analogue scale [VAS]) before the baseline visit, (*e*) had pain in the neck or shoulder region, (*f*) had never been treated for PFM, and (*g*) volunteered to participate in this study.

Exclusion criteria included the following: (*a*) pain from traumatic injury or structural or regional rheumatic disease, (*b*) chronic infection, (*c*) fever or an increased tendency to bleed, (*d*) severe physical impairment, (*e*) signs of tendinitis, (*f*) cardiopulmonary disorder, (*g*) inflammatory arthritis or autoimmune disease, (*h*) uncontrolled endocrine disorder, (*i*) allergic disorder, (*j*) pregnancy or breast-feeding, (*k*) malignancy, or (*l*) unstable medical or psychiatric illness or medication use. They were asked not to use antidepressants, myorelaxants, and nonsteroid anti-inflammatory drugs during the 3 days before the first appointment and during the treatment sessions and the evaluation process after the treatment.

Treatment Procedure for MLDT

In this study, MLDT was applied by a trained physiotherapist (second author), who used specialized hand movements in a range of different sequences.²⁵ The treatment was carried out as very light, completely pain-free, rhythmical translational movements of the skin in the flow direction of the lymph vessels.¹⁶ The subject was in the supine position with knees bent. The MLDT started with abdominal lymph drainage. Afterward, central lymph stimulation was performed; and neck and head manual lymph drainage was applied consecutively. Later, by stimulating bilateral axillar lymph nodes, manual lymph drainage was applied to both the anterior and posterior sides of the trunk. Bilateral inguinal and cervical lymph nodes were also treated. The treatment session lasted approximately 45 minutes. After MLDT, a moisturizing cream was

Table 1. Demographics of the sample (mean ± SD)

	MLDT group (n = 25)	CTM group (n = 25)	P
Age (y)	38.84 ± 6.38	36.96 ± 8.88	.395
BMI (kg/m ²)	24.15 ± 2.64	22.37 ± 3.19	.038*
Education (y)	13.32 ± 3.80	14.96 ± 3.61	.155

BMI indicates body mass index.

* $P < .05$.

applied to decrease the tension of the skin. The MLDT was applied daily (Monday-Friday) for 3 weeks.

Treatment Procedure for CTM

In the CTM group, the treatment procedure focused on 5 different regions that were especially painful. The treatment started in (a) the lumbosacral area (basic section) and progressed to (b) the lower thoracic area, (c) the scapular area, (d) the interscapular area, and (e) the cervicooccipital area,²³ performed by a trained physiotherapist (first author), according to the vascular response of the connective tissue. It lasted 5 to 20 minutes depending on the treated area. Connective tissue massage was also applied to the back of the subject daily, 5 times a week (Monday-Friday), for 3 weeks. During the treatment, the subject was sitting erect, with 90° flexion of the hips, knees, and ankles. The thighs and feet were fully supported. A pillow was placed on the subject's lap for forearm support. The back was unclothed and straight for optimal tension of the connective tissue. For creating traction between the cutaneous tissues, the middle fingers of both hands were used.²⁶

We investigated in this randomized trial firstly whether symptoms disappeared after applying the MLDT or CTM; secondly, we compared the effects of MLDT and CTM in women with PFM.

Measures

All patients underwent an assessment for a diagnosis by a psychiatrist. At the first appointment, they were evaluated in terms of pain intensity and pain pressure threshold (PPT) using a VAS and algometry, respectively. On the same day, they completed the demographic data sheet and the self-report questionnaires, including the Nottingham Health Profile (NHP) and the Fibromyalgia Impact Questionnaire (FIQ). The same researcher (fourth author) repeated the questioning and measurements after the treatment without knowledge of the patient group. The demographics of the sample are shown in Table 1.

Primary Outcome Measures

Pain Intensity. The VAS was used to measure the mean pain intensity over the previous 3 days (average of rest and activity). The 10-cm scale was marked with "0" (no pain) and "10" (worst imaginable pain), and the patients were instructed on how to use the scale.²⁷

Secondary Outcome Measures

The PPT. The PPT was determined with a hand-held algometry (J Tech, Salt Lake City, Utah) mounted with a 1-cm² probe and calibrated in kilopascals. The reproducibility of pressure algometry to evaluate deep somatic tissue sensitivity has been demonstrated previously.²⁸ To assess the PPT, the probe was held perpendicular to the skin of the upper part of musculus trapezius bilaterally, which is one of the tender points used for diagnosis in FM.^{2,29} The pressure was applied at a constant rate of 30 kPa/s. The PPT was defined as the pressure when the perceived sensation changed from pressure to pain. The PPT measurements were conducted 3 times, and the mean of the measurements was calculated.³⁰

Health-Related Quality of Life

The NHP is a widely used generic tool to measure HRQoL. It contains 38 items divided into 6 dimensions: NHP-energy, NHP-pain, NHP-emotional reactions, NHP-sleep, NHP-social isolation, and NHP-physical mobility. All the parameters are summed as NHP-total. The respondent answers "yes" if the statement adequately reflects the current status or feeling, or "no" otherwise.³¹ Dimension scores range from 0 (no problems) to 100 (maximum problems). The Turkish version was administered, and it has been shown to be valid and cross-culturally equivalent to the original.³²

Health Status

Health status was assessed using the Turkish version of the FIQ.³³ The FIQ is a brief 10-item self-administered instrument developed for persons with FM.³⁴ In the revised version of the FIQ,³⁵ the first item focuses on the patient's ability to carry out muscular activities. In the next 2 items, patients are asked to circle the number of days in the past week that they felt good and how often they missed work. Finally, the last 7 questions (job ability, pain, fatigue, morning tiredness, stiffness, anxiety, and depression) are measured by VAS. The FIQ score ranges from 0 to 100, and a higher value indicates a higher impact of the disorder.^{34,35}

The selection of the treatment procedure for the first participant was determined by a closed envelop including a letter. Firstly, there were 2 letters including different treatment approaches: MLDT or CTM. The researcher (third author) chose a letter that included instructions, one of the treatment procedures and the name of the treatment provider. For the first selection, the third researcher did not know which treatment was selected by the participant. She then wanted the participant to read her therapy group. After this, women who met the entry criteria were randomly assigned in a 1:1 ratio to 1 of 2 treatment groups: MLDT or CTM, respectively. They were also given a letter; but this time, the third researcher had knowledge about the content of the letters. However, the other researchers (first, second, and

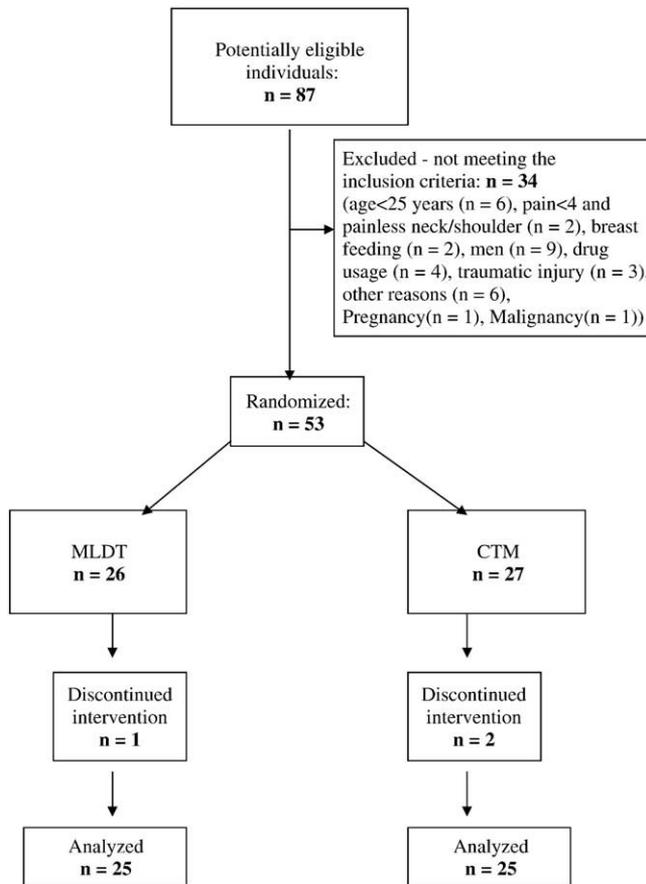


Fig 1. Study flowchart.

fourth) did not have any information. Thus, both the other researchers and the subjects were blinded during the selection of intervention group.

Statistics

Statistical analyses were done using the Statistical Package for the Social Sciences version 11.5 (SPSS Inc, Chicago, Ill), including descriptive statistics. Data are presented as mean (\pm SD) in the text. The Wilcoxon rank test was used to analyze the data obtained before and after the treatments for each group. The outcomes were compared using the Mann-Whitney *U* test to detect significant differences between the groups. The level of statistical significance was set at .05.

RESULTS

The sample was derived from a population of 87 PFM outpatients. Finally, 50 outpatients participated in the current study prospectively (Fig 1).

According to the baseline data of the groups, statistically significant differences were found only in body mass index (Table 1) and 2 subitems of FIQ (Table 2). Whereas the score

for FIQ-2 (feel good) ($P = .036$) was higher, the score for FIQ-9 (anxiety) ($P = .019$) was lower in the MLDT group than in the CTM group (Table 2). Except for these items above, before the treatment, no significance was found between the groups ($P > .05$).

Both treatment methods led to significant and progressive improvements based on NHP (Table 3), VAS (Table 4), PPT (Table 4), and FIQ-total (Table 2) at the end of the treatment program. In the CTM group, no differences were found between baseline and end of treatment data for FIQ-1 (physical impairment) and FIQ-3 (work missed) ($P > .05$) (Table 2). The MLDT group showed more improvements; and statistical significances were found in FIQ-7 (rested) ($P = .006$), FIQ-9 (anxiety) ($P = .060$), and FIQ-total ($P = .010$) vs the CTM group (Table 2).

DISCUSSION

The present study was performed to assess and compare the effects of MLDT and CTM in a sample of PFM patients. The results demonstrate that MLDT and CTM might be effective in improving several key problems of PFM, including pain intensity, PPT, health status, and HRQoL. This study is important because it is the first to compare MLDT and CTM in women with PFM. In addition, the effectiveness and the usefulness of these manual therapy approaches are shown herein. These techniques, especially MLDT, are not commonly used in the treatment of FM, a prevalent chronic pain disease. Because FM is a female predominant syndrome,² our sample included only sedentary female patients. Neither MLDT nor CTM requires active participation.

Asplund¹⁶ used MLDT by the Vodder method in FM treatment. Improvements were determined regarding pain, stiffness, sleep problems, and well-being. The preliminary results of the same study also indicated that MLDT can be a valuable alternative approach for patients with FM. Similarly, the results of the MLDT group in our study showed that this technique may be used to improve pain, health status, and HRQoL in women with PFM.

In 1991, Goats and Keir²² determined that CTM increases blood flow and gives pain relief. Furthermore, McKechnie et al³⁶ showed that CTM reduces tension and anxiety. Similarly, Brattberg²³ stated that CTM gave pain relief, decreased depression, and increased quality of life in patients with FM. In the same study, it was also reported that the analgesic effect appeared gradually with the first 15 treatments. Connective tissue massage has positive effects on autonomic responses.^{10,19,21,22} It has been suggested that abnormalities in the autonomic nervous system may play an important role in the pathogenesis of FM.⁵ Pain in FM is consistently felt in the musculature and is related to sensitization of central nervous system pain pathways.³⁷ Connective tissue massage is thought to be an effective

Table 2. *Fibromyalgia Impact Questionnaire scores of groups (mean ± SD)*

FIQ	MLDT group baseline value (n = 25)	CTM group baseline value (n = 25)	P	MLDT group end of treatment (n = 25)	CTM group end of treatment (n = 25)	P
FIQ-1 physical impairment	2.22 ± 1.06	2.57 ± 1.82	.580	1.19 ± 0.58 [†]	1.92 ± 1.51 [§]	.094
FIQ-2 days felt good	5.89 ± 2.41	4.23 ± 2.75	.036*	2.40 ± 1.28 [†]	2.86 ± 1.97 [‡]	.417
FIQ-3 work missed	0.80 ± 1.49	0.68 ± 1.54	.654	0.34 ± 0.74 [†]	0.31 ± 1.05 [§]	.346
FIQ-4 work impairment	5.84 ± 2.96	6.14 ± 2.50	.740	2.20 ± 1.48 [†]	2.46 ± 2.25 [‡]	.852
FIQ-5 pain	7.36 ± 1.80	6.36 ± 2.54	.156	2.10 ± 1.49 [†]	3.00 ± 2.21 [‡]	.235
FIQ-6 fatigue	6.38 ± 2.43	6.48 ± 2.74	.922	2.76 ± 1.41 [†]	3.82 ± 2.47 [‡]	.227
FIQ-7 morning tiredness	6.18 ± 2.39	6.46 ± 2.78	.558	2.36 ± 1.51 [†]	4.28 ± 2.67 [‡]	.006*
FIQ-8 stiffness	5.26 ± 2.28	5.70 ± 3.21	.459	2.38 ± 1.75 [†]	3.46 ± 2.67 [‡]	.170
FIQ-9 anxiety	4.14 ± 2.84	6.14 ± 2.73	.019*	1.62 ± 1.34 [†]	3.66 ± 2.79 [‡]	.006*
FIQ-10 depression	3.44 ± 2.48	5.00 ± 2.97	.050	1.52 ± 1.31 [†]	2.86 ± 2.36 [‡]	.054
FIQ-total	47.81 ± 15.59	49.51 ± 20.99	.961	18.88 ± 8.30 [†]	28.55 ± 13.46 [‡]	.010*

* P < .05.

[†] P < .05, the difference between before and after the treatment in MLDT group.

[‡] P < .05, the difference between before and after the treatment in CTM group.

[§] P > .05, the difference between before and after the treatment in CTM group.

Table 3. *Nottingham Health Profile scores of groups (mean ± SD)*

NHP	MLDT group baseline value (n = 25)	CTM group baseline value (n = 25)	P	MLDT group end of treatment (n = 25)	CTM group end of treatment (n = 25)	P
Energy	54.49 ± 27.31	51.04 ± 31.39	.777	18.72 ± 19.73 [†]	27.26 ± 33.63 [‡]	.531
Pain	53.68 ± 28.14	53.37 ± 28.43	.869	9.66 ± 9.52 [†]	17.10 ± 13.84 [‡]	.057
Emotional reactions	24.10 ± 23.98	35.19 ± 32.85	.334	7.28 ± 9.75 [†]	11.93 ± 15.42 [‡]	.366
Social isolation	7.37 ± 12.83	14.07 ± 24.53	.432	3.20 ± 7.56 [†]	3.34 ± 9.68 [‡]	.784
Sleep	35.89 ± 29.82	27.72 ± 30.72	.278	4.44 ± 8.66 [†]	4.38 ± 8.26 [‡]	.869
Physical mobility	22.20 ± 13.81	18.71 ± 16.21	.403	9.39 ± 10.61 [†]	12.86 ± 13.18 [‡]	.315
NHP-total	198.95 ± 96.63	201.22 ± 129.16	.977	52.93 ± 31.61 [†]	76.89 ± 63.21 [‡]	.383

* P < .05.

[†] P < .05, the difference between before and after the treatment in MLDT group.

[‡] P < .05, the difference between before and after the treatment in CTM group.

Table 4. *Pain intensity (VAS) and PPT scores of groups (mean ± SD)*

	MLDT group baseline value (n = 25)	CTM group baseline value (n = 25)	P	MLDT group end of treatment (n = 25)	CTM group end of treatment (n = 25)	P
VAS (0-10 cm)	6.98 ± 1.91	6.52 ± 2.29	.466	1.49 ± 1.19*	2.59 ± 2.05 [†]	.071
R.PPT (kg/cm ²)	1.68 ± 0.57	1.64 ± 0.56	.961	2.82 ± 0.72*	2.41 ± 0.74 [†]	.066
L.PPT (kg/cm ²)	1.66 ± 0.47	1.91 ± 0.94	.391	2.95 ± 0.78*	2.66 ± 1.04 [†]	.137

R.PPT indicates right side; L.PPT, left side.

* P < .05, the difference between before and after the treatment in MLDT group.

[†] P < .05, the difference between before and after the treatment in CTM group.

method because it produces general body relaxation, reduces muscle spasm and connective tissue tenderness, and increases plasma β -endorphins.¹⁰

In this study, according to the data obtained from the CTM group, decreased pain intensity, increased PPT, and improved health status and HRQoL were in agreement with the literature.^{10,23}

The pain in FM is commonly perceived as arising from the muscles; and there are typically 1 or 2 locations that are the major pain foci, although sites of pain often shift and fluctuate in intensity over days and weeks. Most FM patients report pain and stiffness in the neck-shoulder muscles; and most develop FM from localized or regional muscle pain conditions, such as trapezius myalgia.^{38,39} Fibromyalgia

patients exhibit lower thresholds for mechanical pain (allodynia) and show exaggerated pain response to noxious stimuli (hyperalgesia).⁴⁰ In addition to this information from the literature, our experiences also show that the neck-shoulder region was stiff and painful in FM patients. Because these areas are highly painful, the trapezius muscle was chosen bilaterally for PPT testing in this study. Consequently, in both groups, after the treatment, the PPT scores were increased significantly. These were valuable data for choosing and planning treatment approaches.

In both groups, the baseline mean scores on the subscales of the HRQoL using NHP indicated that participants reported greater improvements in terms of energy, pain, emotional reactions, sleep disturbances, social isolation, and

physical mobility than the scores obtained at the end of the treatment.

As is the case with other rheumatologic diseases, FM patients may be further scored in terms of disease impact by the FIQ.³³ In support of previous findings, negative affect was significantly predictive of poorer health status; and positive affect was significantly associated with better health status in FM.⁴¹ This work emphasized that health status as determined by FIQ was significantly improved in both groups. However, in the MLDT group, the patients felt more rested when they got up in the morning, less tense, and less nervous/anxious than the CTM group. In addition, the baseline score for FIQ-9 (anxiety) was higher in the CTM group than in the MLDT group.

Both CTM and MLDT had a calming effect on the patients due to the soothing effect of hands-on therapy and the social interaction with a therapist for 20 to 45 minutes on a daily basis. In addition, the MLDT treatment sessions lasted about 45 minutes; and the CTM treatment sessions only lasted about 5 to 20 minutes as described in the "Methods" section. When substantially different amounts of time and attention are given to patients during MLDT and CTM, patients may be expected to respond differently. This may be a potential confounding variable in the statistical analysis and should be taken into consideration. The source of these differences may also be the use of different pressure applications in CTM and MLDT. Whereas MLDT is applied by light massage, traction of connective tissue is necessary for the reflex response in CTM. In addition, touching the skin in itself has positive effects by decreasing stress hormones and muscle tension, and increasing PPT.²³ Manual lymph drainage therapy light massage may be preferred by physiotherapists for improving the symptoms in terms of feeling rested and emotional problems in PFM.

CONCLUSION

Manual lymph drainage therapy and CTM might be helpful in terms of reducing pain intensity, increasing PPT, supporting the HRQoL, and improving the health status in patients with PFM. However, it is not clear which approach is more beneficial for PFM. Both methods used in this trial seemed to be useful, although a placebo effect cannot be ruled out. When selecting a physiotherapy program for patients with PFM, we can harmonize the approaches according to the patients' needs for obtaining the optimal outcome. In this sample of patients, MLDT had a greater effect on health status than CTM based on FIQ. Therefore, MLDT using light massage may be preferred by physiotherapists. It can be concluded that the MLDT and CTM may be safe and valuable treatment methods for symptom relief in patients with this syndrome. They are both efficient in reducing pain and increasing PPT, thus enhancing patients' quality of life. In light of these findings, these methods are thought to be

worthy of investigation in further studies including larger number of groups, men, and long-term follow-up results.

Practical Applications

- Manual lymph drainage therapy might be used in the treatment of PFM.
- Connective tissue massage and MLDT may affect the HRQoL positively in PFM patients.

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