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Comparison of the effectiveness of connective tissue massage and myofascial release technique in young adult women with primary dysmenorrhea

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Ethics Committee Approval
This study was approved by Istanbul Aydın University Clinical Research Ethics Committee (Date: 19.09.2019, Decision Number 2019/157).
The authors stated that the written consent was obtained from the patient presented with images in the study.
All procedures in this study involving human participants were performed in accordance with the 1964 Helsinki Declaration and its later amendments.

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No conflict of interest was declared by the authors.

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Abstract

Background/Aim: Dysmenorrhea can restrict daily living activities and the overall productivity of women, thereby negatively affecting quality of life and causing absenteeism in students and loss of workdays in working women. Medical treatment is frequently used in clinics, but alternative approaches are needed when currently available treatment options are not effective. The aim of this study is to investigate and compare the acute effects of two manipulative methods, connective tissue massage (CTM) and myofascial release technique (MRT), on menstrual pain, fatigue, pain threshold, and menstrual symptoms in young adult women with primary dysmenorrhea (PD).

Methods: Forty young adults diagnosed with PD and scoring ≥4 in menstrual pain intensity according to the Visual Analog Scale (VAS) were included in the study. Menstrual pain and fatigue severity was evaluated by using VAS, pain threshold by algometer device from six unique points, and menstrual symptom severity using the Menstrual Symptom Questionnaire. Participants were randomly divided into two groups and evaluated in their first menstrual cycles. In Group 1, 10 sessions of CTM were applied between the first and second menstrual cycles, and in Group 2, a single session of MRT was applied on the most painful day of the second menstrual cycle. After the application, all participants were re-evaluated on the most painful day of their second menstrual cycles.

Results: No statistically significant difference was found between the groups in terms of age, BMI, menarche age, menstrual cycle, and menstrual bleeding duration. In both groups, a significant decrease was found in pain, fatigue, and menstrual symptom severity, and a significant increase was found in pain threshold (P=0.001). MRT was found to be more effective at improving the pain threshold at all points except the first point (1st point P=0.098, 2nd point P=0.034, 3rd point P=0.037, 4th point P=0.041, 5th point P=0.009, 6th point P=0.001).

Conclusion: It was found that CTM and MRT were effective at improving pain, fatigue, pain threshold, and menstrual symptoms in PD, and MRT was found to be more effective at increasing pain thresholds compared to CTM.

Keywords: primary dysmenorrhea, connective tissue massage, myofascial release, menstrual pain

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Introduction

Dysmenorrhea, which is a physiological event, is one of the most common and important problems experienced during menstruation [1]. It can restrict daily living activities and the overall productivity of women, thereby negatively affecting quality of life and leading to absenteeism in students and loss of workdays in working women [2]. While the rate of dysmenorrhea worldwide is 45–95%, studies conducted in Turkey in recent years reported a rate approximating 60% [3,4].

Primary dysmenorrhea (PD) is a painful condition without an underlying pelvic pathology that begins just before or during menstruation, lasts 12–72 hours, and progresses as cramps in the lower abdomen [2].

PD is mostly seen in young adult women and begins 1–2 years after menarche [5]. The main symptom of pain may accompanied by headache, dizziness, sweating, nausea, palpitations, fatigue, emotional disorders, and gastrointestinal disturbances such as vomiting and diarrhea [6].

The main purpose in dysmenorrhea treatment is to relieve pain by affecting physiological mechanisms or alleviating symptoms [2]. Three approaches are used to treat dysmenorrhea: medical, surgical, and conservative. Physiotherapy methods used in dysmenorrhea treatment include local heat agents, electrical stimulations (e.g., transcutaneous electrical nerve stimulation [TENS]), interferential current), massage, exercise, manipulative therapy, and connective tissue massage (CTM) [2,7].

Generating cutaneous stimulation CTM stimulates the skin and then the mechanical receptors in the connective tissue. The resulting stimulus reaches the radix posterior of the spinal cord via afferent nerves, where it stimulates the release of opioids; thus, pain carried by small-diameter fibers is inhibited [8, 9]. Studies indicate that menstrual pain decreases as a result of CTM [7,10].

Myofascial release technique (MRT) is a technique that focuses on the myofascial complex, and its main purposes are inhibition of pain and improvement of function [11]. MRT is thought to reduce stress in pain-sensitive structures by restoring fascial mobilization. One study found that MRT has positive effects on pain in PD [12].

Based on data from the literature, alternative and more effective, conservative treatment approaches for PD could be implemented. Therefore, the aim of this study is to investigate acute effects of CTM and MRT on menstrual pain, fatigue, pain threshold, and menstrual symptoms in women with PD and to determine which technique is superior.

Materials and methods

Participants

This study was conducted between September 2019 and January 2020 on women who were studying at Istanbul Gelisim University Health Services Vocational School. Comprehensive information was given to all participants about the purpose and duration of the study, assessment tools, and interventions, and written consent was obtained from all participants.

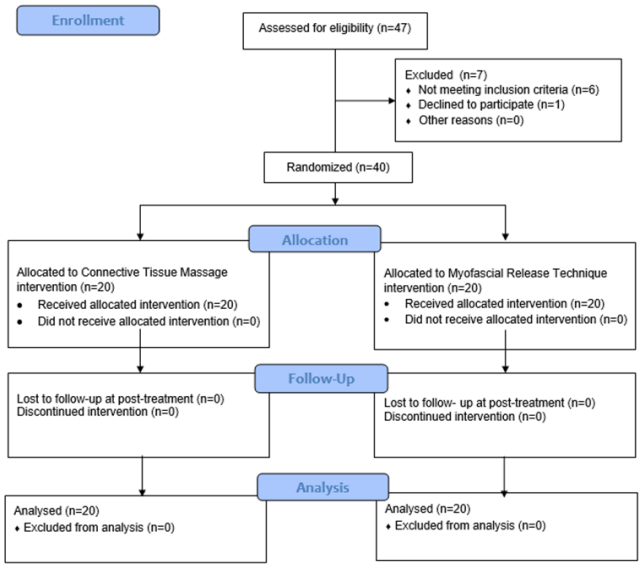
Istanbul Aydın University Clinical Research Ethics Committee approved this study (decision no. 2019/157, taken on Sept. 19, 2019).

Individuals who were ≥18 years, were diagnosed with PD by a gynecologist, had regular menstruation in the last 6 months, had menstrual pain between 40–100 mm according to the VAS, and volunteered to participate in the study were included.

Individuals who have secondary dysmenorrhea, who have an irregular menstrual cycle, who have a menstrual cycle duration <21 days or >35 days, who have a previous birth or pregnancy history, who are pregnant, who are using intrauterine or oral contraceptives, anti-inflammatory, analgesic, and psychotherapeutic medication, who have pelvic pathology or pelvic surgery history, and who have any neurological or systemic disease were excluded from the study.

When we compared the VAS values before and after the treatment in terms of primary outcome measurement, it was calculated that at least eight cases should be included in each sample group in order to find a significant difference between the measurements. Calculations were made using the G*Power v. 3.1.9.4 software program, considering type I error α=0.05 and 95% power value (1-β)= 0.95 [13,14]. Considering possible data loss, 20 female participants were included for each group. Individuals who met the inclusion criteria were randomly divided into two groups, CTM (n=20) or MRT (n=20), using the Research Randomizer website (Randomizer.org, 2019) (Figure 1).

Figure 1: Flow diagram



Assessment tools

Sociodemographic assessment

An evaluation form was completed for all individuals, containing information such as age; weight; height; smoking, alcohol, and exercise habits; age of menarche; duration, type, and intensity of menstruation; medications used for menstrual pain; amount of medication used for menstrual pain; other pain coping methods for menstrual pain; family history of dysmenorrhea; presence of systemic disease; and a history of surgery.

Pain and fatigue assessment

The VAS was used to measure pain intensity. Individuals were asked to mark the degree of pain they felt during evaluation on a 100-mm line. One end represents 0 (no pain), and the other end represents 10 (unbearable pain). Then, the point that was marked was measured with a ruler, and the

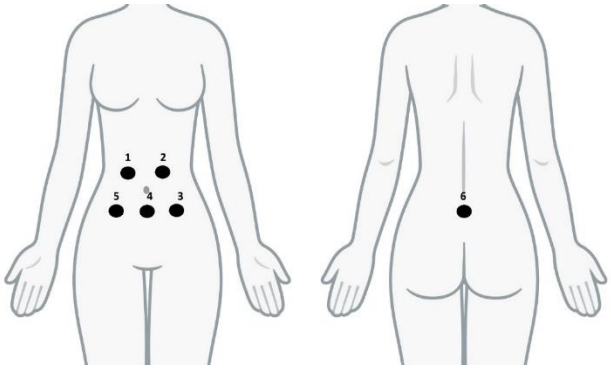
numerical value of pain intensity was recorded [15]. VAS was also used to assess severity of fatigue.

Pain threshold assessment

For pain threshold assessment, deep tissue hyperalgesia was measured using a Baseline® pressure algometer (Fabrication Enterprises Inc., New York, NY). Measurement was performed using a 1-cm^2 pressure probe, by holding the algometer perpendicular to the measurement point [16].

Measurements were made from six different points, 4 cm to right and left of the umbilicus (point 1 and 2), 4 cm below these two points (point 3 and 5), 4 cm below the umbilicus (point 4), and the middle of S2–S4 vertebrae spinous processes (point 6) (Figure 2). Two measurements were taken from each point, and we waited 30 seconds between both measurements. In cases where measurements were inconclusive, a third measurement was taken from same point [16]. Then, the average of these measurements was calculated and recorded as lbs/cm^2. The assessment was performed by gradually increasing the intensity of pressure, and individuals were told to state the moment when pressure caused pain, using the verbal indicator "okay".

Figure 2: Pain threshold measurement points



Menstrual symptom assessment

To evaluate menstrual symptoms, the Menstrual Symptom Scale was used, which was developed by Chesney and Tatso and whose Turkish validity study was conducted by Güvenç et al.. An increase in the total score of the scale indicates an increase in the severity of menstrual symptoms [17,18].

Interventions

Connective tissue massage

CTM was applied to pelvic areas, including the sacral, lumbar, lower thoracic, and anterior pelvic regions. Application was started on the 14th day, following ovulation, and 5 sessions/week were performed, totalling 10 sessions, until the next menstrual cycle. During manipulation, both long (Figure 3a, points 2, 4, 6, 9, and 10; Figure 3b, all points) and short strokes (Figure 3a, points 1, 3, 5, 7, and 8) were used. Each stroke was applied three times on the right side and then three times on the left side. Each session was concluded with long strokes on bilateral iliac crests and subcostal regions.

Treatment of sacral, lumbar, and lower thoracic regions was performed in upright sitting position. Treatment of the anterior pelvic region was performed in the supine position. The total session was completed in approximately 10 minutes [19].

Figure 3a: Direction of strokes in sacral, lumbar and lower thoracic regions (only one side shown)

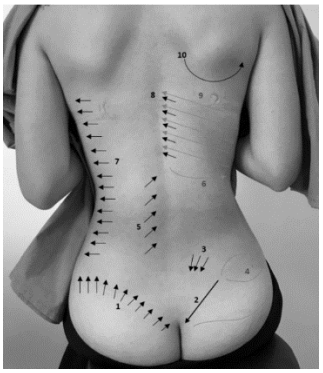
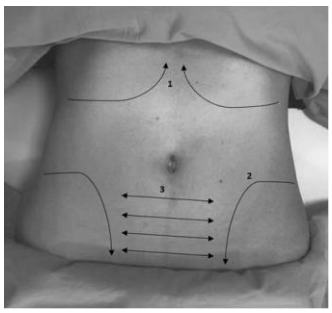


Figure 3b: Direction of strokes in anterior pelvic region



Myofascial release technique

During application, fingers or hands were first placed on treatment area. Pressure was applied to soft tissue until a restricted layer was felt. Then, the fascia was moved along the substrate surface while maintaining contact with substrates. Tension was applied for approximately 60–90 seconds, until relaxation was felt [20].

Individuals were placed in a supine position for antero-lateral (fascia superficialis, fascia transversalis, fascia extraperitonealis) abdominal wall (Figure 4a), then in a prone position for posterior (fascia thoracolumbalis, erector spine) abdominal wall (Figure 4b) [12].

Figure 4a: Antero-lateral abdominal wall relaxation

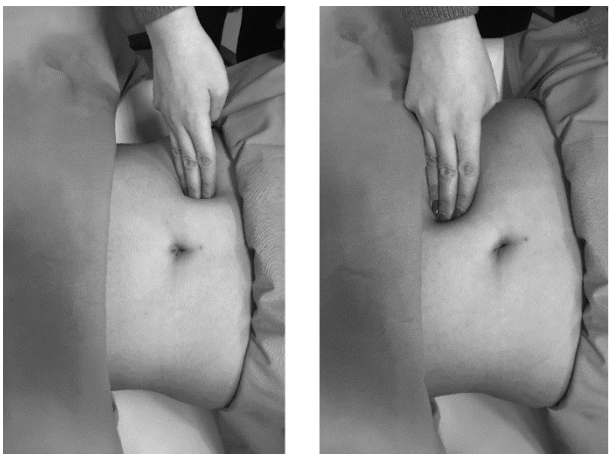
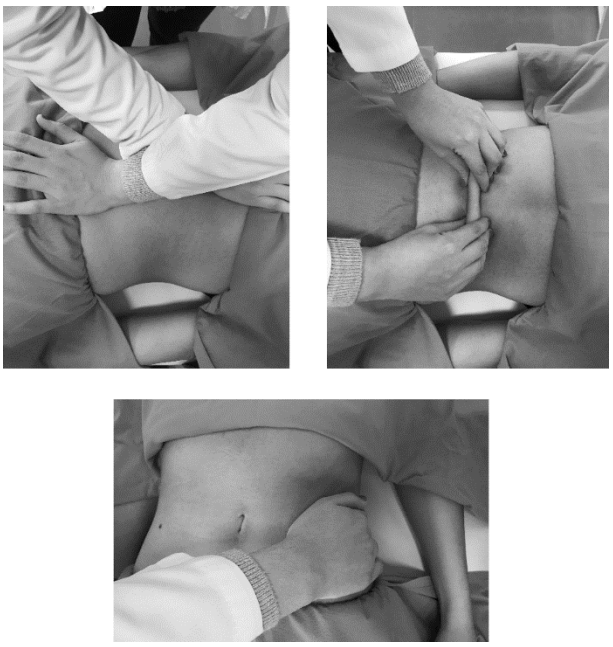


Figure 4b: Posterior abdominal wall relaxation



Statistical analysis

For statistical analysis of data, the software program SPSS v. 24.0 (IBM, Armonk, NY) was used. The Shapiro–Wilk test for normality was used to determine the conformity of data to a normal distribution. If there was a normal distribution in data before and after treatment within-group, the paired samples *t*-test was used; if the data were not normally distributed, the non-parametric Wilcoxon test was used. In intergroup evaluation, if data were suitable for normal distribution independent samples *t*-test was used; if not, the non-parametric Mann–Whitney *U* test was used. The chi-squared test was used to analyze relationship between categorical variables. For statistical significance, data were interpreted at the $P<0.05$ level.

Results

In our study, a total of 40 individuals—20 in the CTM group and 20 in the MRT group—were examined. All participants were evaluated on the most painful day of their first menstrual cycle. Group 1 received 10 sessions of CTM 5 days/week following ovulation (14th day) between the first and second menstrual cycles. Group 2 received one session of MRT on the most painful day of the second menstrual cycle. Following the end of treatments, on the most painful day of the second menstrual cycle, evaluations were re-applied to all participants as outcome measures implied.

The mean age of individuals was 21.70 (2.71) years in the CTM group and 20.75 (2.02) years in the MRT group. The mean BMI of the CTM group was 22.56 (3.15) kg/m^2 and of the MRT group was 21.53 (3.77) kg/m^2. Individuals in the CTM and MRT groups were found to be similar in terms of age ($P=0.31$) and BMI ($P=0.291$). In the CTM group, the mean menarche age of patients was 12.80 (1.36) years and 12.95 (1.60) years in the MRT group. When age of menarche ($P=0.868$), duration of menstrual cycle ($P=0.483$), and menstruation cycle length ($P=0.532$) were examined, both groups had similar values and were within normal limits (Table 1).

Table 1: Sociodemographic characteristics of the groups

	CTM (n=20) Mean (SD)	MRT (n=20) Mean (SD)	z	*P*-value
Age	21.70 (2.71)	20.75 (2.02)	-1.016	0.310
BMI (kg/m^2)	22.56 (3.15)	21.53 (3.77)	-1.055	0.291
Menarche age (years)	12.80 (1.36)	12.95 (1.60)	-0.166	0.868
Cycle length (days)	28.15 (1.63)	28.45 (2.08)	-0.702	0.483
Menstruation length (days)	5.45 (1.53)	5.75 (1.77)	-0.625	0.532

P<0.05: Statistically Significant Difference, Mean: Arithmetic Average, SD: Standard Deviation, z: Mann Whitney U Test Value

There was no difference between groups in terms of pain ($P=0.561$), fatigue ($P=0.394$), and menstrual symptom severity ($P=0.168$) before treatment. However, there was a significant difference in terms of pain intensity (CTM, $P=0.001$; MRT, $P=0.001$), fatigue intensity (CTM, $P=0.001$; MRT, $P=0.004$), and menstrual symptom severity (CTM, $P=0.007$; MRT, $P=0.001$) values in both the CTM and MRT groups after treatment. There was no difference between groups in terms of pain ($P=0.342$), fatigue ($P=0.824$), and menstrual symptom severity ($P=0.148$) after treatment (Table 2).

Table 2: Comparison of pain, fatigue and menstrual symptom severity values of groups before and after treatment

		CTM (n=20) Mean (SD)	MRT (n=20) Mean (SD)	t	*P*-value
Pain intensity (cm)	BT	7.20 (1.43)	6.92 (1.58)	0.586	0.561[a]
	AT	3.94 (2.32)	2.90 (2.21)	-0.962	0.342[a]
	P	0.001[b]	0.001[b]		
	t	5.644	7.476		
Fatigue intensity (cm)	BT	6.79 (1.85)	6.27 (1.96)	0.862	0.394[a]
	AT	4.21 (2.71)	3.90 (2.76)	0.224	0.824[a]
	P	0.001[b]	0.004[b]		
	t	4.305	3.284		
Menstrual symptom severity	BT	76.90 (14.40)	83.10 (13.47)	-1.406	0.168[a]
	AT	64.45 (12.93)	77.10 (14.45)	1.478	0.148[a]
	P	0.007[b]	0.001[b]		
	t	3.025	4.140		

P<0.05: Statistically Significant Difference, Mean: Arithmetic Average, SD: Standard Deviation, BT: Before Treatment, AT: After Treatment, a: Independent Samples T Test, b: Paired Samples T Test, t: Test Value

Before treatment, there was no difference in pain threshold values between groups (1st point $P=0.265$, 2nd point $P=0.166$, 3rd point $P=0.178$, 4th point $P=0.184$, 5th point $P=0.272$, 6th point $P=0.559$). After treatment, at all points in both groups, a significant increase was observed in pain threshold, and MRT was superior to CTM at all points except point 1 (1st point $P=0.098$, 2nd point $P=0.034$, 3rd point $P=0.037$, 4th point $P=0.041$, 5th point $P=0.009$, 6th point $P=0.001$; Table 3).

Table 3: Comparison of groups' pain threshold values before and after treatment

			CTM (n=20) Mean (SD)	MRT (n=20) Mean (SD)	t/z	*P*-value
Pain threshold (lbs/cm^2)	Point 1	BT	2.47 (1.40)	2.95 (1.41)	z=-1.115	0.265[c]
		AT	4.75 (1.13)	6.29 (1.69)	z=-1.654	0.098[c]
		P	0.001[a]	0.001[a]		
		Z	z=-3.847	z=-3.925		
	Point 2	BT	2.39 (1.50)	2.93 (1.13)	z=-1.386	0.166[c]
		AT	4.84 (1.41)	6.58 (1.31)	z=-2.125	0.034[c]
		P	0.001[a]	0.001[a]		
		Z	z=-3.826	z=-3.922		
	Point 3	BT	1.81 (1.43)	2.43 (1.54)	z=-1.346	0.178[c]
		AT	4.30 (1.42)	6.00 (1.33)	z=-2.089	0.037[c]
		P	0.001[a]	0.001[a]		
		z	z=-3.935	z=-3.923		
	Point 4	BT	1.83 (1.42)	2.38 (1.31)	z=-1.328	0.184[c]
		AT	4.16 (1.04)	5.81 (1.29)	z=-2.046	0.041[c]
		P	0.001[a]	0.001[a]		
		z	z=-3.811	z=-3.826		
	Point 5	BT	2.00 (1.73)	2.53 (1.19)	t=-1.114	0.272[d]
		AT	4.40 (1.06)	6.33 (1.48)	t=-2.748	0.009[d]
		P	0.001[b]	0.001[b]		
		t	t=-6.490	t=-10.709		
	Point 6	BT	5.27 (2.73)	5.71 (1.87)	t=-0.590	0.559[d]
		AT	8.58 (2.82)	11.35 (2.53)	t=-3.906	0.001[d]
		P	0.001[b]	0.001[b]		
		t	t=-8.316	t=-12.700		

P<0.05: Statistically Significant Difference, Mean: Arithmetic Average, SD: Standard Deviation, BT: Before Treatment, AT: After Treatment, a: Wilcoxon Test, b: Paired Samples T Test, c: Mann Whitney U Test, d: Independent Samples T Test, t: Paired Samples T Test and Independent Samples T Test Value, z: Wilcoxon and Mann Whitney U Test Value

Discussion

The effectiveness of CTM and MRT treatments on pain, fatigue, pain threshold, and menstrual symptoms in PD were examined. It was found that CTM and MRT treatments decreased menstrual symptoms, menstrual pain, and fatigue and increased pain thresholds. When two treatment methods were compared, it was determined that MRT was superior at increasing pain thresholds.

CTM can create presynaptic and postsynaptic inhibition and close the "pain gate" by stimulating cutaneous–visceral reflexes through mechanoreceptors in skin and the autonomic nervous system as a result of stretching force [21]. Also, CMT provides an increase in endogenous opioid release [22], and CTM creates vasodilation as a result of local mechanical effect, and then increases parasympathetic activity [23]. Therefore, our

study shows that CTM is an effective method for pain relief in PD treatment.

Increased prostaglandin levels in PD lead to an increase in intrauterine pressure, which leads to a decrease in uterine blood flow and to ischemia. This ischemia also results in pain [24]. The increase in venous blood flow provided by MRT may lead to a reduction in pain by eliminating ischemia. In addition, some studies implied that activation of the sympathetic nervous system and cortisol levels decrease with MRT [25]. In our study, a decrease in abnormal sympathetic activity may be an explanation for reduced pain. In addition, pressure applied with MRT releases endorphins and other inhibitory neurotransmitter substances [26]. This may also be effective at reducing PD pain.

CTM has positive effects on fatigue, including effects such as general body relaxation, reduction of muscle spasm, increase of plasma β-endorphins, and vascularization [21]. In addition, the beneficial effects of touch and massage on different systems, especially sympathetic nervous system activity, hypothalamic–pituitary–adrenocortical activity, and stress hormones reducing effects play a role in the reduction of fatigue [27]. In our study, we believe that the reasons for the decrease found in fatigue with CTM are relaxation of body, increase in vascularization and β-endorphins, decrease in excessive sympathetic activity, and the presence/increase in stress hormones.

It is known that MRT increases energy and relieves physical tension [20]. No studies in the literature were found examining the effect of MRT on fatigue in women with PD; our study is the first such study.

Our study found a significant improvement in fatigue level of individuals with MRT, which we believe is due to positive effects of touch obtained with massage-like applications and with relaxation effect provided by MRT.

In a study with 88 dysmenorrhea patients, effects of thermotherapy and TENS were examined, revealing that pain threshold increased in application groups in abdominal region and increased in each group, including the placebo group, in the lumbar region [16]. Our study found a significant increase in pain threshold values after application at all points in both groups. The reasons for this increase may be decrease of individuals' pain perception, decrease in sensitivity of cutano-visceral regions according to gate-control theory, and decrease in sympathetic activity. In addition, when we compared groups after treatment, it was seen that MGT was more effective in increasing pain threshold at all points except point 1. The reason for this result may be that MGT can reduce sensitivity by relaxing fascia and contribute to increased myometrial blood flow. Our results support the literature and corroborate the idea that reducing pain leads to an increase in pain threshold by decreasing sensitivity.

Demirtürk et al. [10] applied reflexology and CTM to students with PD, and they found that menstrual symptoms decreased significantly with both approaches, but no difference was found between approaches. In a study examining short-term effects of CTM, Özgül et al. [19] found a significant improvement in menstrual symptoms of individuals compared to controls. In our study, although there was a significant improvement in menstrual symptom severity in both groups, no significant difference was found between groups. We think that positive effects of both approaches on menstrual symptoms are due to reasons such as decreased pain and sensitivity, decreased sympathetic activity, increased dopamine and serotonin release, and increased vascularization.

Limitations

Since there was no control group in our study, the potential for a placebo effect from the applications could not be eliminated. Because the pre- and post-treatment evaluations of individuals were made on the most painful day of their menstrual cycles, difficulties were encountered in reaching individuals on these days. Also, it was not possible for both applications to be blinded. Although the sample size was calculated with G power using the sample article, our statistical analyses would yield more accurate results if a larger sample size is used.

Conclusion

Both treatment approaches—CTM and MRT—can be used in clinics as an alternative to medication to reduce severity of pain and fatigue, increase pain threshold, and alleviate menstrual symptoms. Also, these two techniques can be used in combination. Studies examining prostaglandin levels and changes in hormones can be planned in order to better understand the mechanism of action of treatment approaches. Studies that compare the effectiveness of CTM and MRT with different approaches (e.g., spinal manipulation, classical massage, relaxation exercises, reflexology, TENS, acupressure, local heat application, phytotherapy, vitamin-mineral supplements, physical activity) can be conducted in individuals with PD. Our study evaluated the short-term effects of CTM and MRT. Future studies are encouraged to use longer-term treatment programs. Placebo-controlled studies can be conducted with larger samples, involving individuals of different age groups.

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