

# Comparison of Connective Tissue Massage and Classic Massage in Women With Primary Dysmenorrhea: A Randomized Clinical Trial



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## ABSTRACT

**Objective:** The purpose of this study was to compare the short-term effects of connective tissue massage (CTM) and classic massage (CM) on pain, functional and emotional status, and menstrual complaints in women with primary dysmenorrhea (PD).

**Methods:** Women with PD were randomly assigned to 2 groups: CTM (n = 19) and CM (n = 19). CTM or CM was applied 5 days a week from the estimated date of ovulation to the onset of the next menstruation. The pain intensity with the Visual Analog Scale and functional and emotional status with the Functional and Emotional Dysmenorrhea Scale (FEDS) were assessed before and after the applications. Pain duration and the presence of menstrual complaints were recorded.

**Results:** In the postintervention period, both groups had decreased menstrual pain intensity and duration, drug use, and FEDS scores ( $P < .001$ ). Pain duration and FEDS-functional scores decreased more in the CTM group than in the CM group ( $P < .05$ ). Moreover, in the postintervention period, fewer women were nervous in the CM group, whereas low back pain, constipation, and sleeplessness were less frequent in the CTM group, compared with their preintervention period ( $P < .05$ ). A difference was observed between groups only in terms of the changes in sleeplessness between before and after intervention ( $P = .016$ ).

**Conclusion:** CTM and CM improved menstrual pain and functional and emotional status, and decreased drug use. Moreover, CTM was superior in improving pain duration, functional status, and sleeplessness compared with CM in PD. CTM and CM might be useful treatment methods for PD. (J Manipulative Physiol Ther 2023;46:305-314)

**Key Indexing Terms:** *Dysmenorrhea; Massage; Pain; Physical Therapy Modalities; Women*

## INTRODUCTION

Dysmenorrhea is defined as painful menstrual cramps.<sup>1</sup> Its prevalence varies between 16.8% and 81%.<sup>2</sup> It is basically classified into 2 categories as primary dysmenorrhea (PD) and secondary dysmenorrhea. It is known that PD, defined as painful menstruation without any underlying pathology, usually occurs within 6 to 12 months after

menarche.<sup>3</sup> PD may also be accompanied by some complaints such as headache, nausea, vomiting, and diarrhea.<sup>4</sup> Therefore, PD negatively affects functional and emotional status and quality of life.<sup>5,6</sup> The pathophysiology of PD has not been completely elucidated; nevertheless, one of its most accepted causes is prostaglandins and other inflammatory factors, such as leukotriene released from the endometrium during menstruation. These factors increase uterine contractions and menstrual pain.<sup>4</sup> In secondary dysmenorrhea, there is an organic disorder in the background of pain.<sup>7</sup> Endometriosis, uterine polyps and fibroids, cervical stenosis, pelvic inflammatory diseases, soft tissue damage due to pelvic surgery, and congenital anomalies are among the causes of secondary dysmenorrhea.<sup>8</sup>

Various treatment modalities such as pharmacologic and nonpharmacologic approaches are used to control menstrual pain. Nonsteroidal anti-inflammatory drugs, contraceptive hormonal therapy, and other analgesics are among the pharmacologic approaches.<sup>1</sup> Although these drugs have quick effects, their long-term use can cause problems such as digestive problems, peptic ulcer, and diarrhea.<sup>9</sup> Moreover, there is still a 20% to 25% failure rate of these drugs in dysmenorrhea.<sup>10</sup> For this reason, nonpharmacologic approaches such as physiotherapy, massage,

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herbal products, and acupuncture have attracted the attention of women with PD.<sup>11</sup>

Connective tissue massage (CTM) focuses on stretching connective tissue layers with manual tractions. CTM is a reflex therapy and has local (activating mast cell secretion such as histamine, nitric oxide, and heparin, and producing redness reactions),<sup>12,13</sup> segmental (improving functioning of the tissues supplied by the same spinal segment of the reflex zone via cutaneous-visceral reflexes),<sup>13</sup> and general effects (rebalancing of autonomic nervous system and generating endocrine responses).<sup>12,13</sup> Furthermore, CTM can regulate the balance between sympathetic and parasympathetic activity, increase collateral circulation, reduce pain, and create healing effects in internal organs.<sup>12,13</sup> CTM can be used in the management of PD because it increases circulation to the uterus and decreases menstrual pain.<sup>14-16</sup>

Classic massage (CM) includes rhythmic applications of movements such as stroking, kneading, and friction on the skin. CM has mechanical (increasing skin elasticity, relaxing/relieving, preventing adhesions, etc.), physiological (increasing vasodilation, activating gate control mechanism, release of endorphins, etc.), and psychological effects (creating sedative effects, reducing stress and anxiety, etc.).<sup>17,18</sup> The purpose of this massage is to create local relaxation, to improve blood and lymph flow, and to reduce muscle tension and pain.<sup>19</sup> This massage can be effective in declining pain and serum prostaglandin in the management of PD.<sup>20-22</sup>

In the literature, it was explained that manual therapy methods can be preferred in the first step to decrease menstrual pain intensity and complaints, and improve quality of life in the treatment of PD.<sup>23,24</sup> CTM and CM are also included in various manual therapy methods, as part of pain management.<sup>25-28</sup> These massage techniques are safe and effective methods.<sup>13,19</sup> In addition, CTM has more effects on the autonomic nervous system than CM<sup>26,28</sup> and has various effects on the recovery of internal organ functions via reflex mechanisms.<sup>13</sup> However, in clinics, CM application is often preferred more than CTM because it is easier to apply.

According to the authors' knowledge, there are no studies comparing the effects of CTM and CM in PD. Determining the difference between the therapeutic effects of these massage techniques can be important to guide the therapists to choose the appropriate approach for the symptom they prioritize to treat. Therefore, the current study aimed to compare the short-term effects of CTM and CM on pain, functional and emotional status, and menstrual complaints in PD. The hypothesis of our study was that the effects of CTM and CM on PD could be different.

## METHODS

### Study Design and Participants

A randomized comparative trial design was used.

### Ethics

This study was approved by the Clinical Research Ethics Committee of Yildirim Beyazit University Yenimahalle Education Research Hospital (approval number: E-2021-66). The rules of the Declaration of Helsinki were taken into account in the study. It was registered at [www.clinicaltrials.gov](http://www.clinicaltrials.gov) (NCT05158036), and carried out at the Physiotherapy and Rehabilitation Department between January 2022 and June 2022.

The study included volunteering women having a diagnosis of PD via a gynecologist and according to the criteria of the Primary Dysmenorrhea Consensus Guidelines,<sup>29</sup> who were nulliparous, aged >18 years, and having a regular menstruation cycle and menstrual pain rated higher than 4 cm on the Visual Analog Scale in the previous 6 months.

Women with chronic pain syndromes and/or psychiatric diseases, those who were pregnant, those who used intrauterine devices, those with a pelvic surgery history, those who used oral contraceptives, and those with secondary dysmenorrhea and not attending treatment sessions regularly were excluded. Personal and online announcements were made and women were selected by snowball sampling method in accordance with the inclusion and exclusion criteria. With these announcements, university students, university staff, and their relatives were included in the study. Written informed consents were obtained.

### Randomization

Women were assigned to either the CTM or the CM group using a computer-based block randomization procedure, created by an individual not involved in the assessment and treatment of women with PD. The attending therapist proceeded with treatment according to the group assignment lists.

### Intervention

Both CTM and CM were applied respectively 5 days per week and once a day from the estimated day of ovulation (menstrual cycle length [day] minus 14 days) until the next period begins. A mean of 10 to 12 sessions of massage applications were made according to the menstrual cycle days of women. These intervention periods were planned based on previous studies.<sup>14,16,28,30,31</sup> These applications were performed by the same physiotherapists.

**Connective Tissue Massage.** Connective tissue massage was applied to the lumbosacral, lower thoracic, abdominal, and anterior pelvic regions.<sup>16</sup> The regions where the CTM was applied were selected according to the innervations of the genital organs from the lumbosacral nerve roots, and the presence of the referred pain areas and tense areas due to PD.<sup>13,19</sup> During the treatment of back, women were sitting with the thigh and foot supported with 90° hip and

knee flexion. The back was unclothed and straight for optimal tension of the connective tissue. During the treatment of abdominal and anterior pelvic region, women were in a supine position with pillows placed under the head and knees. Both short and long tissue strokes with the distal interphalangeal joint at 45° flexion of the middle finger of the therapist were performed. Each stroke was performed for 3 times. All sessions were ended with bilateral long strokes to the iliac crest and subcostal regions. One session of the application took approximately 15 to 20 minutes.

**Classic Massage.** Classic massage was applied to the lumbar and abdominal region using the Swedish technique.<sup>31</sup> The regions where the CM was applied were selected according to the presence of the referred pain areas and tense areas due to PD.<sup>13,18</sup> Women were in a prone position with pillows placed under the abdomen during the treatment of the lumbar region. They were in a supine position with pillows placed under the head and knees during the treatment of abdominal region. Baby oil was used during CM applications. The procedure for the lumbar region included stroking, kneading, and stroking to the latissimus dorsi, erector spinae, and gluteal muscles, in this order. Before and after the applications on these muscles, general stroking was performed on the lumbar region. The application for the abdominal region included abdominal stroking, colon stroking, and kneading. After the abdomen and the colon stroking movements, clockwise and circular movements were performed along the line of the colon, beginning from the sigmoid colon to the ascending colon with a moderate pressure in the colon kneading. After the colon kneading, colon and abdominal stroking applied again. Each massage movement was performed for 3 times. One session of the application took approximately 15 to 20 minutes.

### Outcome Measures

Physical data (age, height, weight, and body mass index), smoking status, alcohol consumption, exercise habits, and menstrual characteristics (age at menarche, menstrual cycle, menstruation duration, family history related to PD, and drug use) were recorded by the same physiotherapists administering the applications. Menstrual pain and complaints and functional-emotional status were evaluated with self-reported questionnaires. Preintervention assessment of the participants was made on the first or second days of their menstruation. Postintervention assessment was performed in the first or second days of next menstruation following the interventions in both groups.

**Primary Outcome Measures.** The intensity of menstrual pain was assessed with the Visual Analog Scale, based on marking the appropriate point for describing pain intensity on a 10 cm line.<sup>32</sup> According to this scale, 0 means “no pain” and 10 means “very severe pain.” The marked point

was measured with the help of a ruler and the result obtained was recorded in cm.

**Secondary Outcome Measures.** Pain duration was recorded as hours. Drug (analgesic, etc.) use of women for the menstrual pain was recorded as number. Functional and emotional effects of PD were assessed with the Functional and Emotional Dysmenorrhea Scale (FEDS).<sup>33</sup> The scale consists of 2 subscales, namely, functional and emotional and 14 five-point Likert-type items. The score range of the scale is 14 to 70. A high score of the scale indicates a high level of functional and emotional impact of dysmenorrhea.<sup>33</sup>

Menstrual complaints were also recorded as “present” or “absent.” These complaints include headache, low back pain, abdominal distention, breast pain/tenderness, diarrhea, constipation, nausea/vomiting, fatigue, sleeplessness, nervousness, and depression.<sup>14,34,35</sup>

### Sample Size

Before the present study, we conducted a pilot study by recruiting 10 women with PD (5 per group) to examine the effect of CM and CTM on pain intensity. The partial  $\eta^2$  for the interaction effect of massage type and time was obtained as 0.414 in this pilot study. The effect size ( $f$ ) for this value was 0.844. Because the present study had 1 between-subject factor and 1 within-subject factor, the sample size was calculated using the  $F$  test—analysis of variance: repeated measures, within-between interaction module in the G\*Power (ver 3.1.9.7; Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany) program with the “as in SPSS” option for effect size estimation. A total of 30 women should be included in the study for a type 1 error level of 0.05 and a type 2 error level of 0.01. The data loss rate was accepted as 20% during the study. Therefore, the sample size was increased to  $30/0.8 \approx 38$ .

### Statistical Analysis

The distributions of continuous variables such as age and body mass index were examined by the Shapiro-Wilk test, normality plots, and skewness/kurtosis statistics. Body mass index was reported by mean  $\pm$  SD, whereas other numeric variables were assessed by median (IQR:  $Q_1$ - $Q_3$  [25th-75th percentile]). Educational status, smoking, drinking alcohol, family history, analgesic use, and presence of PD-related symptoms are presented as frequency (%).

Demographic and menstrual characteristics were compared between 2 groups by the Student's  $t$  test, the Mann-Whitney  $U$  test, the Pearson chi-square test, or the Fisher's exact test based on the type and distribution of the variables. The changes in menstrual pain intensity, duration, analgesic use, FEDS scores, and PD-related symptoms were evaluated between groups by group  $\times$  time

interaction effect and within the groups by within-group time effects obtained from nonparametric analysis for longitudinal data with F1-LD-F1 design. Between-group comparisons were performed using the Mann-Whitney *U* test for pain intensity, pain duration and FEDS scores, and chi-square tests for drug use and menstrual complaints at each evaluation time. Statistically significant value was determined as a *P* value of  $<.05$ .

Nonparametric analysis for longitudinal data with F1-LD-F1 design was performed by *nparLD* package (v2.1) in the R Statistical Software (v4.1.3) via RStudio Software (v2022.07.0.548) (R Foundation for Statistical Computing, Vienna, Austria).<sup>36-38</sup> IBM SPSS Statistics 22.0 (IBM Corp, released in 2013; IBM SPSS Statistics for Windows, version 22.0, IBM Corp) was used for the analysis.

RESULTS

Forty-four women with PD were assessed for eligibility. Thirty-eight women completed the study (Fig 1). There were no adverse events reported after the study. The features of the groups are presented in Table 1 ( $P > .05$ ).

Both groups had significantly decreased menstrual pain intensity, pain duration, drug use, and FEDS scores in the postintervention period (for all within-group comparisons  $P < .001$ ; Table 2). However, pain duration ( $P = .011$ ) and functional score of FEDS ( $P = .039$ ) decreased more in the CTM group compared with the CM group, whereas changes in other variables were similar between groups ( $P > .05$ ; Table 2).

Considering the menstrual complaints, the number of women with only breast pain/tenderness in CTM group

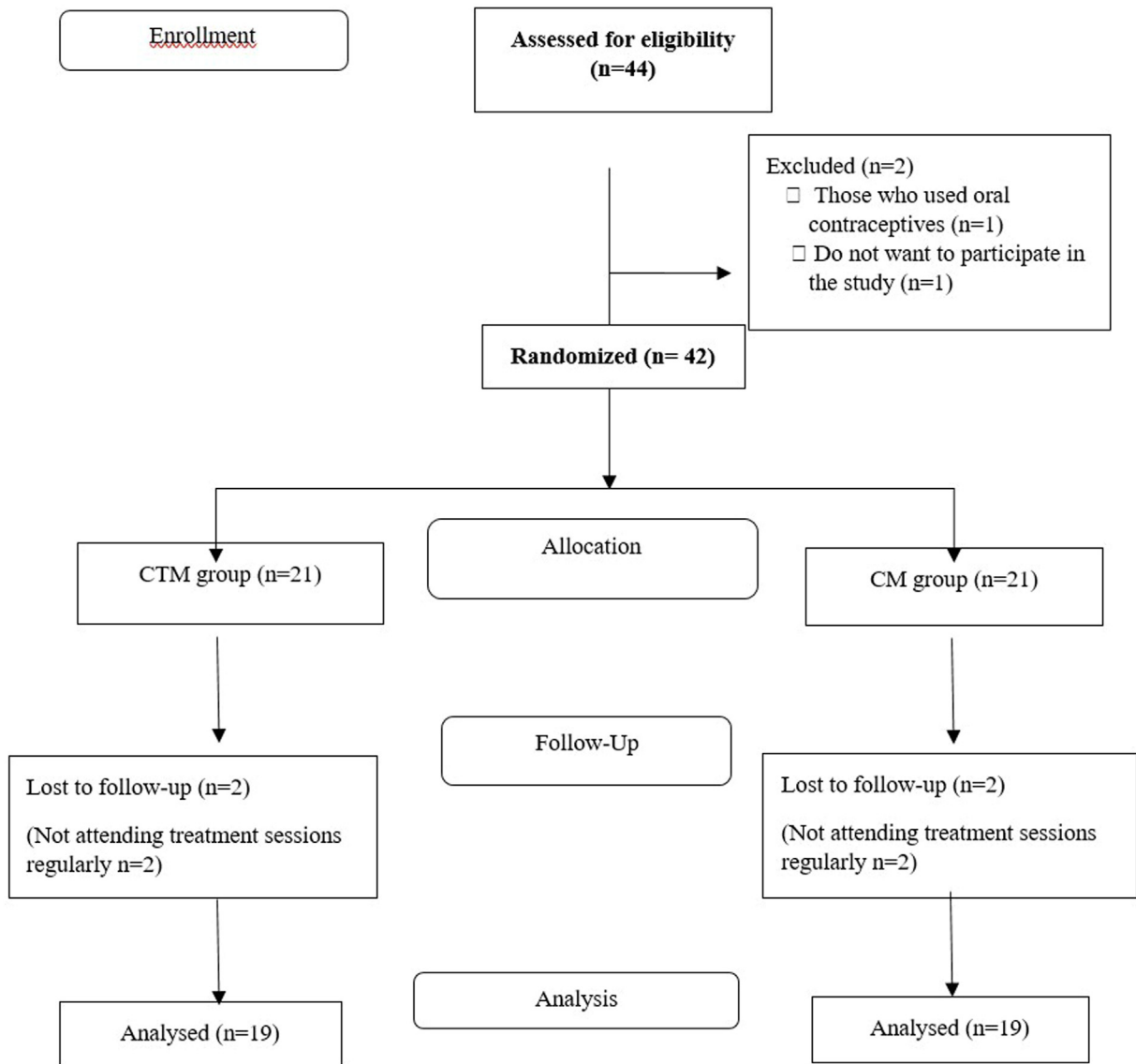


Fig 1. The flowchart diagram of the participants. CM, classic massage; CTM, connective tissue massage.

**Table 1.** Physical and Menstrual Features of the Groups

Features	CTM Group (n = 19) Mean ± SD, Median (Q <sub>1</sub> -Q <sub>3</sub> ), <sup>a</sup> or n (%)	CM Group (n = 19) Mean ± SD, Median (Q <sub>1</sub> -Q <sub>3</sub> ), <sup>a</sup> or n (%)	P Value
Age (y)	21 (20-22)	21 (20-28)	.583
BMI (kg/m <sup>2</sup> )	22.70 ± 3.31	22.03 ± 3.13	.526
Smoking	2 (10.5)	2 (10.5)	>.999
Alcohol	3 (15.8)	1 (5.3)	.604
Exercise habits	7 (36.8)	5 (26.3)	.485
Age at menarche (y)	12 (12-13)	12 (12-13)	>.999
Menstrual cycle (d)	28 (27-30)	28 (28-30)	.908
Menstruation duration (d)	7 (6-7)	6 (5-7)	.284
Family history related to PD	17 (89.5)	19 (100.0)	>.999
Drug use	14 (73.7)	11 (57.9)	.305

BMI, body mass index; CM, classical massage; CTM, connective tissue massage; PD, primary dysmenorrhea.

<sup>a</sup> IQR.

was higher than in the CM group in the preintervention period ( $P = .027$ ; Table 3). In the CM group, fewer women were nervous in the postintervention period compared with the preintervention period ( $P = .004$ ; Table 3). In the CTM group, low back pain ( $P = .011$ ; Table 3), constipation ( $P < .001$ ; Table 3), and sleeplessness ( $P = .028$ ; Table 3) were less frequent in the postintervention period compared with the preintervention period. Only the change in sleeplessness between preintervention and postintervention resulted in a significant difference between groups ( $P = .016$ ; Table 3).

## DISCUSSION

This is the first randomized comparative trial investigating the short-term effects of CM and CTM on PD. The results showed in both CTM and CM groups that menstrual pain and drug use decreased and functional and emotional status increased. Low back pain, constipation, and sleeplessness complaints were less frequent in the CTM group, whereas nervousness was less frequent in the CM group. In addition, CTM was superior in improving pain duration, functional status, and sleeplessness complaint compared with CM.

In recent years, the use of various massage techniques in PD management has increased due to the growing evidence on the effects of massage treatments in PD and as it has fewer side effects and is easy to apply.<sup>39</sup> It was reported that CTM was superior to placebo and control interventions in reducing menstrual pain and symptoms.<sup>16</sup> Ozgul et al<sup>14</sup> reported that CTM and advice improved menstrual pain

and symptoms and decreased drug use more than only advice. Reis et al<sup>40</sup> found that menstrual pain intensity and the rate of analgesics use decreased after CTM. Our study also detected that CTM decreased pain intensity and duration, drug use, low back pain, constipation, and sleeplessness complaints and increased functional and emotional status in women with PD. These results may be due to the releasing opiates with mechanical stimuli applied to the skin, regulation of autonomic nervous system, and improvement of the internal organ function with the stimulation of cutaneous visceral reflexes.<sup>12,13</sup>

Previous studies related to the management of PD have reported that CM had an effect on menstrual pain intensity, and especially can stimulate releasing  $\beta$ -endorphin levels, reduce proinflammatory cytokines, and prevent the pain transmission to the upper centers.<sup>41,42</sup> Our study also found that CM decreased pain intensity and duration, drug use, and nervousness complaint and increased functional and emotional status in PD. These findings may be due to the mechanical, physiological, and psychological effects of the CM technique.<sup>18,19</sup> It was reported that touch movement during massage activates the brain area involved in the coding of pleasant stimulations, and thus, declines anxiety, stress, and nervousness by decreased pain threshold.<sup>43</sup> This technique can be considered as an alternative approach in PD. Although there are studies comparing CTM or CM with different physiotherapy approaches, limited studies have compared these massage techniques with other massage techniques. Kaur et al<sup>30</sup> found that both CTM and Kinesio taping were equally effective in decreasing menstrual pain and complaints. Demirtürk et al<sup>15</sup> detected that menstrual pain intensity and

**Table 2.** Menstrual Pain Intensity and Duration, Drug Use, and Emotional and Functional Status Scores of Groups at Preintervention and Postintervention Evaluations

Menstrual Characteristics	CTM Group (n = 19) Median (Q <sub>1</sub> -Q <sub>3</sub> ) <sup>a</sup> or n (%)	CM Group (n = 19) Median (Q <sub>1</sub> -Q <sub>3</sub> ) <sup>a</sup> or n (%)	BG P Value	GTI P Value
Pain intensity (VAS, cm)				.955
Before intervention	7.6 (6.8-8.2)	7.4 (6.2-8.2)	.624	
After intervention	3.5 (2.1-5.7)	3.8 (3.1-4.3)	>.999	
WG P value	<.001 <sup>b</sup>	<.001 <sup>b</sup>		
Pain duration (h)				.011 <sup>b</sup>
Before intervention	48 (16-72)	15 (13-48)	.020 <sup>b</sup>	
After intervention	5 (1-11)	12 (4-14)	.130	
WG P value	<.001 <sup>b</sup>	<.001 <sup>b</sup>		
Drug use				.525
Before intervention	14 (73.7)	11 (57.9)	.305	
After intervention	4 (21.1)	3 (15.8)	>.999	
WG P value	<.001 <sup>b</sup>	<.001 <sup>b</sup>		
FEDS functional score				.039 <sup>b</sup>
Before intervention	28 (25-30)	25 (24-28)	.034 <sup>b</sup>	
After intervention	17 (13-22)	20 (18-20)	.488	
WG P value	<.001 <sup>b</sup>	<.001 <sup>b</sup>		
FEDS emotional score				.068
Before intervention	24 (19-28)	20 (19-25)	.154	
After intervention	13 (10-20)	17 (14-18)	.370	
WG P value	<.001 <sup>b</sup>	<.001 <sup>b</sup>		
FEDS total score				.109
Before intervention	51 (46-59)	46 (42-55)	.116	
After intervention	31 (23-41)	36 (34-38)	.506	
WG P value	<.001 <sup>b</sup>	<.001 <sup>b</sup>		

BG, between-group comparison; CM, classical massage; CTM, connective tissue massage; FEDS, Functional and Emotional Dysmenorrhea Scale; GTI, Group × time interaction effect; VAS: Visual Analog Scale; WG, within-group comparison.

<sup>a</sup> IQR.

<sup>b</sup> P < .05.

duration decreased and menstruation-related symptoms improved in both foot reflexology and CTM applications, but no superiority was observed between these applications. Some studies have indicated that both CM and stretching exercises have similar effects on pain management in PD.<sup>31,44</sup> Ozturk et al<sup>45</sup> found that massage was more effective on

abdominal-back pain and fatigue compared with stretching exercises. Azima et al<sup>20</sup> showed that the use of isometric exercises and massage therapy might reduce the intensity and duration of PD. Our study also found that the CTM was superior in improving pain duration, functional status, and sleeplessness complaint compared with CM. Increased uterine

**Table 3.** Menstrual Complaints at Preintervention and Postintervention Evaluations

Menstrual Complaints	CTM Group (n = 19) n (%)	CM Group (n = 19) n (%)	BG P Value	GTI P Value
Headache				.571
Before intervention	8 (42.1)	9 (47.4)	.744	
After intervention	8 (42.1)	8 (42.1)	>.999	
WG P value	>.999	.571		
Low back pain				.212
Before intervention	15 (78.9)	16 (84.2)	>.999	
After intervention	10 (52.6)	14 (73.7)	.179	
WG P value	.011 <sup>a</sup>	.146		
Abdominal distention				.096
Before intervention	19 (100.0)	17 (89.5)	.486	
After intervention	16 (84.2)	18 (94.7)	.604	
WG P value	.066	.571		
Breast pain/tenderness				.253
Before intervention	17 (89.5)	11 (57.9)	.027 <sup>a</sup>	
After intervention	14 (73.7)	11 (57.9)	.305	
WG P value	.253	>.999		
Constipation				.069
Before intervention	12 (63.2)	7 (36.8)	.105	
After intervention	4 (21.1)	4 (21.1)	>.999	
WG P value	<.001 <sup>a</sup>	.066		
Diarrhea				.099
Before intervention	3 (15.8)	2 (1.5)	>.999	
After intervention	1 (5.3)	4 (21.1)	.340	
WG P value	.146	.317		
Nausea/vomiting				.476
Before intervention	7 (36.8)	5 (26.3)	.485	
After intervention	4 (21.1)	4 (21.1)	>.999	
WG P value	.170	.571		

(continued)

**Table 3.** (Continued)

Menstrual Complaints	CTM Group (n = 19) n (%)	CM Group (n = 19) n (%)	BG P Value	GTI P Value
Fatigue				.237
Before intervention	15 (78.9)	13 (68.4)	.461	
After intervention	11 (57.9)	12 (63.2)	.740	
WG P value	.086	.317		
Sleeplessness				.016 <sup>a</sup>
Before intervention	8 (42.1)	7 (36.8)	.740	
After intervention	4 (21.1)	8 (42.1)	.163	
WG P value	.028 <sup>a</sup>	.317		
Nervousness				.257
Before intervention	18 (94.7)	17 (89.5)	>.999	
After intervention	15 (78.9)	11 (57.9)	.163	
WG P value	.066	.004 <sup>a</sup>		
Depression				.323
Before intervention	15 (78.9)	14 (73.7)	>.999	
After intervention	14 (73.7)	16 (84.2)	.693	
WG P value	.662	.317		

BG, between-group comparison; CM, classical massage; CTM, connective tissue massage; GTI, Group × time interaction effect; WG, within-group comparison.

<sup>a</sup> P < .05.

tone, decreased blood flow, and hormonal (prostaglandin, vasopressin) fluctuations are known as pathophysiological mechanisms of PD.<sup>46</sup> CTM is a reflex therapy and it has effects on the autonomic nervous system and internal organs.<sup>12,13</sup> This superiority may be due to generally increased parasympathetic activity, decreased sympathetic activity, and increased circulation in the uterus of the CTM. In addition, it is thought that these results may be due to the more general effects (rebalancing of autonomic nervous system and endocrine responses) of CTM than CM.<sup>12-16</sup> These results support that these massage techniques (CTM and CM) can be used in management of PD because they have no potential side effects and are noninvasive, low-cost, and effective methods. Moreover, CTM may be preferred more in women with PD who have more pain duration, functional impairment, and sleeplessness complaint.

**Limitations**

One limitation of this study was the lack of blinding the participants and assessors, which may be a source of bias in the result of the study. The second limitation was the

presentation of short-term results. In addition, the applications were performed in short periods based on previous studies<sup>14,16,28,30,31</sup>; however, positive improvements were also seen in such short periods. There is a need for studies in which these applications are carried out in longer periods and longer-term (6 months to 1 year) results will be examined. The third limitation was the absence of a control group. The absence of a control group prevents the observation of the natural process of menstrual symptoms. This may adversely affect the quality of the study. In future studies, randomized controlled studies comparing these massage techniques can be planned.

**CONCLUSION**

In this study, it was seen that menstrual pain intensity and duration, drug use, and some menstrual complaints decreased and functional and emotional status increased in both CTM and CM groups. Low back pain, constipation, and sleeplessness complaints were less frequent in the CTM group, whereas nervousness was less frequent and less women were nervous in the CM group. Moreover,

CTM was superior in improving menstrual pain duration, functional status, and sleeplessness complaints compared with CM. Both CM and CTM might be used as alternative applications in the management of PD.

#### FUNDING SOURCES AND CONFLICTS OF INTEREST

No funding sources or conflicts of interest were reported for this study.

#### CONTRIBUTORSHIP INFORMATION

Concept development (provided idea for the research): S.T.C., O.B.

Design (planned the methods to generate the results): S.T.C., O.B.

Supervision (oversight, organization, and implementation): S.T.C., O.B.

Data collection/processing (experiments, organization, and reporting data): O.B., A.K.

Analysis/interpretation (analysis, evaluation, and presentation of results): S.T.C., O.B., A.K., A.A.

Literature search (performed the literature search): S.T.C., O.B., A.K.

Writing (responsible for writing a substantive part of the manuscript): S.T.C., O.B., A.K., A.A.

Critical review (revised manuscript for intellectual content): S.T.C., O.B., A.K., A.A.

#### Practical Applications

- Both CM and CTM might be used as alternative applications in the management of women with PD.
- It was seen that menstrual pain intensity and duration, drug use, and some menstrual complaints decreased and functional and emotional status increased in both CTM and CM groups.
- CTM was superior in improving menstrual pain duration, functional status, and sleeplessness complaint compared with CM.

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