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Original Article

The Effect of Aromatherapy Massage on Knee Pain and Functional Status in Participants with Osteoarthritis

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ABSTRACT

This study was conducted to evaluate the effect of aromatherapy massage on knee pain and functional status in subjects with osteoarthritis. The study was designed as a non-randomized interventional study. The study was carried out on patients who referred to the outpatient clinics of the Department of Orthopedics, Physiotherapy and Rehabilitation at Bozok University Research and Application Hospital, and were diagnosed with osteoarthritis. A total number of 95 patients were included in the study, and of those, 33 were allocated to aromatherapy massage group, 30 were allocated to conventional massage group, and 32 were allocated to the control group. The study data were collected using the Patient Identification Form, visual analogue scale, the Western Ontario and McMaster University Osteoarthritis Index. Repeated measures analysis of variance test was used to analyze the outcomes in the aromatherapy, conventional massage and control groups, according to the weeks of follow-up. Bonferroni test was used for further analysis. Baseline mean visual analogue scale score and the Western Ontario and McMaster University Osteoarthritis Index were not significantly different between the groups ($p > .05$). Visual analogue scale (rest-activity) scores and the scores in the Western Ontario and McMaster University Osteoarthritis Index in the aromatherapy massage group were lower, and the difference compared to the control group was statistically significant ($p < .001$). Aromatherapy massage performed in patients with osteoarthritis reduced knee pain scores, decreased morning stiffness, and improved physical functioning status. Thus, as long as specific training is provided for aromatherapy massage, aromatherapy can be recommended for routine use in physical therapy units, hospitals and homes.

Pain is the most important symptom of osteoarthritis (OA). Previous studies have reported that patients with OA experience various levels of pain (Kiper & Kılıç Akça, 2012; Doğan, Goris, & Demir, 2016; Panah, Baharlouie, Rezaeian, & Hawker, 2016). Doğan et al. (2016) have reported the percentage of osteoarthritis patients experiencing pain as 78.5%. Pain in osteoarthritis is induced by osteophytes irritating the periosteum, pressure in the subchondral bone, capsule distension, bursitis, tenosynovitis, central neurogenic changes, and muscle spasms around the affected joint (Karadakovan & Arslan, 2009; Ling & Rudolph, 2007).

Patients with knee osteoarthritis experience joint stiffness in the morning when they wake up and/or after immobilization for a certain period. The stiffness often lasts for less than 30 minutes, but the pain and stiffness result in decreased physical function (Karadakovan & Arslan, 2009). Gümüş and Ünsal, (2014) reported that shopping (32%) and getting into transportation vehicles (28.5%) were the major daily activities during which individuals with OA felt dependent. Pain, stiffness, decreased physical function, sleep disturbances, anxiety, and depression experienced by patients with knee OA decrease the quality of life (Hafez, Alenazi, Kachanathu, Alromi, & Mohamed, 2014). Such problems must be addressed through up-to-date treatment approaches and care practices (Atalay-Gümüş, Alkan, & Aytekin, 2013; Güler Uysal & Başaran, 2009; Karadakovan & Arslan, 2009).

Current guidelines for the treatment of knee OA recommend the concomitant use of pharmacologic and nonpharmacologic methods. Nonopioids (acetaminophen [paracetamol] combinations), nonsteroidal anti-inflammatory drugs, and opioids are among the available pharmacologic options. However, patients

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often experience gastrointestinal problems, sleep disturbances, sexual dysfunction, and depression associated with the use of multiple drugs for a long period. They therefore use their medications irregularly and resort to nonpharmacologic therapies to cope with their symptoms (Basedow, Runciman, March, & Esteman, 2014; Blagojevic, Jinks, Jeffery, & Jordan, 2010; Hafez et al., 2014; Swift 2012).

Aromatherapy massage is a nonpharmacologic method used for symptom control. Its main aim is not to cure the disease but to control the symptoms emerging as a result of the disease (Başaran, 2009; Buckle, 2001; Lindquist, Snyder, & Tracy, 2014; Özdemir & Öztunç, 2013). The use of aromatherapy massage in nursing practice is important to improve overall health and accelerate recovery. Aromatherapy massage is preferred in many areas because of its efficacy in relieving pain, strengthening the immune system, alleviating inflammation, and increasing sleep quality and quality of life of the patients (Fontaine, 2005; Gok Metin & Ozdemir, 2016). Aromatherapy massage can also be performed for joint diseases such as knee OA (Yip & Tam, 2008). Components of the essential oils used during aromatherapy massage access the circulatory system through the lymph and blood vessels in the epidermis and act to relieve pain and improve physical function (Başaran, 2009; Buckle, 1998; Gok Metin & Ozdemir, 2016; Özata, 2009; Taşçı & Başer, 2015). It has been stated that certain components with analgesic characteristics in essential oils reduce pain in patients by influencing the release of neurotransmitters such as dopamine, endorphin, noradrenaline, and serotonin (Başaran, 2009; Gül & Eti Aslan, 2012; Taşçı & Başer, 2015).

Various studies have emphasized that eucalyptus oil, lavender oil, and ginger oil can be applied during massage therapy to control pain and improve the physical function of patients with joint diseases (Barbar, 2015; Kim, Nam, & Paik, 2005; Varghese, Rajeswari, Gayathri-Priya, & Kalpana, 2014; Yip & Tam, 2008). In OA, ginger oil is preferred for its effect of improving joint function, lavender oil for its effect of decreasing pain, and eucalyptus oil for its effect of locally decreasing pain through the neural networks (Huang, Fang, & Fang, 2014; Özata, 2009; Taşçı & Başer 2015; White 2007). Kim et al. (2005) evaluated 40 patients with arthritis and reported decreased pain and depression levels in the aromatherapy massage group. Hwang et al. (Hwang, Lee, & Kim, 2011) dripped 2-3 drops of lavender oil on a warmed towel and applied it as a compress on the knees of the patients. They reported a decrease in knee pain and an increase in joint flexibility (using a visual analog scale [VAS]) in the experimental group ($n = 21$) compared with the control group ($n = 24$) ($p < .001$). Varghese et al. (2014) found that aromatherapy massage with eucalyptus oil in female patients ($n = 60$) decreased joint pain and increased quality of life. In a qualitative study performed by Therkleson (2010) on 10 individuals with OA, ginger oil compresses increased joint stimulation, decreased pain, and allowed flexibility of joint movements.

Previous studies on individuals with knee OA have only evaluated the effectiveness of aromatherapy massage compared with a control group. We were unable to find any study that compared the effect of conventional massage using olive oil with that of aromatherapy massage using lavender, eucalyptus, or ginger oils in patients with knee OA. In addition, previous studies had small sample sizes and were based on pre- and post-test assessments (Hwang et al., 2011; Kim et al., 2005; Therkleson, 2010; Varghese et al., 2014). There is also no study with regular weekly follow-ups to evaluate the effectiveness of these interventions. The aim of the present study was to evaluate the effects of aromatherapy massage using a mixture of lavender, eucalyptus, and ginger oils on knee pain and functional status in patients with osteoarthritis.

Ethical Considerations

Ethics Committee approval to conduct the study was obtained from the Turgut Ozal University Faculty of Medicine Clinical Trials Ethics Committee (dated October 8, 2015 and numbered 99950669/156). The study was initiated after obtaining the written approval of the study centers and informed consent of the participants after providing information about the objectives of the research while paying attention to the willingness and voluntariness of the participants.

Methods

Hypotheses of the research were as follows:

H1-1: Aromatherapy massage reduces knee pain in patients with osteoarthritis.
H1-2: Aromatherapy massage reduces stiffness in patients with osteoarthritis.
H1-3: Aromatherapy massage fosters functional condition in patients with osteoarthritis.
H1-4: Classical massage reduces knee pain in patients with osteoarthritis.
H1-5: Classical massage reduces stiffness in patients with osteoarthritis.
H1-6: Classical massage fosters functional condition in patients with osteoarthritis.

Design and Sample

A nonrandomized clinical trial was conducted on two interventional groups and one control group. The study group consisted of individuals who were referred with a diagnosis of knee osteoarthritis to the outpatient clinics of the Department of Orthopedics, Physiotherapy and Rehabilitation at Bozok University Research and Application Hospital, located in a middle Anatolian city center.

Inclusion criteria were as follows: (1) VAS pain score (activity) between 3-10 points, (2) age 35 years and older, (3) a diagnosis of knee OA made by the physician according to the criteria of the American College of Rheumatology, (4) not participating in a physical therapy program during the study, (5) absence of a known psychiatric disease, (6) absence of visual or hearing impairment, (7) able to provide verbal and written consent for participation in the study.

Exclusion criteria were as follows: (1) diagnosis of any type of cancer, (2) sensitivity to essential oils or those with wounds at the application site, (3) previously diagnosed vascular disease, (4) joint inflammation, (5) surgery within the last 3 months. Criteria for withdrawal from the study included the following: (1) placement in a physical therapy program, (2) unwillingness to continue participation in the study at any time point, and (3) inability to be contacted for follow-up phone calls.

Power analysis and sample size (NCSS-PASS, https://www.ncss.com/) software were used to calculate the required sample size for this study. Yip and Tam (2008) reported a change of 1.8 points in the pain subscale of the Western Ontario and McMaster University Osteoarthritis Index (WOMAC) in the intervention group. Arithmetic mean and standard deviation ($\alpha = .05$ and strength $= 90$) were used to estimate the sample size of study, and 30 participants were required per group to provide sufficient power. Thirty-five participants were allocated into each group, taking into account possible dropouts from the study.

Data Collection

Patients with osteoarthritis who had presented to the outpatient clinics of the orthopedics and physiotherapy and

rehabilitation unit were referred by the physicians. All participants were evaluated for their eligibility to participate in the study. The first participants were allocated to the aromatherapy massage group and subsequent participants were allocated either to the conventional massage or control group depending on the match criteria (age, gender, VAS activity score, analgesic use). Total WOMAC scores for both knees of individuals with osteoarthritis were taken into consideration. The same procedure was performed on both knees.

The affected knees were evaluated using the WOMAC osteoarthritis index and VAS. Pain intensity values of the participants both during activity (performing daily routine tasks) and at rest were evaluated using VAS at baseline, week 1, week 2, and week 3. Pain, stiffness, and physical function were evaluated using the WOMAC osteoarthritis index at baseline, week 1, week 2, and week 3. VAS and WOMAC osteoarthritis indexes were used to evaluate the participants in the aromatherapy and conventional massage groups at baseline and during sessions 3, 6, and 9 through face-to-face interviews. In the control group, the VAS and WOMAC osteoarthritis indexes were administered through face-to-face interviews at baseline, and subsequent assessments were made over phone calls at week 1, week 2, and week 3. Routine treatment of the participants in the aromatherapy, conventional massage, and control groups were not changed over the entire study period (Fig. 1).

Instruments

Participant Description Form

The participant description form is an eight-item form prepared by the investigator in line with the relevant literature to determine sociodemographic characteristics such as age, gender, educational status, body mass index, exercise status, and other factors such as duration of disease, pain duration and type, factors aggravating and relieving pain, and medication use (Yıldırım, Ulusoy, & Bodur, 2010; Yip & Tam, 2008).

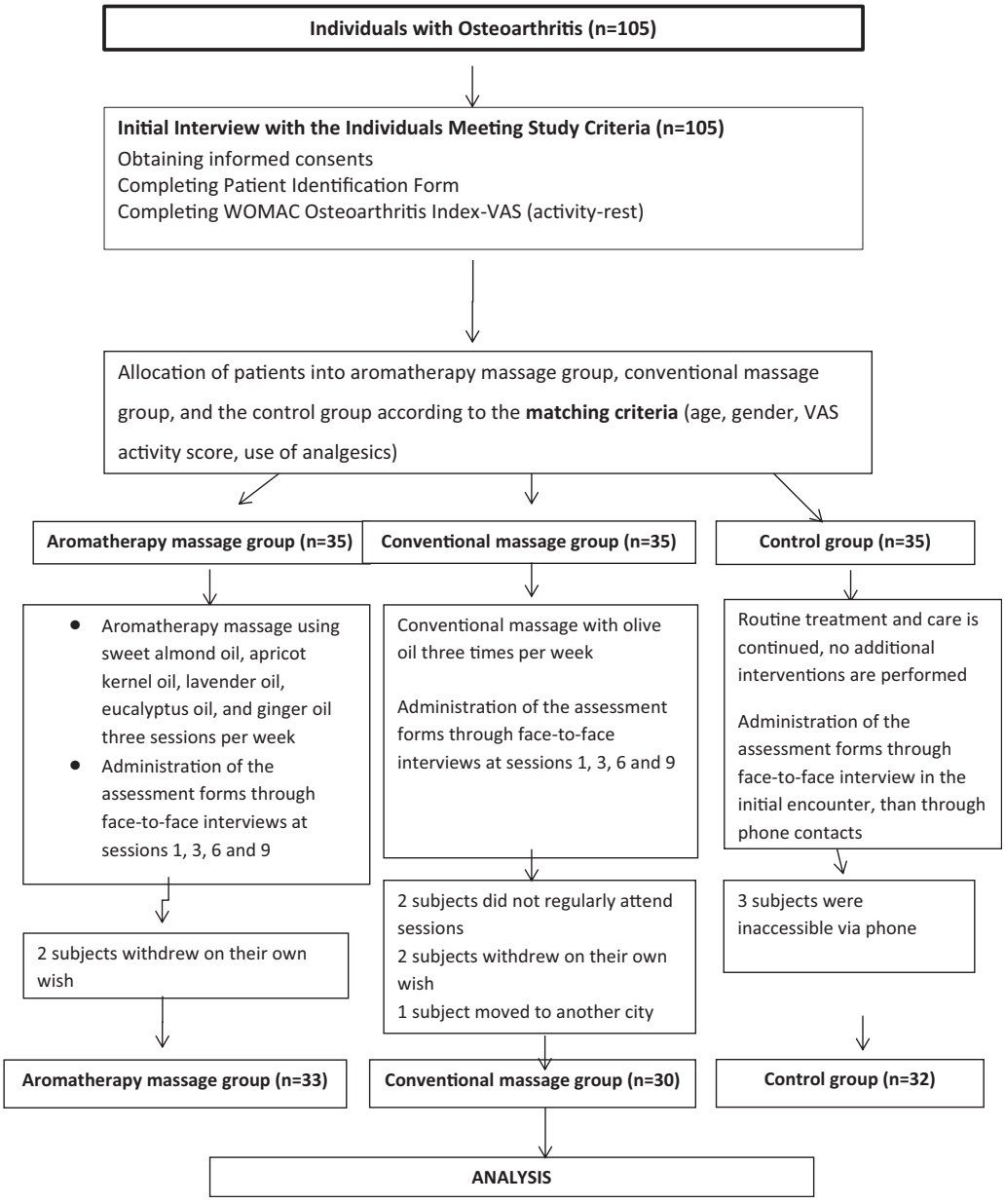

Figure 1. Description of the study sample. WOMAC, The Western Ontario and McMaster University Osteoarthritis Index; VAS, visual analog scale.

Table 1
Distribution of the Participants According to Descriptive Characteristics (N = 105)

Characteristics	Groups			Test	*p*
	Aromatherapy Massage Group, n (%)	Conventional Massage Group, n (%)	Control Group, n (%)		
Sex					
Female	28 (84.8)	26 (86.7)	29 (87.4)	*	*
Male	5 (15.2)	4 (13.3)	3 (12.6)		
Age					
35-64 yr	24 (72.7)	17 (56.7)	20 (62.5)	$\chi^2 = 1.825$	.401
≥65 yr	9 (27.3)	13 (43.3)	12 (37.5)		
Educational Status					
Literate[a]	14 (42.4)	12 (40.0)	19 (59.4)	$\chi^2 = 2.827$	.243
Primary school and higher[b]	19 (57.6)	18 (60.0)	13 (40.6)		
	X ± SD (Min-Max)	X ± SD (Min-Max)	X ± SD (Min-Max)		
Mean age	58.1 ± 10.7 (36-77)	.299	61.6 ± 8.0 (48-77)	F = 1.017	.366
Mean body mass index	31.6 ± 5.1 (22.2–42.3)	33.6 ± 5.0 (19.8–43.0)	32.1 ± 6.1 (24.9 ± 53.3)	F = 1.149	.321
Mean duration of disease (years)	5.6 ± 4.5 (1.0–15.0)	7.4 ± 6.3 (1.0–20.0)	5.7 ± 4.4 (1.0 ± 16.0)	F = 1.222	

[a] The datas of people who was literate and non-literate were united.
[b] Group includes people in primary school, junior high school and high school group.
* The numbers in the cell are less five. So test was failed.

Visual Analog Scale

The VAS was developed by Price et al. in 1983 and is a valid and reliable tool for determining pain intensity. This easy-to-apply scale is used to evaluate the intensity of pain with the patient rating the highest level of pain perceived on a 10-centimeter scale with 10 evenly spaced markers from 0 (no pain) to 10 (most severe pain) points. The pain decreases toward the left and increases toward the right in the horizontal VAS scale (Gallagher, Liebman, & Bijur, 2001). Our participants were asked to place a mark on the line at a point that corresponded to the level of pain intensity they recently perceived.

WOMAC Osteoarthritis Index

The WOMAC index is composed of 24 items and 3 subdimensions (pain, stiffness, and physical function). The participants are asked to rate pain (5 questions), stiffness (2 questions), and difficulties encountered in physical functioning (17 questions) during the day (24 hours). The index is a 5-point Likert-type scale, where 0 is none, 1 mild, 2 moderate, 3 severe, and 4 very severe. Pain scores range from 0–20 points, stiffness scores from 0–8 points, and difficulties in physical function scores from 0–68 points. Higher scores indicate increased pain and stiffness, impairment in physical functioning, and higher levels of physical limitation (Aungst, Aeschlimann, Steiner, & Stucki, 2001).

This validated and reliable tool is widely used to assess patients with hip and knee osteoarthritis. Cronbach's α values for the WOMAC pain, stiffness, and physical function subdimensions in our study were .76, .94, and .93 before treatment, respectively, and the same values after intervention were .94, .95, and .90, respectively.

Aromatherapy Massage

Preliminary Procedures

We prepared a quiet room where the patient could lie down comfortably for the procedure. The patient needs to be able to lie down comfortably without any anxiety and the person performing the massage needs to have warm hands for both the aromatherapy massage and conventional massage.

The oils we used were prepared by taking the aromatherapist's opinions and the current literature into account. We had the oils analyzed for color, odor, pH level, and bacterial content to make sure they were appropriate for use on the body, that the odor of the aromatherapy oils would stimulate positive emotions in the participant, and that no organic content was present, and also to prevent the development of allergic reactions. The oil for the aromatherapy massage group included 2 milliliters lavender, 2 milliliters eucalyptus, and 1 milliliters ginger oil in 50 milliliters of sweet almond oil and 50 milliliters of apricot kernel oil. (In-Ryoung, 2006; Kim et al., 2005; Özata, 2009; Shaw, Annett, & Doherty, 2007; Taşçı & Başer, 2015; Varghese et al., 2014; Yip & Tam, 2008). In line with expert opinions and literature data, massage therapy was performed nine times, each session lasting 30 minutes, to the legs of the participants in the aromatherapy and conventional massage groups (15 minutes for each knee).

Steps of Aromatherapy Massage

The massage was performed using the following steps after informing the participants and obtaining consent for the procedure (Shaw et al. 2007; Taşçı & Başer, 2015; Tel, 2010; Tuna, 2004; Varghese et al., 2014; Yip & Tam, 2008): (1) The participant was placed in the semi-Fowler's position. (2) The practitioner's hands were rubbed together 10–15 times to warm the hands. (3) The amount of oil used for each technique was 20 drops—1 milliliter. The oil was first applied to the hands to make them slippery. We then waited for a minute for the oil to be absorbed through the skin. (4) We then used 1 milliliter of oil for the knee and used the effleurage technique to apply it, followed by one-hand “patting” of the knee for 2–3 minutes. (5) Using another 1 milliliter of oil, we used the petrissage technique to apply it to the knee with two hands followed by one hand kneading (grasping the muscles with your palm and fingers and kneading them by twisting and without sliding forth) of the knee for 2–3 minutes. (6) Using another 1 milliliter of oil, a friction technique with the palms and then with four fingers and the thumb was used to apply it to the knee with deep friction and “circular movements/circular rubbing” of the knee for 4-5 minutes. (7) Using another 1 milliliter of oil, the effleurage technique with both hands was employed to apply it to the knees followed by one-hand “patting” of the knee for 1 minute. These steps were then repeated for the other affected knee joint,

Table 2
Comparison of VAS Scores of Participants According to Weeks of Follow-Up (N = 105)

VAS Severity	Follow-Up Weeks				Test[e]	*p*	Significant Difference
	Baseline[a] X ± SD	Week 1[b] X ± SD	Week 2[c] X ± SD	Week 3[d] X ± SD			
VAS Rest							
Aromatherapy Massage Group[1]	4.6 ± 1.6 (2.0-9.0)	3.4 ± 1.5 (1.0-7.0)	2.7 ± 1.5 (0.0-6.0)	1.4 ± 1.1 (0.0-4.0)	50.467	*.001*[*]	*a-b, *a-c, *a-d. *b-d. *c-d
Conventional Massage Group[2]	4.9 ± 1.6 (3.0-8.0)	4.1 ± 1.7 (1.0-8.0)	3.7 ± 1.6 (1.0-7.0)	3.4 ± 1.6 (0.0-6.0)	12.922	*.001*[*]	*a-b, *a-c, *a-d
Control group[3]	5.1 ± 2.6 (2.0-10.0)	5.2 ± 2.7 (2.0-10.0)	5.1 ± 2.6 (1.0-10.0)	5.2 ± 2.5 (2.0-10.0)	.135	.939	—
Test[f]	.474	6.746	12.654	33.883			
p	.624	*.002*[°]	*.000*[°]	*.000*[°]			
Difference	—	[°]*1-3*	[°]*1-3. [°]1-2. [°]2.3*	[°]*1-3 [°]1-2. [°]2.3*			
VAS Activity							
Aromatherapy Massage Group[1]	8.9 ± 1.2 (5.0-10.0)	6.3 ± 1.9 (2.0-9.0)	5.1 ± 1.1 (0.0-6.0)	3.8 ± 1.2 (2.0-7.0)	135.106	*.001*[*]	*a-b,*a-c,*a-d *b-c, *b-d, *c-d
Conventional Massage Group[2]	8.5 ± 1.5 (3.0-10.0)	7.5 ± 1.4 (5.0-10.0)	6.3 ± 2.0 (1.0-10.0)	5.9 ± 2.1 (0.0-9.0)	23.996	*.001*[*]	*a-b,*a-c,*a-d, *b-c,*b-d
Control Group[3]	8.1 ± 2.0 (4.0-10.0)	7.7 ± 1.6 (4.0-10.0)	7.3 ± 1.7 (4.0-10.0)	7.8 ± 1.7 (3.0-10.0)	3.221	.082	—
Test[f]	1.842	6.546	15.023	45.910			
p	.164	*.002*[°]	*.001*[°]	*.001*[°]			
Difference	—	[°]*1-3. [°]1-2*	[°]*1-3. [°]1-2*	[°]*1-3. [°]1-2. [°]2-3*			

VA, visual analog scale; SD, standard deviation; ANOVA, analysis of variance.
[a] baseline.
[b] first week.
[c] second week.
[d] Third week.
[e] ANOVA was used for repeated measurements.
[f] One-way ANOVA was used.
[°] Comparison of groups.
[*] Comparison of weeks.
[1] Aromatherapy massage.
[2] Conventional massage.
[3] Control group.

5-10 minutes after the initial massage therapy. (8) The materials used were removed at the end of the procedure. (9) The next visit was scheduled with the participant and the patient was discharged from the unit (Shaw et al. 2007; Taşçı & Başer, 2015; Tel, 2010; Tuna, 2004; Varghese et al., 2014; Yip & Tam, 2008).

Conventional Massage Intervention

Olive oil was used for the conventional massage group. The preliminary procedures, massage technique, application steps and session content, frequency, and duration were the same in the conventional massage group.

Data Analysis

The Statistical Package for Social Sciences (SPSS) Version 21 (IBM Corp., Armonk, NY) was used for statistical analysis. Repeated-measures analysis of variance was used to evaluate participants in the aromatherapy, conventional massage, and control groups according to the follow-up weeks. The Bonferroni test was used for further analysis, and one-way analysis of variance was used to determine the difference between the groups. The level of statistical significance was set at $p < .05$ within a 95% confidence interval (Nahcivan, 2014; Özdamar, 2013).

Results

Demographic Characteristics of the Participants

Regarding the participants in the aromatherapy massage group, 72.7% were in the 35-64 years age group (the mean age was 58.1 ± 10.7 years), 84.8% were female, and 57.6% were primary school graduates or had higher education. Mean body mass index (BMI) was 31.6 ± 5.1 kilograms per square meter. The mean duration of disease was 5.6 ± 4.5 years.

Regarding the participants in the conventional massage group, 56.7% were in the 35-64 years age group (the mean age was 60.8 ± 11.6 years), 86.7% were female, 60% were primary school graduates or had higher education, and the mean BMI was 33.6 ± 5.0 kilograms per square meter. The mean duration of disease was 7.4 ± 6.3 years.

Regarding the participants in the control group, 62.5% were in the 35–64 years age group (the mean age was 61.6 ± 8.0 years), 87.4% were females, 59.4% were literate and the mean BMI was 32.1 ± 6.1 kilograms per square meter. The mean duration of disease was 5.7 ± 4.4 years.

There was no statistically significant difference between the aromatherapy massage, conventional massage and control groups with respect to descriptive characteristics of the participants. The individuals in all three groups had similar characteristics (Table 1).

Intervention Effects

We found no significant difference between the pretest VAS and WOMAC scores of the aromatherapy, classic massage, and control group participants ($p > .05$). The individuals in all three groups can be seen to have similar characteristics (Tables 2 and 3).

There were significant differences between the mean VAS scores (rest-activity) of the participants in the aromatherapy and conventional massage groups according to follow-up weeks (at sessions 3, 6, and 9). The decrease in pain scores in the aromatherapy and conventional massage groups started in the first week of

Table 3
Comparison of Mean WOMAC Scores of the Participants According to the Weeks of Follow-Up (N = 105)

WOMAC	Follow-Up Weeks				Test[e]	*p*	Significant Difference
	Baseline[a] X ± SD	Week 1[b] X ± SD	Week 2[c] X ± SD	Week 3[d] X ± SD			
WOMAC Pain							
Aromatherapy Massage Group[1]	16.0 ± 2.8 (11.0-20.0)	12.8 ± 3.2 (6.0-17.0)	10.6 ± 3.0 (5.0-15.0)	8.3 ± 3.3 (2.0-14.0)	107.982	*.001**	*a-b,*a-c,*a-d. *b-c.*b-d.*c-d
Conventional Massage Group[2]	15.4 ± 2.2 (12.0-20.0)	14.0 ± 2.5 (9.0-19.0)	13.2 ± 3.0 (4.0-19.0)	12.4 ± 3.3 (4.0-19.0)	16.943	*.001**	*a-b,*a-c *a-d.*b-d
Control group[3]	16.0 ± 3.2 (8.0-20.0)	15.7 ± 3.0 (8.0-20.0)	15.2 ± 3.3 (8.0-20.0)	15.9 ± 3.0 (8.0-20.0)	1.798	.153	—
Test[f]	.491	7.749	18.055	45.586			
p	.614	*.001* °	*.001* °	*.001*°			
Difference	-	°1-3	°1-2.°1-3. °2-3	°1-2.°1-3. °2-3			
WOMAC Stiffness							
Aromatherapy Massage Group[1]	5.3 ± 1.3 (2.0-8.0)	4.7 ± 1.3 (2.0-6.0)	4.2 ± 1.5 (0.0-6.0)	3.3 ± 1.4 (0.0-6.0)	23.126	*.001**	*a-c.*a-d. *b-d.*c-d
Conventional Massage Group[2]	5.7 ± 1.3 (4.0-8.0)	5.4 ± 1.3 (2.0-8.0)	5.3 ± 1.3 (3.0-8.0)	5.3 ± 1.6 (0.0-8.0)	2.337	.079	—
Control group[3]	5.6 ± 1.6 (2.0-8.0)	5.3 ± 1.6 (2.0-8.0)	5.3 ± 1.5 (2.0-8.0)	5.6 ± 1.5 (2.0-8.0)	1.354	.262	—
Test	.572	2.281	7.161	21.733			
p	.566	.108	*.001*°	*.001*°			
Difference	—	—	°*1-2.* °*1-3*	°*1-2.* °*1-3*			
WOMAC Physical Function							
Aromatherapy Massage Group[1]	52.5 ± 7.7 (40.0-64.0)	45.7 ± 8.1 (28.0-57.0)	40.8 ± 9.0 (13.0-59.0)	33.6 ± 10.7 (10.0-57.0)	76.494	*.001**	*a.b.*a-c.*a-d. *b-c.*b-d.*c-d
Conventional Massage Group[2]	52.6 ± 7.8 (39.0-66.0)	50.1 ± 9.0 (31.0-66.0)	48.6 ± 8.7 (37.0-66.0)	47.0 ± 10.0 (25.0-66.0)	13.018	*.001**	*a-b.*a-c.*a-d. *b-d
Control group[3]	54.1 ± 7.9 (33.0-67.0)	55.3 ± 8.7 (34.0-67.0)	54.3 ± 8.6 (34.0-68.0)	55.4 ± 8.5 (34.0-68.0)	1.652	.183	—
Test[f]	.430	10.325	19.147	41.004			
p	.652	*.001*°	*.001*°	*.001*°			
Difference	—	°*1-3*	°*1-2.* °*1-3.* °*2-3*	°*1-2.* °*1-3.* °*2-3*			

WOMAC, The Western Ontario and McMaster University Osteoarthritis Index; SD, standard deviation; ANOVA, analysis of variance.
[a] baseline.
[b] first week.
[c] second week.
[d] Third week.
[e] ANOVA was used for repeated measurements.
[f] One-way ANOVA was used.
° Comparison of groups.
[1] Aromatherapy massage.
[2] Conventional massage.
[3] Control group.

therapy and continued in the following weeks. This decrease was even more remarkable in the aromatherapy massage group compared with the conventional massage group (aromatherapy massage group, $p < .001$; conventional massage group, $p < .001$; control group, $p > .05$; Table 2, Fig. 2).

There were highly significant differences between WOMAC pain, WOMAC stiffness, and WOMAC physical function scores of the participants in the aromatherapy, conventional massage, and the control groups according to the week of follow-up ($p < .001$). WOMAC pain and stiffness scores, and physical function scores were more significantly decreased in the aromatherapy massage group compared with the conventional massage and control groups. We also found that the WOMAC pain scores decreased together with an improvement in physical functioning status in the conventional massage group, but there was no decrease in the stiffness scores ($p < .001$). (Table 3; Figs. 3, 4, and 5).

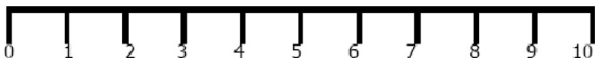

Figure 2. Visual analog scale. WOMAC, The Western Ontario and McMaster University Osteoarthritis Index.

Discussion

We found a significantly more prominent decrease in the pain scores of the participants in the aromatherapy group than those in the conventional massage group in this study. Such a significant decrease in the aromatherapy massage group may be a result of the aromatherapy oils used during the massage therapy, which possibly increased the effectiveness of the massage, together with favorable effects of the massage itself on circulation. Lavender oil,

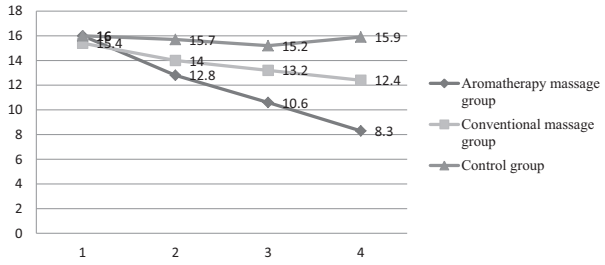

Figure 3. Comparison of the mean WOMAC-Pain scores of the participants according to the weeks of follow-up. WOMAC, The Western Ontario and McMaster University Osteoarthritis Index.

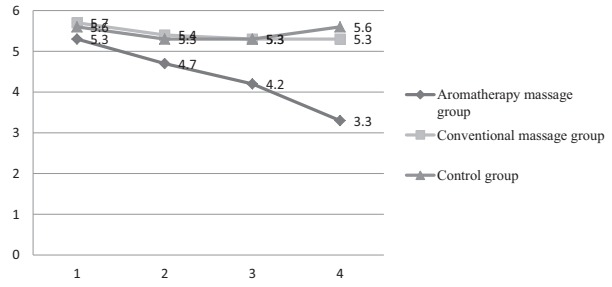

Figure 4. Comparison of the mean WOMAC-Stiffness scores of the participants according to the weeks of follow-up. WOMAC, The Western Ontario and McMaster University Osteoarthritis Index.

one of the commonly used aromatic oils, is able to slow down nerve impulses thanks to the linalool found in lavender. This mechanism results in decreased muscle tension, lower pain perception, and less anxiety (Başaran, 2009; Buckle, 2001; Steflitsch & Steflitsch, 2008). Eucalyptus oil is effective in decreasing joint, muscle, and bone pain in patients with arthritis and rheumatic disorders (Barbar, 2015; Başaran, 2009; Özata, 2009). In a semiexperimental study conducted by Kim et al. (2005) using lavender oil, eucalyptus oil, marjoram oil, rosemary oil, and peppermint oil in patients with arthritis, pain scores were found to be lower in the aromatherapy group compared with the control group. Hwang et al. (2011) applied 2-3 drops of lavender oil on warmed towel compresses and then applied these to the knees of their patients. They reported decreased knee pain scores (VAS) in the experimental group compared with the control group ($p < .001$). The decreases noted in the pain scores of participants in the aromatherapy and conventional massage groups in the present study are comparable to those reported in the literature.

Stiffness occurs as a result of immobility and can be relieved with mobilization of the individual. Aromatherapy massage decreased joint stiffness in our study, whereas conventional massage had no effect. In a qualitative study performed by Therkleson (2010) on participants with OA (n = 10), ginger oil compresses increased range of joint motion in addition to providing warming, stimulatory, and analgesic effects. Therkleson and Sherwood (2004) evaluated ginger compressed on the kidney region in participants with OA and reported a warming sensation and body relaxation. In line with the literature, the present study found that aromatherapy massage significantly reduced WOMAC stiffness scores when compared with the other groups. As already known, massage relieves pain by increasing tissue oxygenation and endorphin release. We believe the aromatherapy oils, rather than the massage therapy itself, affected the outcomes in terms of reducing stiffness. Ginger oil, one of these aromatherapy oils, enters the circulation through vasodilation at the relevant body area and

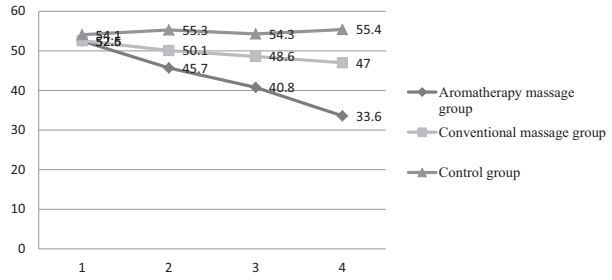

Figure 5. Comparison of the mean WOMAC–Physical Function scores of the participants according to the weeks of follow-up. WOMAC, The Western Ontario and McMaster University Osteoarthritis Index.

then stimulates tissues and reduces stiffness (Ryan, Heckler, & Roscoe, 2012; Steflitsch & Steflitsch, 2008; Therkleson, 2010).

Participants with knee OA have reduced level of physical functioning because of pain, stiffness, and structural changes in the joints (Doral et al., 2007 Karadakovan & Arslan, 2009;). The aromatherapy massage and conventional massage used in the present study improved physical functioning in participants with osteoarthritis ($p < .001$). Won and Chae (2011) reported from their study on knee OA patients who received aromatherapy massage twice a week for four weeks that the study group had significant decreased pain compared with the control group ($p < .001$). In a quasiexperimental study, Inja and Kyung (2009) evaluated pain and fatigue in participants with knee osteoarthritis and reported that aromatherapy massage decreased pain and fatigue and improved functioning in daily activities. In a study carried out by Yip and Tam (2008) on participants with knee osteoarthritis, aromatherapy massage performed for 3 weeks reduced pain and improved functional status; however, there was no significant difference between the experimental group and the control group ($p > .05$). With the use of aromatherapy massage, participants with OA experienced less difficulty in daily activities such as walking up and down the stairs, going shopping, and putting on socks, and these results are consistent with the results of the other studies.

Limitations

This study had some limitations. First, the study sample consisted only of patients diagnosed with knee osteoarthritis from the orthopedics, physical therapy, and rehabilitation outpatient clinics of a single university hospital located in a middle Anatolian city center. Second, all data pertaining to the aromatherapy massage, conventional massage, and control groups were collected by the investigator. We assumed that the participants used the medication recommended by the physician.

Once a person develops chronic knee osteoarthritis, this condition becomes a lifelong disease. Future research involving a time frame of 6 months or longer is therefore recommended to determine long-term effectiveness of the intervention.

Conclusions and Implications for Nursing

Aromatherapy massage is superior to conventional massage in terms of reducing pain and stiffness and improving physical functioning. These complementary treatment modalities are useful for nurses who can perform aromatherapy massage for symptom management in OA. However, training the practitioners and ensuring they are adequately experienced in aromatherapy massage are critical to achieve successful results. It is recommended that randomized controlled, double-blind studies be conducted to support the evidence obtained in this study. The present study is important because it aimed to determine the efficacy of aromatherapy massage using lavender, eucalyptus, and ginger oils to develop a method for home use by individuals with OA and to alleviate the most common symptoms such as pain, stiffness, and decreased physical function. Aromatherapy massage can be performed at centers admitting osteoarthritis patients. The research suggests that developing evidence-based procedures in nursing practices would contribute to improving and standardizing the outcomes of clinical care.

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