

# The Effects of Aromatherapy Massage and Reflexology on Pain and Fatigue in Patients with Rheumatoid Arthritis: A Randomized Controlled Trial

■ ■ ■ *Zebra Gok Metin, Research Assistant, PhD, RN and Leyla Ozdemir, Associate Professor, PhD, RN*

## ■ ABSTRACT:

Nonpharmacologic interventions for symptom management in patients with rheumatoid arthritis are underinvestigated. Limited data suggest that aromatherapy massage and reflexology may help to reduce pain and fatigue in patients with rheumatoid arthritis. The aim of this study was to examine and compare the effects of aromatherapy massage and reflexology on pain and fatigue in patients with rheumatoid arthritis. The study sample was randomly assigned to either an aromatherapy massage (n = 17), reflexology (n = 17) or the control group (n = 17). Aromatherapy massage was applied to both knees of subjects in the first intervention group for 30 minutes. Reflexology was administered to both feet of subjects in the second intervention group for 40 minutes during weekly home visits. Control group subjects received no intervention. Fifty-one subjects with rheumatoid arthritis were recruited from a university hospital rheumatology clinic in Turkey between July 2014 and January 2015 for this randomized controlled trial. Data were collected by personal information form, DAS28 index, Visual Analog Scale and Fatigue Severity Scale. Pain and fatigue scores were measured at baseline and within an hour after each intervention for 6 weeks. Pain and fatigue scores significantly decreased in the aromatherapy massage and reflexology groups compared with the control group ( $p < .05$ ). The reflexology intervention started to decrease mean pain and fatigue scores earlier than aromatherapy massage (week 1 vs week 2 for pain, week 1 vs week 4 for fatigue) ( $p < .05$ ). Aromatherapy massage and reflexology are simple and effective nonpharmacologic nursing interventions that can be used to help manage pain and fatigue in patients with rheumatoid arthritis.

© 2016 by the American Society for Pain Management Nursing

*From the Department of Internal Medicine Nursing, Hacettepe University Faculty of Nursing, Ankara, Turkey.*

*Address correspondence to Zebra Gok Metin, PhD, RN, Research Assistant, Department of Internal Medicine Nursing, Hacettepe University Faculty of Nursing, Ankara 06100, Turkey. E-mail: zebraok85@hotmail.com*

*Received August 31, 2015;  
Revised January 29, 2016;  
Accepted January 30, 2016.*

*Funding: None.  
Conflicts of interest: None.*

*1524-9042/\$36.00  
© 2016 by the American Society for  
Pain Management Nursing  
[http://dx.doi.org/10.1016/  
j.pmn.2016.01.004](http://dx.doi.org/10.1016/j.pmn.2016.01.004)*

## BACKGROUND

Pain and fatigue related to rheumatoid arthritis (RA) often decrease patients' independence and may limit activities of daily living, which can negatively impact patients' quality of life (Edwards, Bingham, Bathon, & Haythornthwaite, 2006; Hewlett, Nicklin, & Treharne, 2008; Pollard, Choy, Gonzalez, Khoshaba, & Scott, 2006). Despite the high prevalence of RA-related pain and fatigue, there are no curative treatments (Cornell, 2007). Conventional treatments for RA include pharmacologic treatments such as nonsteroidal anti-inflammatory drugs (NSAIDs), corticosteroids, disease-modifying antirheumatic drugs (DMARD), and biologic drugs. However, these treatments have common and harmful side effects such as liver and kidney toxicity, nausea, vomiting, loss of appetite, anemia, and ocular or systemic infections (Demirel & Kirnap, 2010). Additionally, these treatments do not lead to a complete cure of the disease or its symptoms.

Nonpharmacologic interventions have also been employed to manage symptoms and improve functional status (Kohara et al., 2004; Özdemir, Ovayolu, & Ovayolu, 2013; Wang, Tsai, Lee, Chang, & Yang, 2008). Nonpharmacologic interventions include physical therapy and rehabilitation; exercises; nutrition; peripheral techniques such as aromatherapy, massage, and reflexology; cognitive behavioral therapies; and acupuncture (Cramp et al., 2013; Hewlett et al., 2011; Wang et al., 2008).

Aromatherapy is one of the complementary therapy modalities widely used around the world to manage chronic disease symptoms (Buckle, 1999; Ernst, 2004; Kim, Nam, & Paik, 2005; Steflitsch & Steflitsch, 2008). Aromatherapy is defined as the use of essential oils extracted from plants to produce physiologic or pharmacologic effects through the sense of smell or absorption through the skin (Steflitsch & Steflitsch, 2008). Essential oils have been used for their antiseptic, antibacterial, analgesic, anti-inflammatory, antispasmodic, antitoxic, immunostimulatory, and relaxing effects for management of the symptoms of cancer, respiratory diseases, migraine, hypertension, arthritis, and muscle-related pain (Başaran, 2009; Steflitsch & Steflitsch, 2008; Yip & Tam, 2008).

Essential oils have also been used with massage because of their quick absorption into the skin. Aromatherapy and massage have been used in juvenile RA, fibromyalgia, and chronic fatigue syndrome to relieve pain, fatigue, morning stiffness, and anxiety (Ernst, 2004; Field, Diego, Hernandez-Reif, & Shea, 2007; Field et al., 1997; Kim et al., 2005). Increased physical and mental well-being have also been noted

(Brownfield, 1998; Ovayolu & Ovayolu, 2013). In a quasi-experimental study, Kim et al. (2005) found that aromatherapy massage significantly decreased pain scores for patients with RA. In another quasi-experimental study, Han et al. (2010) found that aromatherapy massage reduced pain scores and painful inflamed joints in patients with RA.

Reflexology is another complementary therapy modality with potential beneficial effects in RA. Reflexology uses specific hand and finger techniques to apply pressure to individual body parts and organs at specific reflex points on the hands and feet to stimulate endocrine glands (Wang et al., 2008). Reflexology has been found to decrease migraine, neck and arm, and low back and muscle-related pain and to improve muscle strength and tone (Gunnarsdottir & Peden-McAlpine, 2010; Poole, Glenn, & Murphy, 2007; Quinn, Hughes, & Baxter, 2008; Siev-Ner, Gamus, Lerner-Geva, & Achiron, 2003). A case study reported that reflexology significantly decreased pain scores after six 1-hour reflexology sessions (Khan, Otter, & Springett, 2006). Another study found that 45-minute reflexology interventions over 6 weeks significantly lessened fatigue in RA patients (Khan, Otter, & Springett, 2006; Otter et al., 2010).

However, few of the previously mentioned studies tested the effects of aromatherapy massage and reflexology on RA-related pain and fatigue. The authors could find no research comparing these modalities. The aim of this randomized controlled trial was to compare the effects of aromatherapy massage and reflexology on pain and fatigue in patients with RA. We hypothesized that aromatherapy massage and reflexology interventions would decrease pain and fatigue scores in subjects with RA.

## METHODS

### Ethical Considerations

This study was approved by the Ethical Commission of Turgut Ozal University, Ankara. The aim and the method of the study were explained to the subjects, and informed consent was obtained from each of the subjects. Study subjects were informed that if they did not want to continue, they could withdraw from the study without stating a reason.

### Design and Sample

This was a randomized controlled trial comparing the effects of aromatherapy massage, reflexology, and no intervention on pain and fatigue levels in subjects with RA. Data were collected between July 2014 and January 2015. A convenience sample of 54 adults

with RA was recruited from a rheumatology clinic of a university hospital located in a large city in Turkey. All subjects suffered from pain and fatigue symptoms. To be included in the study, subjects must have been 18 years or older, diagnosed with RA for at least 1 year, had a Visual Analog Scale (VAS) score of  $\geq 4$  points and a Fatigue Severity Scale (FSS) score of  $\geq 4$  points, not currently using biological drug therapy, and not currently receiving physiotherapy or using any complementary therapy modalities. Subjects with knee and foot wounds or surgery, cancer, osteoarthritis, essential oil allergies, and blood coagulation disorders such as hemophilia were excluded from the

study. In addition, those who were pregnant, anemic, or who had a Disease Activity Score (DAS28)  $> 5.1$  were also excluded from the study.

The software package G-power (Faul, Erdfelder, Buchner, & Lang, 2009) was used to conduct an apriori power analysis to calculate the number of subjects required. Fifty-one subjects (17 subjects in each study group) were required to detect an effect size of 0.3 at 80% power. The alpha level used to define significance was 0.05.

Figure 1 presents a flow diagram of subject selection and progress through the study. Fifty-four subjects met the inclusion criteria and provided consent. Subjects

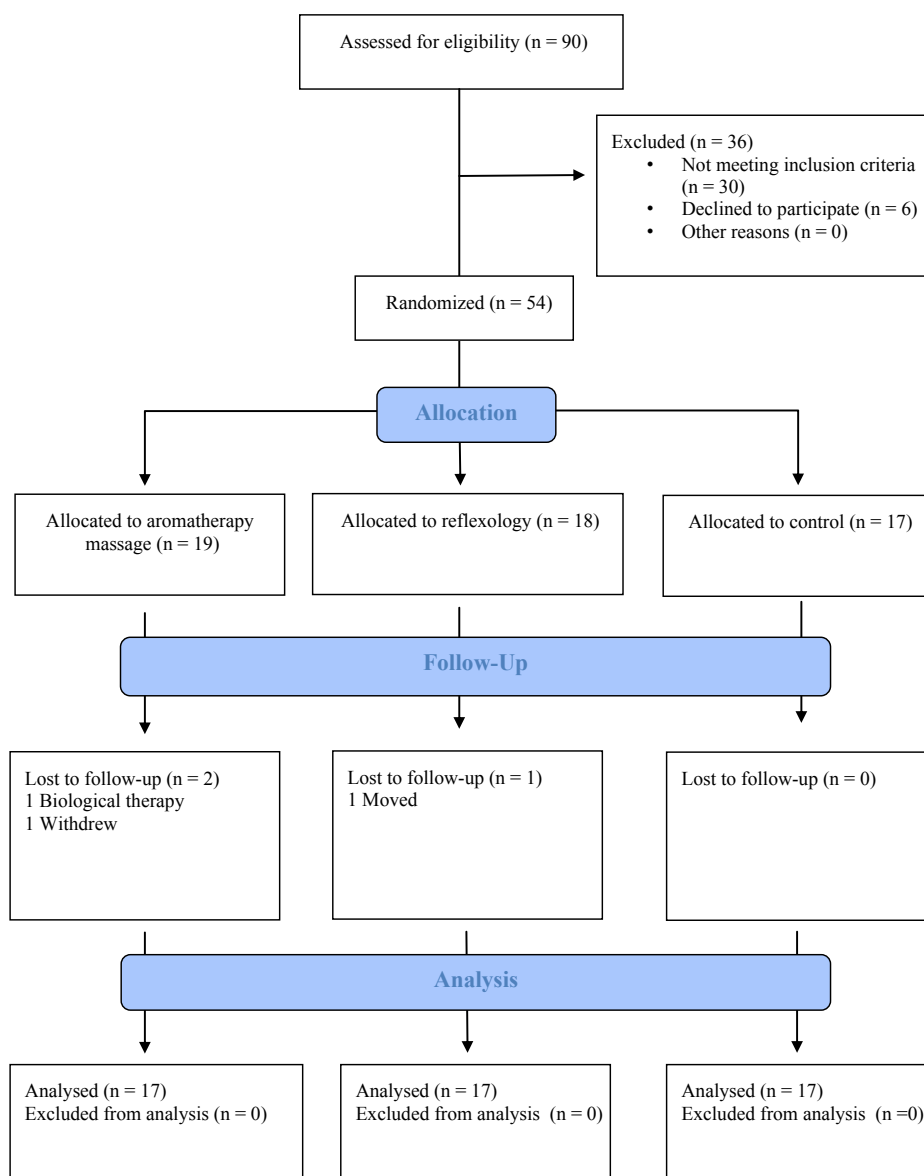


FIGURE 1. ■ Flow diagram of subject progress through the phases of randomized trial.

**TABLE 1.**  
**Active Substances in Essential Oils and Their Effects**

Essential Oil	Active Substances (%)	Effects on the Body
<i>Juniperus officinalis</i>	a-Pinene (38.99) Sabinen (10.75) Mycren (13.39) Limonene + b-Phelleandrene (4.05) Terpinen-4-ol (3.92) d-Germacren (3.66)	Analgesic Antiviral Antioxidant Antitoxic Sedative
<i>Lavendula augustifolia</i>	c-b-ocimen + limonen (3.69) Linalool (30.51) Linalyacetat (36.62) Lavandula asetat (2.90) t-b-ocimen (3.03) 1,8 Cineol (0.55) Terpinen-4-ol (2.91)	Anti-inflammatory Analgesic Antiseptic Sedative Circulation-stimulating Cell regenerating
<i>Cananga odorata</i>	Linalool + methylbenzoat (7.54) Geranylacetate (7.75) b-Caryophellen (11.16) Germacren-D (19.16) t-t-a-Farnesen (10.45) d-Cadinen (3.37) Benzyl benzoate (6.52)	Antiseptic Muscle relaxant Cell regenerating Anti-neuralgic Antidepressant Analgesic
<i>Rosmarinus officinalis</i>	a-Pinen (11.32) Limonene (2.51) 1,8 cineol (47.18) Linalool (0.93) Kampher (11.46) b-Caryophylen (2.86)	Antiviral Antibacterial Anti-inflammatory Antioxidant

were stratified by disease duration, VAS score, FSS score, DAS28 score, and type of RA treatment (DMARD or DMARD plus steroids). Next, subjects were assigned to either the control group (n = 17) or experimental groups that received aromatherapy massage (n = 19) or reflexology (n = 18) interventions by using a random number table. During the intervention, three subjects (two from the aromatherapy massage group and one in the reflexology group) were lost to attrition.

### Data Collection

Baseline data were obtained by face-to-face interviews with the subjects in the rheumatology clinic. In these interviews demographic information as well as DAS28, VAS, and FSS scores were obtained. Demographic information included the subject's age, sex, educational level, employment, smoking status, frequency of exercise, health history data, treatment period, treatment type, and use of complementary therapies (Diraçoğlu, 2007; Edwards et al., 2006; Helmick et al., 2008).

All study subjects' physical examinations and DAS28 score calculations were carried out by the same rheumatologist. The principal investigator (PI) interviewed subjects face-to-face after their physical

examinations and obtained demographic information, VAS, and FSS scores. All study individuals were then instructed on how to rate their own VAS and FSS scores. For the control group, the PI made weekly calls to obtain subjects' VAS and FSS scores during the study period. For the individuals in the experimental groups, the PI made weekly home visits to deliver aromatherapy massage or reflexology interventions, after which subjects were asked to complete the VAS and FSS scales within an hour following each intervention.

**Instruments.** DAS28 has four components measuring tender-joint count, swollen-joint count, erythrocyte sedimentation rate (ESR), and self-reported general health. The 28 tender joint count (28TJC) and 28 swollen joint count (28SJC) both have a range of 0–28. ESR range is 0–150; the general health (GH) range is 0–100. DAS28 is a continuous index with a range of 0–9.4. The level of RA disease activity is classified as low (DAS28 ≤ 3.2), moderate (DAS28 3.2 to ≤ 5.1), or high (DAS28 > 5.1). A DAS28 < 2.6 corresponds to remission status according to the American Rheumatism Association (ARA) criteria (Fransen, Stucki, & van Riel, 2003).

VAS for pain consists of a 10-cm horizontal scale with the descriptor of no pain on the left and worst

**TABLE 2.**  
**Disease and Baseline Characteristics of Subjects (N = 51)**

Characteristic	Aromatherapy		Reflexology		Control		$\chi^2, p$
	n	%	n	%	n	%	
Time since RA diagnosis (years) ( $10.7 \pm 7.8$ )							
<10	7	41.1	12	70.6	9	52.9	0.000, 1.000
$\geq 10$	10	58.9	5	29.4	8	47.1	
Pain score ( $5.9 \pm 1.88$ )							
4-6	11	64.7	11	64.7	12	70.6	0.176, .916
7-10	6	35.3	6	35.3	5	29.4	
Fatigue score ( $5.60 \pm 0.85$ )							
4-5.6	7	41.1	8	52.9	11	64.7	2.040, .361
5.7-7	10	58.9	9	47.1	6	35.3	
DAS28 score ( $2.82 \pm 0.88$ )							
<2.6	8	47.1	5	29.4	7	41.2	1.152, .562
>2.7	9	52.9	12	70.6	10	58.8	
RA treatment protocol							
DMARD	8	47.1	8	47.1	8	47.1	0.000, 1.000
DMARD + Steroid	9	52.9	9	52.9	9	52.9	

possible pain on the right (Eti Aslan, 2002; Scott & Huskisson, 1979). Subjects were asked to place a mark on the line at a point that corresponded to the level of pain intensity they were currently feeling. To provide group homogeneity, subjects were divided into two subgroups: mild to moderate (4-6) and severe (7-10) pain intensity.

The Fatigue Severity Scale (FSS) is a nine-item scale that measures the effect of fatigue on daily living using statements, such as "I am easily fatigued." Possible responses range from one ("completely disagree") to seven ("completely agree") (Schwartz, Jandorf, & Krupp, 1993). Subjects with a mean score of four or more were identified as suffering from significant fatigue. The Turkish FSS scale has a Cronbach's alpha reliability coefficient of 0.85 and internal consistency of 0.94 (Gencay-Can & Can, 2012).

### Interventions

Consistency of the aromatherapy massage and reflexology interventions was ensured by using one individual (the PI) to collect data and administer treatments using the same intervention technique. Aromatherapy massage and reflexology were administered to subjects by the PI, a certified aromatherapy massage, reflexology practitioner, and registered nurse. The control group did not receive any sham interventions and usual care was continued. Aromatherapy massage and reflexology were performed during home visits in a quiet room and at a convenient time for subjects. All study subjects continued to follow their routine RA treatments during the study. However, subjects were

asked not to take analgesic drugs on the days of the intervention.

**Aromatherapy Massage.** The aromatherapy massage essential oil was a 5% mixture consisting of *Lavandula augustifolia*, *Juniperus communis*, *Cananga odorata*, and *Rosmarinus officinalis* in the ratio 3:3:2:2 in 100 mL of coconut carrier oil (Buckle, 1999; Chang, 2008) (Table 1). The choice of essential oils was determined in consultation with the Department of Pharmacology, based on a review of the literature (Faixov & Faix, 2008; Kang & Kim, 2008; Tümen & Hafizoğlu, 2003).

Before beginning the aromatherapy massage, subjects were placed in a supine position. The aromatherapy oils were applied topically to both knees. The PI remained seated on the same side as the intervention knee. The first part of the massage was initiated with superficial effleurage from the foot superiorly, including the ankle and knee joint area, for 3 minutes before applying essential oils. In the second part of the massage, the knee area was divided into four equal quadrants (with an imaginary plus sign passing midpatella). Five drops of the essential oil blend were applied to each quadrant (total 20 drops) with both hands and with circular movements on the knee for a total of 6 minutes. The third part of the massage technique was an additional 6 minutes of massage with five drops of essential oil blend for each quadrant (total 20 drops) of the right knee. After completing the 15-minute aromatherapy massage session for the right knee, the massage was repeated on the left knee. The total duration of aromatherapy massage was

**TABLE 3.**  
**Demographic Characteristics of Subjects (N = 51)**

Characteristic	Aromatherapy		Reflexology		Control	
	n	%	n	%	n	%
Age (years) (mean = 54.4 ± 1.2)						
18–60	11	64.7	11	64.7	11	64.7
≥61	6	35.3	6	35.3	6	35.3
Sex						
Female	15	88.2	15	88.2	15	88.2
Male	2	11.8	2	11.8	2	11.8
Educational level						
Primary school	10	58.9	10	58.8	11	64.7
High school	3	17.6	2	11.8	2	11.8
University	4	23.5	5	29.4	4	23.5
Employment						
Employed	3	17.6	4	23.5	2	11.8
Retired	4	23.5	3	17.6	3	17.6
Unemployed	10	58.9	10	58.9	12	70.6
Smoking						
Active	4	23.6	4	23.6	2	11.8
Never	10	58.8	9	52.8	9	52.9
Past	3	17.6	4	23.6	6	35.3
Exercise						
3 times/week	3	17.6	0	0.0	2	11.8
<2 times/week	2	11.8	8	47.1	3	17.5
Irregular	8	47.1	5	29.4	8	47.2
No exercise	4	23.5	4	23.5	4	23.5
Comorbidity						
Hypertension	8	53.3	6	40.0	4	26.7
Coronary artery disease	2	13.3	6	40.0	2	13.3
Diabetes mellitus	4	26.7	1	6.7	2	13.3
Hyperlipidemia	2	13.3	2	13.3	2	13.3
Complementary therapy						
Experienced	8	47.1	5	29.4	6	35.3
Nonexperienced	9	52.9	12	70.6	11	64.7
Complementary therapy type						
Spa/hot spring	5	62.5	4	80.0	5	83.3
Massage	0	0.0	0	0.0	1	16.7
Herbal therapy	3	37.5	0	0.0	0	0.0
Cupping	0	0.0	1	20.0	0	0.0

30 minutes. Aromatherapy massage was provided three times each week for a 6-week period.

**Reflexology.** Before the intervention, subjects were placed in a supine position. During reflexology, the PI sat on a chair facing the subjects' feet, with the feet at the PI's chest level. Relaxation techniques were administered first to the right foot for 5 minutes. After relaxation, all reflex points and the region associated with the pituitary gland on the right foot were stimulated with thumb pressing, finger pressing, rubbing, stroking, and squeezing for 3 minutes. Subsequently, 12 minutes were spent stimulating the specific areas of the foot associated with the head, neck, shoulders, pineal, pituitary gland, solar plexus, spinal column, knees, and spleen using the same

reflexology techniques. After completion of the right foot, the same steps were repeated for the left foot. Reflexology was applied for 20 minutes on each foot, for a total of 40 minutes. Treatment was continued once weekly for a 6-week period.

#### Data Analysis

Data analyses were conducted using SPSS version 22.00 (SPSS, Inc, Chicago, IL, USA). A *p* value of <.05 was considered significant. Parametric data, such as subjects' pain and fatigue scores, were compared with ANOVA test. Nonparametric data, such as sex, educational level, and exercise status were compared with frequency and Chi-square comparisons. Tukey's HSD post-hoc test was performed for defining the differences.

**TABLE 4.**  
**Comparison of Mean Pain Scores in Intervention and Control Groups (N = 51)**

Measurement Time	Patient Group	N	VAS X ± SD	F	p	*Difference (Tukey's Test)
Baseline	Aromatherapy	17	6.00 ± 1.96	0.500	.610	-
	Reflexology	17	6.35 ± 2.17			
	Control	17	5.70 ± 1.44			
First week	Aromatherapy	17	3.88 ± 1.57	5.216	.009	2-3
	Reflexology	17	2.38 ± 2.02			
	Control	17	4.53 ± 2.29			
Second week	Aromatherapy	17	3.00 ± 1.73	7.573	.001	3-1,2
	Reflexology	17	2.03 ± 1.78			
	Control	17	5.00 ± 3.04			
Third week	Aromatherapy	17	2.65 ± 1.45	6.435	.003	3-1,2
	Reflexology	17	2.00 ± 1.73			
	Control	17	4.29 ± 2.44			
Fourth week	Aromatherapy	17	2.18 ± 1.81	8.305	.001	3-1,2
	Reflexology	17	2.18 ± 1.77			
	Control	17	4.56 ± 2.27			
Fifth week	Aromatherapy	17	2.24 ± 1.34	12.968	.001	3-1,2
	Reflexology	17	1.53 ± 1.46			
	Control	17	4.59 ± 2.47			
Sixth week	Aromatherapy	17	1.59 ± 1.17	22.652	.001	3-1,2
	Reflexology	17	0.56 ± 1.14			
	Control	17	4.29 ± 2.38			

\*1 = aromatherapy, 2 = reflexology, 3 = control.

## RESULTS

### Subjects' Demographic and Disease Characteristics

Disease and baseline scores for the three groups are shown in Table 2. The mean duration of diagnosis was  $10.7 \pm 7.8$  years. The mean score for pain was  $5.9 \pm 1.88$  years; mean score for fatigue was  $5.6 \pm 0.85$  years; and mean score for DAS28 was  $2.82 \pm 0.88$ . Regarding treatments, all subjects were taking either DMARD or DMARD plus steroids. There were no significant differences in RA characteristics or in the baseline parameters among the three groups ( $p > .05$ ).

As shown in Table 3, subjects' mean age was  $54.4 \pm 1.2$  years (range 21-89 years). The great majority of the subjects were female (88.2%), with only 2 men in each study group. The preponderance of subjects in all groups was unemployed (mean: 62.8%). More than half of the all subjects had never smoked. An average of 41.2% of subjects did not exercise regularly, and almost 24% of subjects in each study group stated they never exercise. Comorbidities varied

somewhat by group. The aromatherapy massage group showed hypertension and diabetes mellitus as the most common comorbidities, whereas the reflexology group showed hypertension and coronary artery disease as more common. In the control group, hypertension was the most common comorbidity. Hypertension was the most common comorbidity for all three study groups. Although women were more likely than men to have used complementary therapies, more than half of all subjects had never used any complementary therapy. Of those who did use complementary therapy, the most commonly used was spa/hot spring.

### Intervention Effects

At the end of the monitoring period, the analysis showed a statistically significant decrease in VAS and FSS scores among the intervention groups compared with the control group ( $p < .05$ ). Specifically, aromatherapy massage significantly decreased pain scores beginning the second week of the study. Reflexology findings showed significantly decreased pain scores

**TABLE 5.**  
**Comparison of Mean Fatigue Scores in Intervention and Control Groups (N = 51)**

Measurement Time	Patient Group	n	FSS X ± SD	F	p	*Difference (Tukey's Test)
Baseline	Aromatherapy	17	5.86 ± 0.71	1.449	.245	-
	Reflexology	17	5.58 ± 0.98			
	Control	17	5.37 ± 0.82			
First week	Aromatherapy	17	4.75 ± 0.76	4.296	.019	2-3
	Reflexology	17	4.24 ± 1.41			
	Control	17	5.30 ± 0.85			
Second week	Aromatherapy	17	4.48 ± 0.85	11.477	.001	2-1,3
	Reflexology	17	3.26 ± 1.45			
	Control	17	5.11 ± 1.03			
Third week	Aromatherapy	17	4.08 ± 1.08	8.828	.001	2-3
	Reflexology	17	3.17 ± 1.64			
	Control	17	4.97 ± 0.88			
Fourth week	Aromatherapy	17	3.49 ± 1.18	7.745	.001	3-1,2
	Reflexology	17	2.82 ± 1.75			
	Control	17	4.82 ± 1.51			
Fifth week	Aromatherapy	17	3.48 ± 1.12	11.078	.001	3-1,2
	Reflexology	17	2.54 ± 1.51			
	Control	17	4.64 ± 1.24			
Sixth week	Aromatherapy	17	2.94 ± 1.13	13.873	.001	3-1,2
	Reflexology	17	1.88 ± 1.18			
	Control	17	4.41 ± 1.79			

\*1 = aromatherapy, 2 = reflexology, 3 = control.

beginning the first week of the study (Table 4). Likewise, aromatherapy massage significantly reduced fatigue scores beginning the fourth week of the study. Reflexology reduced fatigue scores beginning the first week of the study (Table 5).

The effects of the reflexology intervention were earlier than for aromatherapy massage. In addition, the pain scores were significantly lower each week (except for week 4) for subjects who received the reflexology intervention compared with subjects who received aromatherapy massage. Similar findings were seen with fatigue scores. The fatigue scores were significantly lower each week for subjects who received the reflexology intervention compared with subjects who received aromatherapy massage (Tables 4 and 5).

## DISCUSSION

This study demonstrated that aromatherapy massage and reflexology were superior to a no-intervention control in reducing pain and fatigue scores. In

addition, reflexology appears to have a greater effect than aromatherapy massage for reducing pain and fatigue scores in RA subjects.

There was a significant reduction in the intervention groups' mean pain scores compared with the control group throughout the intervention period, beginning the first week for reflexology and the second week for aromatherapy massage. Similar to current study results, aromatherapy massage administered to RA subjects for two consecutive evenings reduced pain in a randomized controlled study (Brownfield, 1998). In a quasi-experimental study, aromatherapy massage significantly decreased pain scores of RA subjects (Kim et al., 2005). Similarly, a quasi-experimental study found that aromatherapy massage administered for 4 weeks reduced the number of tender and swollen joints and pain scores in subjects with RA (Han et al., 2010). Regarding reflexology, a case report using reflexology for subjects with RA noted a decrease in pain after the first session (Khan et al., 2006).

In the current study, pain reduction in aromatherapy massage started later compared with



reflexology. This delayed effect may be due to essential oils' slow absorption by inflamed joints or differential response times among individuals to aromatherapy massage. Reflexology's rapid impact can be attributed to its effects on nerves and joints, and stimulation of the entire body immediately after intervention (Khan et al., 2006; Taha & Ali, 2011).

According to the results of this study, reflexology is more effective than aromatherapy massage at reducing fatigue scores from the beginning of the intervention. Nonetheless, aromatherapy massage also decreased fatigue scores, starting the fourth week of the study. This result confirms previous work and may be interpreted as indicating that reflexology has a quick effect on the body (Otter et al., 2010). Also, reflexology decreased pain scores starting the first week, and this led to relief of fatigue associated with pain.

### Limitations

This study had some limitations. First, the PI collected the data for both the control and experimental groups and administered all the interventions. This could be a potential bias. Another limitation was the homogeneous nature of the sample, which makes findings difficult to generalize to all subjects with RA. Third, this study protocol occurred over 6 weeks with no follow-up, so the long-term effects are unknown. Therefore, a study identifying the long-term effects would be better able to describe the full impact of the interventions. Finally, the effects of aromatherapy massage and reflexology were examined only for pain and fatigue symptoms, so it is not known whether other symptoms may be equally impacted by these interventions.

## CONCLUSIONS AND IMPLICATIONS FOR NURSING

This study is intended to demonstrate the effectiveness of aromatherapy massage and reflexology as pain and fatigue relief in a real-world setting such as a rheumatology clinic, and to justify their introduction in the field of rheumatology.

In this study, aromatherapy massage and reflexology significantly decreased pain and fatigue symptoms in subjects with RA in the short term. Thus, the study confirms that aromatherapy massage and reflexology can be applied as nonpharmacologic methods for managing pain and fatigue in subjects with RA. Based on the study results, aromatherapy massage and reflexology may be beneficial for RA subjects. Moreover, these complementary treatments are useful for nurses who can apply aromatherapy massage and reflexology as a component of care for symptom management in RA subjects. However, practitioner training and experience with aromatherapy massage and reflexology are critical to achieving successful results.

The authors suggest that future research should explore aromatherapy massage and reflexology for other RA symptoms such as joint immobility, sleep disturbance, and depression to provide more comprehensive care for subjects with RA.

### Acknowledgments

The authors are grateful to the people who participated in the study; Umut Kalyoncu, MD, who helped recruit study subjects in the rheumatology clinic; and Marie Bakitas, DNSc, CRNP, who edited the manuscript.

## REFERENCES

- Başaran, A. (2009). Doğal aromaterapötik bitkiler ve uçucu yağlar. *Türkiye Klinikleri Journal of Medical Sciences*, 29(5), 86-94.
- Brownfield, A. (1998). Aromatherapy in arthritis: A study. *Nursing Standard*, 13(5), 34-35.
- Buckle, J. (1999). Use of aromatherapy as a complementary treatment for chronic pain. *Alternative Therapies in Health and Medicine*, 5(5), 42-51.
- Chang, S. Y. (2008). Effects of aroma hand massage on pain, state anxiety and depression in hospice patients with terminal cancer. *Journal of Korean Academy of Nursing*, 38(4), 493-502.
- Cornell, P. (2007). Management of patients with rheumatoid arthritis. *Nursing Standard*, 22(4), 51-57, quiz 58.
- Cramp, F., Hewlett, S., Almeida, C., Kirwan, J. R., Choy, E. H., Chalder, T., Pollock, J., & Christensen, R. (2013). Non-pharmacological interventions for fatigue in rheumatoid arthritis. *Cochrane Database of Systematic Reviews*, 8, CD008322.
- Demirel, A., & Kirnap, M. (2010). Romatoid artrit tedavisinde geleneksel ve güncel yaklaşımlar. *Saglik Bilimleri Dergisi*, 19(1), 74-84.
- Diraçoğlu, D. (2007). Romatoid artrit tamamlayıcı-alternatif tıp yöntemleri. *Romatizma*, 22(1), 24-30.
- Edwards, R. R., Bingham, C. O., Bathon, J., & Haythornthwaite, J. A. (2006). Catastrophizing and pain in arthritis, fibromyalgia, and other rheumatic diseases. *Arthritis Care & Research*, 55(2), 325-332.
- Ernst, E. (2004). Musculoskeletal conditions and complementary/alternative medicine. *Best Practice & Research Clinical Rheumatology*, 18(4), 539-556.
- Eti Aslan, F. (2002). Pain assessment methods. *Journal of Cumburiyet University School of Nursing*, 6(1), 9-16.

- Faixov, Z., & Faix, S. (2008). Biological effects of rosemary (*Rosemarinus officinalis*) essential oil. *Folia Veterinaria*, 52(3-4), 135-139.
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G\* Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149-1160.
- Field, T., Diego, M., Hernandez-Reif, M., & Shea, J. (2007). Hand arthritis pain is reduced by massage therapy. *Journal of Bodywork and Movement Therapies*, 11(1), 21-24.
- Field, T., Hernandez-Reif, M., Seligmen, S., Krasnegor, J., Sunshine, W., Rivas-Chacon, R., Schanberg, S., & Kuhn, C. (1997). Juvenile rheumatoid arthritis: Benefits from massage therapy. *Journal of Pediatric Psychology*, 22(5), 607-617.
- Fransen, J., Stucki, G., & van Riel, P. L. (2003). Rheumatoid arthritis measures: Disease activity score (DAS), disease activity Score-28 (DAS28), rapid assessment of disease activity in rheumatology (RADAR), and rheumatoid arthritis disease activity Index (RADAI). *Arthritis Care & Research*, 49(S5), S214-S224.
- Gencay-Can, A., & Can, S. S. (2012). Validation of the Turkish version of the fatigue severity scale in patients with fibromyalgia. *Rheumatology International*, 32(1), 27-31.
- Gunnarsdottir, T. J., & Peden-McAlpine, C. (2010). Effects of reflexology on fibromyalgia symptoms: A multiple case study. *Complementary Therapies in Clinical Practice*, 16(3), 167-172.
- Han, S.-H., Nam, E.-S., Uhm, D.-C., Kim, K.-S., Paik, S.-I., & Park, S.-H. (2010). Effects of aromatherapy on pain and inflammatory responses in patients with rheumatoid arthritis. *Journal of Muscle and Joint Health*, 17(1), 25-34.
- Helmick, C. G., Felson, D. T., Lawrence, R. C., Gabriel, S., Hirsch, R., Kwoh, C. K., Liang, M. H., Kremers, H. M., Mayes, M. D., Merkel, P. A., Pillemer, S. R., Reveille, J. D., Stone, J. H., & (National arthritis data Workgroup) (2008). Estimates of the prevalence of arthritis and other rheumatic conditions in the United States: Part I. *Arthritis & Rheumatism*, 58(1), 15-25.
- Hewlett, S., Ambler, N., Almeida, C., Cliss, A., Hammond, A., Kitchen, K., Knops, B., Pope, D., Spears, M., Swinkels, A., & Pollock, J. (2011). Self-management of fatigue in rheumatoid arthritis: A randomised controlled trial of group cognitive-behavioural therapy. *Annals of the Rheumatic Diseases*, 70(6), 1060-1067.
- Hewlett, S., Nicklin, J., & Treharne, G. (2008). *Fatigue in musculoskeletal conditions. Topical reviews series 6*. Chesterfield, UK: Arthritis Research.
- Kang, S.-J., & Kim, N.-Y. (2008). The effects of aroma hand massage on pruritus, fatigue and stress of hemodialysis patients. *Korean Journal of Adult Nursing*, 20(6), 883-894.
- Khan, S., Otter, S., & Springett, K. (2006). The effects of reflexology on foot pain and quality of life in a patient with rheumatoid arthritis: A case report. *The Foot*, 16(2), 112-116.
- Kim, M.-J., Nam, E.-S., & Paik, S.-I. (2005). The effects of aromatherapy on pain, depression, and life satisfaction of arthritis patients. *Taeban Kanbo Hakboe chbi*, 35(1), 186-194.
- Kohara, H., Miyauchi, T., Suehiro, Y., Ueoka, H., Takeyama, H., & Morita, T. (2004). Combined modality treatment of aromatherapy, footsoak, and reflexology relieves fatigue in patients with cancer. *Journal of Palliative Medicine*, 7(6), 791-796.
- Otter, S., Church, A., Murray, A., Lucas, J., Creasey, N., Woodhouse, J., Grant, R., & Cooper, H. (2010). The effects of reflexology in reducing the symptoms of fatigue in people with rheumatoid arthritis: A preliminary study. *The Journal of Alternative and Complementary Medicine*, 16(12), 1251-1252.
- Ovayolu, Ö., & Ovayolu, N. (2013). Onkolojide semptom yönetiminde kullanılan kanıt temelli tamamlayıcı yöntemler ve etkileri. *ERÜ Sağlık Bilimleri Fakültesi Dergisi*, 1(1), 83-98.
- Özdemir, G., Ovayolu, N., & Ovayolu, Ö. (2013). The effect of reflexology applied on haemodialysis patients with fatigue, pain and cramps. *International Journal of Nursing Practice*, 19(3), 265-273.
- Pollard, L. C., Choy, E. H., Gonzalez, J., Khoshaba, B., & Scott, D. L. (2006). Fatigue in rheumatoid arthritis reflects pain, not disease activity. *Rheumatology*, 45(7), 885-889.
- Poole, H., Glenn, S., & Murphy, P. (2007). A randomised controlled study of reflexology for the management of chronic low back pain. *European Journal of Pain*, 11(8), 878-887.
- Quinn, F., Hughes, C. M., & Baxter, G. D. (2008). Reflexology in the management of low back pain: A pilot randomised controlled trial. *Complementary Therapies in Medicine*, 16(1), 3-8.
- Schwartz, J. E., Jandorf, L., & Krupp, L. B. (1993). The measurement of fatigue: A new instrument. *Journal of Psychosomatic Research*, 37(7), 753-762.
- Scott, J., & Huskisson, E. C. (1979). Vertical or horizontal visual analogue scales. *Annals of the Rheumatic Diseases*, 38(6), 560.
- Siev-Ner, I., Gamus, D., Lerner-Geva, L., & Achiron, A. (2003). Reflexology treatment relieves symptoms of multiple sclerosis: A randomized controlled study. *Multiple Sclerosis*, 9(4), 356-361.
- Stefflitsch, W., & Stefflitsch, M. (2008). Clinical aromatherapy. *Journal of Men's Health*, 5(1), 74-85.
- Taha, N. M., & Ali, Z. H. (2011). Effect of reflexology on pain and quality of life in a patient with rheumatoid arthritis. *Life Science Journal-Acta Zhenzhen University Overseas Edition*, 8(2), 357-365.
- Tümen, İ., & Hafizoğlu, H. (2003). Türkiye'de yetişen ardıc (*Juniperus l.*) türlerinin kozalak ve yaprak uçucu yağlarının bileşiminde bulunan terpen grupları. *Bartın Orman Fakültesi Dergisi*, 5(5), 78-87.
- Wang, M.-Y., Tsai, P.-S., Lee, P.-H., Chang, W.-Y., & Yang, C.-M. (2008). The efficacy of reflexology: Systematic review. *Journal of Advanced Nursing*, 62(5), 512-520.
- Yip, Y. B., & Tam, A. C. (2008). An experimental study on the effectiveness of massage with aromatic ginger and Orange essential oil for moderate-to-severe knee pain among the elderly in Hong Kong. *Complementary Therapies in Medicine*, 16(3), 131-138.