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The effect of aromatherapy massage with lemon and peppermint essential oil on menopausal symptoms: A double-blinded, randomized placebo controlled clinical trial☆

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ARTICLE INFO

Keywords:
Aromatherapy
Menopause
Massage
Peppermint essential oil
Lemon essential oil

ABSTRACT

Objectives: Menopausal and postmenopausal women experience many physical and psychological symptoms. The positive effects of aromatherapy sessions with different oils on menopausal symptoms are well known. The aim of this study was to investigate the effect of an aromatherapy massage with peppermint and lemon essential oil on menopausal symptoms.

Methods: Total 63 menopausal and postmenopausal women were included in this study. Participants were randomly divided into three groups: Menta peppermint ($n = 21$), Citrus lemon ($n = 21$), and Placebo ($n = 21$). The peppermint and lemon essential oils of the intervention groups were diluted with 1.5 % sweet almond oil. Pure sweet almond oil was used in the placebo group. Each participant in the massage groups received a hand and arm massage with the selected oil twice a week for 4 weeks in 30-min sessions. Participants' menopausal symptoms were assessed before and after application using the Menopause Symptoms Rating Scale (MRS).

Results: When the differences in the treatment groups according to time were examined, it was found that there were statistically significant differences in lemon ($F = 9.561$, $p = 0.003$, $\eta^2 = 0.139$) and peppermint essential oil ($F = 15.687$, $p = 0.001$, $\eta^2 = 0.210$) groups according to time. The peppermint essential oil group was more effective than the lemon group. In addition, both peppermint and lemon essential oils were effective for somatic symptoms ($p < 0.05$). For psychological symptoms, only the lemon oil ($p = 0.011$) proved effective, and for urogenital symptoms, only the peppermint essential oil ($p = 0.001$).

Conclusion: The study found that aromatherapy massage with peppermint and lemon essential oil effectively reduced menopausal symptoms. Peppermint essential oil was more effective than lemon essential oil in reducing the menopausal symptoms.

The Clinical trial registration number: NCT05677698.

Introduction

Menopause is a process experienced by women that involves physiological, psychological, and hormonal changes.[1] Estrogen and progesterone production starts to decline with menopause and stops during menopause. In addition to physical symptoms such as hot flashes, excessive sweating, headache, decreased libido, fatigue, sleep disturbances, and palpitations, psychological symptoms such as anxiety, depression, and mood swings often occur.[2-4] Reducing the symptoms that occur during menopause and making women more comfortable during this period is important to reduce the complaints experienced by menopausal women.[5] Massage is suggested to be effective during menopausal transition and postmenopause, being related to the improvement of the level of fatigue, anxiety and depression.[6,7] Aromatherapy massage during menopause, is a complementary method to reduce physiological and psychological symptoms.[8,9]

Aromatherapy is defined as "the science of using highly concentrated essential oils or essences distilled from plants to utilize their therapeutic

☆ *Note:* A summary of this study was presented at the 3RD International Acharaka Congress on Medicine, Nursing, and Health Sciences convention on March 11–13, 2023. İzmir/Turkey.

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https://doi.org/10.1016/j.explore.2023.09.001
Received 24 July 2023; Received in revised form 5 September 2023; Accepted 5 September 2023
Available online 13 September 2023

properties".[10] Essential oils, which can be applied in a variety of ways, can directly reach the neocortex part of the brain through connections extending to the limbic system and the hypothalamus through scent. Essential oils cross the blood-brain barrier and affect the cerebral cortex, thalamus and limbic system. In this way, essential oils reduce symptoms of anxiety and depression and improve sleep quality.[10,11]

Many aromatherapy studies on menopause have used essential oils such as lavender, rose, geranium and jasmine, rosemary, and citrus aurantium.[8,12-18] There is a systematic review and meta-analysis on the subject, studies on women's health show that lemon essential oil reduces labor pain[19] and reduces nausea and vomiting[20] during pregnancy. Peppermint essential oil, on the other hand, is reported to reduce nausea and vomiting in pregnancy,[21] and reduce nipple cracks in breastfeeding mothers.[22] Although peppermint and lemon essential oils are known to have an effect on menopausal symptoms, there are no studies comparing their effectiveness. This aim of this study was to investigate the effect of aromatherapy massage with peppermint and lemon essential oil on menopausal symptoms.

Methods

Protocol

This study' design was carried out with the approval of the KTO Karatay University Faculty of Medicine Non-Pharmaceutical and Non-Medical Device Researches Ethics Committee (Date: 21.09.2022, Decision No: 2022/016) and was prospectively registered on clinicaltrials.gov (registration number: NCT05677698). This study was reported according to the recommendations of the Consolidated Standards of Reporting Trials (CONSORT) Statement.[23]

Participants

This study was carried out between December 2022 and February 2023 at KTO Karatay University Midwifery Practice Laboratory. The university allowed us to use the application laboratory for 3 months at appropriate hours. Therefore, the study was conducted after the participants were recruited. A total of 63 volunteer participants menopausal and postmenopausal women aged 45–65 years were included. The participants were informed before the study and their consent was obtained. All phases of this study were carried out in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

The inclusion criteria were: having a score above 1 point in the Menopause Rating Scale (MRS), no respiratory disease such as asthma or bronchitis (self-report), absence of hormone replacement therapy, no allergy to the oils to be used (self-report), being diagnosed with menopause or postmenopausal period by a doctor.[24] The exclusion criteria were: absence of menopausal symptoms, allergy to the oils to be used, having a respiratory disease such as asthma, or bronchitis, and failure to give consent, conditions where massage is contraindicated, such as breast cancer or lymphedema.

Randomization and blinding

Participants were randomly assigned to one of three study groups (lemon, peppermint, or placebo) with a 1:1 allocation ratio via an Internet-based randomization website (www.randomizer.org) by an independent investigator. All participants were informed that they would be randomly assigned to one of the three study groups. All outcomes were assessed at base line and immediately after treatment by a blinded investigator. Participants were randomly allocated blindly without knowing which groups were in the study. Participants were not informed about which oil they would receive treatment with, and the oils to be applied to the participants were of standard color, shape and size.[25] All participants received the same instructions and performed the interventions in different rooms.

Sample size

The study sample was determined using the G*Power program (version 3.0.10; Franz Foul, Universitat Kiel, Germany). The sample size was calculated as at least 21 individuals in each group, for the effect size of 0.41, Type I error of 0.05, and power of 80 % obtained from our pilot study which we conducted with ten participants.

Interventions

In all groups, each participant received a 30-min session of aromatherapy message (with Euphlorage and Petrisaj techniques) twice per week for 4 weeks (a total of 8 sessions), on their hands and arms. It was applied to the hand-arm area as it is more practical and easier for the participant to smell the aroma. Before the sessions, participants received the same information about possible side effects of the therapies. Additionally, participants were informed about photo sensibility application of lemon essential oil. All sessions were performed by a midwife with 2 years of experience in the field of aromatherapy under the supervision of a medical specialist. Before the sessions, the participants received the same information about the effect of the therapies. For the sessions, the participants took a seat in a back-support chair, directly in front of the therapist, arms relaxed on the table. All interventions were performed in separate rooms at a temperature of 23 °C to prevent odour contamination. The room was ventilated for 10 min between participants. The essential oils were purchased from a certified organic and tested company.

Lemon essential oil group

Lemon essential oil diluted with 1.5 % sweet almond oil (2 drops of aromatic oil to 5cc sweet almond oil). After the oil was diluted, it was heated up to 36°C. The participant was seated in a back-support chair, directly opposite the therapist, with arms relaxed on the table. The therapist massaged the right hand and arm (up to the elbow) for 15 min, and the left hand and arm (up to the elbow) for 15 min. After the massage, hands and arms were wrapped with dry towels for 5 min.

Peppermint essential oil group

Peppermint essential oil diluted with 1.5 % sweet almond oil (2 drops of aromatic oil to 5cc sweet almond oil). After the oil was diluted, it was heated up to 36°C. The participant was seated in a back-support chair, directly opposite the therapist, with arms relaxed on the table. The therapist massaged the right hand and arm (up to the elbow) for 15 min, and the left hand and arm (up to the elbow) for 15 min. After the massage, hands and arms were wrapped with dry towels for 5 min.

Placebo group

Pure sweet almond oil was heated up to 36°C. The participant was seated in a back-support chair, directly opposite the therapist, with arms relaxed on the table. The therapist massaged the right hand and arm (up to the elbow) for 15 min, and the left hand and arm (up to the elbow) for 15 min. After the massage, hands and arms were wrapped with dry towels for 5 min.

Measurements

All measurements were carried out by a blinded evaluator before the first intervention and at the end of the study.

The primary outcome of the study was menopausal symptoms. The Menopause Rating Scale (MRS) developed by Schneider et al.[26] and adapted into Turkish by Gurkan[27] was used to assess menopausal

symptoms. The 5-point Likert-type MRS consists of 11 items, of each including "0 = none"', "1 = mild", "2 = moderate", "3 = severe", and "4 = very severe". Scores for each item are used to calculate the total score of the scale. The lowest score from the scale is 0, and the highest score is 44. The increase in the total score from the scale indicates the increase in the severity of the complaints that are experienced.

Statistical analysis

A statistical package program SPSS 25 (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, version 25.0. Armonk, NY: IBM Corp.) was used to analyze the data. Descriptive statistics (mean, standard deviation, number, and percentile) for categorical and continuous variables were reported in the study. The Kruskal–Wallis test was used for the multigroup comparisons. Fisher's exact test was used to compare categorical data. Homogeneity of variances, one of the prerequisites for the parametric tests, was checked with "Levene's test". The normality assumption was checked with the "Shapiro-Wilk" test. The mixed design analysis of variance and the "Bonferroni-Dunn" test, one of the tests for multiple comparisons, were used to make a general assessment between iterative measurements and groups in the analyzes, and the "Bonferroni-Dunn" test was used to see the change over time. The Eta-squared coefficient (effect size) (η^2) was used to calculate the strength of the relationship between variables. A value of $p < 0.05$ was considered statistically significant.

Results

Sixty-three volunteer participants who had been diagnosed with menopause by a specialized physician or were in the postmenopausal period were included in this study. One of the participants did not complete the study for personal reasons **(**Fig. 1**).** The age of the participants ranged from 45 to 65 years with a mean age of 52.45 ± 5.83 years, and the duration of menopause ranged from 1 to 8 years with a mean age of 4.16 ± 3.06 years. The duration of menopause, marital status, educational level and income status of the participants are given in Table 1 (Table 1).

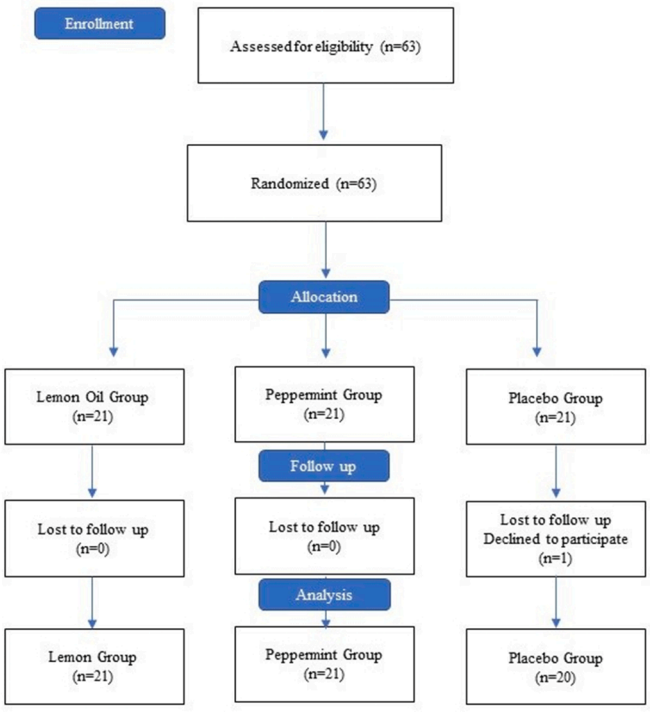

Fig. 1. CONSORT flow diagram of the study.

Table 1
Demographic data.

	Lemon essential oil group ($n = 21$) (M ± SD, n (%))	Peppermint essential oil group ($n = 21$) (M ± SD, n (%))	Placebo group (almond oil) ($n = 20$) (M ± SD, n(%))	p
Age (year)	50.90 ± ± 6.94	54.90 ± ± 5.95	51.24 ± ± 4.63	0.062[a]
Menopause Duration (year)	2.86 ± ± 2.72	5.81 ± ± 2.85	3.71 ± ± 2.91	0.004[a]
Marital status				
Married	20 (%95.2)	14 (%66.7)	18 (%85.7)	0.080[b]
Widowed	1(%4.8)	6 (%28.6)	3 (%14.3)	
Single	0	1 (%4.8)	0	
Education level				
Literate	2 (%9.5)	3 (%14.3)	1 (%4.8)	0.003[b]
Primary school	5 (%23.8)	12 (%57.1)	17 (%81.0)	
Middle school	2 (%9.5)	1 (%4.8)	2 (%9.5)	
High school	3 (%14.3)	3 (%14.3)	1 (%4.8)	
University and above	9 (%42.9)	2 (%9.5)	0	
Income status				
Income less than expenses	4 (%19.0)	8 (%38.1)	1 (%4.8)	0.009[b]
Income and expense equal	16 (%76.2)	10 (%47.6)	18 (%85.7)	
Income more than expenses	1 (%4.8)	3 (%14.3)	2 (%9.5)	

M, mean; SD, standard deviation; n, number; %, percantange.
[a] Kruskal–Wallis.
[b] Fisher's exact test; $p < 0.05$.

Participant's base line values of the Menopause Rating Scale and the scores of the sub-parameters were similar ($p > 0.05$) (Table 2).

There was no significant "group × time" interaction effect for the MRS subscales of somatic symptoms compared to the groups ($F = 0.344$, $p = 0.710$). The within group difference in lemon essential oil group for the MRS subscales of somatic symptoms significantly lower post-intervention compared to base line ($F = 10.120$, $p = 0.002$, $\eta^2 = 0{,}144$). The within group difference in peppermint essential oil group for the MRS subscales of somatic symptoms significantly lower post-intervention compared to base line ($F = 30.607$, $p = 0.001$, $\eta^2 = 0{,}338$). For the MRS subscales of somatic symptoms, there was no significant between-group difference in the almond group compared to base line ($F = 0.808$ $p = 0.372$) (Table 3).

There was no significant "group × time" interaction effect for the MRS subscales of psychological symptoms compared to the groups ($F = 1.204$, $p = 0.307$). The within group difference in lemon essential oil

Table 2
Before application - comparison of MRS sub-dimension and total scale mean scores by groups.

	Lemon essential oil group ($n = 21$) M ± SD	Peppermint essential oil group ($n = 21$) M ± SD	Placebo group (almond oil) ($n = 20$) M ± SD	p
MRS somatic symptoms	10.85 ± 3.74	11.66 ± 3.81	10.71 ± 2.90	0.640
MRS psychological symptoms	11.28 ± 3.92	10.14 ± 3.92	11.47 ± 4.16	0.511
MRS urogenital symptoms	6.95 ± 2.10	7.05 ± 2.74	6.57 ± 2.56	0.878
MRS total score	29.09 ± 8.14	29.10 ± 8.29	28.76 ± 7.62	0.984

M, mean; SD, standard deviation; n, number; $p < 0.05$.

Table 3
After application- intragroup comparison of the mean differences of MRS subdimension and total scale score.

	Groups	MD ± SE	*p*
MRS somatic symptoms	Lemon Essential Oil ($n = 21$)	2.19 ± 0.68	**0.002***
	Peppermint Essential Oil ($n = 21$)	3.81 ± 0.68	**0.001***
	Placebo (Almond Oil) ($n = 20$)	0.61 ± 0.68	0.372
MRS psychological symptoms	Lemon Essential Oil ($n = 21$)	2.57 ± 0.98	**0.011***
	Peppermint Essential Oil ($n = 21$)	1.85 ± 0.98	0.064
	Placebo (Almond Oil) ($n = 20$)	1.76 ± 0.98	0.078
MRS urogenital symptoms	Lemon Essential Oil ($n = 21$)	0.95 ± 0.57	0.100
	Peppermint Essential Oil ($n = 21$)	2.00 ± 0.58	**0.001***
	Placebo (Almond Oil) ($n = 20$)	0.61 ± 0.57	0.281
MRS total score	Lemon Essential Oil ($n = 21$)	5.71 ± 1.84	**0.003***
	Peppermint Essential Oil ($n = 21$)	7.50 ± 1.89	**0.001***
	Placebo (Almond Oil) ($n = 20$)	3.00 ± 1.84	0.110

MD, mean difference; SE, standard error; MRS, menopause rating scale, *n*, number; $p < 0.05$.

group for the MRS subscales of psychological symptoms significantly lower post-intervention compared to base line ($F = 6.843$, $p = 0.011$, μ2 = 0.102). For the MRS subscales of psychological symptoms, there was no significant between-group difference in the peppermint essential oil ($F = 3.569$, $p = 0.064$) and almond oil ($F = 3.213$, $p = 0.78$) groups by measurement time (Table 3).

There was no significant "group × time" interaction effect for the MRS subscales of urogenital symptoms compared to the groups ($F = 0.245$, $p = 0.783$). The within group difference in lemon essential oil group for the MRS subscales of urogenital symptoms significantly lower post-intervention compared to base line ($F = 11.744$, $p = 0.001$, $\eta^2 = 0.166$). For the MRS subscales of urogenital symptoms, there was no significant between-group difference in the peppermint essential oil ($F = 2.796$, $p = 0.100$) and almond oil ($F = 1.181$, $p = 0.281$) groups by measurement time (Table 3).

There was no significant "group × time" interaction effect for the total MRS scores compared to the groups ($F = 0.488$, $p = 0.616$). The within group difference in lemon essential oil group for the total MRS scores significantly lower post-intervention compared to base line ($F = 9.561$, $p = 0.003$, $\eta^2 = 0{,}139$). The within group difference in peppermint essential oil group for the total MRS scores significantly lower post-intervention compared to base line ($F = 15.687$, $p = 0.001$, $\eta^2 = 0.210$). For the MRS subscales of somatic symptoms, there was no significant between-group difference in the almond oil group compared to base line ($F = 2.635$, $p = 0.110$) group by measurement time (Table 3).

Discussion

Menopause is a natural process of aging in women. Additionally, accompanied by various physiological changes in women. One of the most obvious changes is the decrease in female sex hormones. As a result, many symptoms (hot flashes, palpitations, depression, anxiety, dyspareunia, etc.) may occur. Menopausal and postmenopausal symptoms can negatively affect women's lives.[28] During this time, women may need the help of health professionals. Traditional medicine methods are also used to reduce the symptoms experienced during this period. Aromatherapy massage is one of these methods. This study was carried out to evaluate the effect of aromatherapy massage with peppermint and lemon essential oil twice a week for a period of 4 weeks, for a total of 8 sessions, on menopausal symptoms. Participants who received aromatherapy massage with peppermint and lemon essential oil experienced a greater reduction in menopausal symptoms than the placebo group. In addition, peppermint essential oil was found to reduce menopausal symptoms more than lemon essential oil.

Essential oils used in aromatherapy have been shown to have a phytoestrogen effect and effectively reduce the physical and psychological symptoms of menopause by improving the lipid profiles of menopausal people.[29] Twelve weeks of aromatherapy with lavender inhalation is effective in reducing menopausal hot flushing and menopausal symptoms.[8,30] Eight sessions of massage with aromatherapy oil (lavender, rose geranium, rose, and rosemary in a 4:2:1:1:1 ratio, diluted almond (90 %) and evening primrose oil (10 %) at a final concentration of 3 %) is effective in reducing menopausal symptoms.[15] The results of this study were similar to the results of other aromatherapy applications in the literature. Lavender essential oil is generally used in the literature. In this study, unlike other studies, lemon and peppermint essential oil were found to be effective. Peppermint essential oil has anti-inflammatory, analgesic, anti-infectious, antimicrobial, antiseptic, antispasmodic effects.[31] Lemon essential oil has analgesic, antidepressant, anti-inflammatory, sedative, antibacterial, anti-stress, insecticide, anxiolytic and penetration enhancing effects.[32] We think that the reason for the effectiveness of mint and lemon essential oils in our study is the properties of the oils.

This study's results showed that aromatherapy massage with peppermint or lemon essential oil effectively reduce somatic complaints (joint and muscle discomfort, hot flashes, excessive sweat, sleep disturbances, cardiac problems) during menopause and postmenopause. In their study evaluating the effect of peppermint and lavender essential oil aromatherapy on sleep quality in cardiac patients, Mahdavikyan et al.[33] showed that peppermint and lavender essential oils improved sleep quality.[33] In another study, peppermint essential oil massage was found to be an effective method for relieving muscle pain.[34,35] in a study of aromatherapy with lemon essential oil inhalation in patients with acute myocardial infarction, found that lemon essential oil inhalation reduced anxiety and regulated heart rate in systolic blood pressure.[35] Although different effects of peppermint and lemon essential oil were observed in studies on different groups of patients, no study was found that addressed menopausal somatic symptoms.

Lemon essential oil accelerates the turnover of dopamine in the hippocampal region, producing an antidepressant effect. In this way, it is used therapeutically to reduce the symptoms of depression.[36] Lemon essential oil has been reported to have positive effects on mood, mental well-being (cognitive well-being) and discomfort due to its stimulating effect on the central nervous system.[37] In this study, lemon essential oil was found to effectively reduce psychological symptoms in menopausal and postmenopausal women. There are findings that aromatherapy with lemon essential oil can be used as an alternative treatment for various groups of patients to change the stress and negative health consequences of various diseases.[38,39] However, no other study was found in the literature that investigated the effect of aromatherapy massage with lemon essential oil on the psychological symptoms of menopausal and postmenopausal women.

Peppermint essential oil is frequently used in women's health, especially in pregnant women. As a result of this study, peppermint essential oil was found to be effective in relieving urogenital complaints, sexual problems (dyspareunia, loss of libido, etc.), and vaginal dryness in menopausal and postmenopausal women. We think that peppermint essential oil may be effective on sexual dysfunction and urogenital problems by inhibiting muscle contraction with its anti-spasmotic effect. Peppermint essential oil has an anti-spasmatic effect.[31] There is no study in the literature investigating the effect of peppermint essential oil on urogenital complaints and sexual problems. These results suggest that further research is needed.

Conclusion

Various studies have shown that aromatherapy has an effect on menopausal symptoms in menopausal women. According to the results of this study, aromatherapy massage with peppermint and lemon essential oil was found to reduce menopausal symptoms. Peppermint essential oil was found to be more effective than lemon essential oil. It is believed that peppermint and lemon essential oil can be recommended to reduce menopausal and postmenopausal women's symptoms. However, further evidence-based studies are needed for recommendations to be evidence-based.

Author statement

All the authors approved the final version of the manuscript for submission.

Limitations

The study had some limitations. The participants' other chronic diseases that may cause menopausal symptoms were not considered, and their drug use was not disregarded. The strength of the study was that it was randomized and double-blind.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

CRediT authorship contribution statement

Şerife İrem Döner: Conceptualization, Investigation, Supervision, Visualization, Validation, Data curation, Writing – original draft, Resources, Methodology, Project administration, Writing – review & editing. **Hafize Dağ Tüzmen:** Conceptualization, Investigation, Supervision, Visualization, Validation, Writing – original draft, Resources, Methodology, Project administration, Writing – review & editing. **Büşra Duran:** Writing – original draft, Resources, Investigation, Supervision, Visualization, Validation. **Füsun Sunar:** Supervision, Resources.

Acknowledgements

We would like to thank Ph.D. Assistant Professor Hediye Karakoç for supporting the study and all women who participated in the study voluntarily.

References

1 Santoro N, Epperson CN, Mathews SB. Menopausal symptoms and their management. *Endocrinol Metab Clin*. 2015;44(3):497–515. https://doi.org/10.1016/j.ecl.2015.05.001.
2 Parry BL. Depressive history as a major predictor of postmenopausal depressive symptoms. *Menopause*. 2022;29(7):763–764. https://doi.org/10.1097/GME.0000000000002027.
3 Lee J, Han Y, Cho HH, et al. Sleep disorders and menopause. *J Menopausal Med*. 2019;25(2):83–87. https://doi.org/10.6118/jmm.19192.
4 Bansal R, Aggarwal N. Menopausal hot flashes: a concise review. *J Mid-life Health*. 2019;10(1):6–13. https://doi.org/10.4103/jmh.JMH_7_193.
5 El Khoudary SR, Greendale G, Crawford SL, et al. The menopause transition and women's health at midlife: a progress report from the study of women's health across the nation (SWAN). *Menopause (New York, NY)*. 2019;26(10):1213–1227. https://doi.org/10.1097/GME.0000000000001424.
6 Gökbulut N, Ibici Akça E, Karakayali Ay Ç. The impact of foot massage given to postmenopausal women on anxiety, fatigue, and sleep: a randomized-controlled trial. *Menopause*. 2022;29(11):1254–1262. https://doi.org/10.1097/GME.0000000000002062.
7 Lotfipur-Rafsanjani SM, Vaziri-Nejad R, Ismailzadeh S, et al. Comparison of the efficacy of massage and aromatherapy massage with geranium on depression in postmenopausal women: a clinical trial. *Zahedan J Res Med Sci*. 2015;17(4):29–33. https://doi.org/10.17795/zjrms970.
8 Kazemzadeh R, Nikjou R, Rostamnegad M, et al. Effect of lavender aromatherapy on menopause hot flushing: a crossover randomized clinical trial. *J Chin Med Assoc*. 2016;79(9):489–492. https://doi.org/10.1016/j.jcma.2016.01.020.
9 Sánchez-Vidaña DI, Ngai SPC, He W, et al. The effectiveness of aromatherapy for depressive symptoms: a systematic review. *Evid Based Complement Alternat Med*. 2017:1–21. https://doi.org/10.1155/2017/5869315, 5869315.
10 Tanvisut R, Traisrisilp K, Tongsong T. Efficacy of aromatherapy for reducing pain during labor: a randomized controlled trial. *Arch Gynecol Obstet*. 2018;297:1145–1150. https://doi.org/10.1007/s00404-018-4700-1.
11 Cui J, Li M, Wei Y, et al. Inhalation aromatherapy via brain-targeted nasal delivery: natural volatiles or essential oils on mood disorders. *Front Pharmacol*. 2022;13, 860043. https://doi.org/10.3389/fphar.2022.860043.
12 Hur M-H, Yang YS, Lee MS. Aromatherapy massage affects menopausal symptoms in Korean climacteric women: a pilot-controlled clinical trial. *Evid Based Complement Alternat Med*. 2008;5(3):325–328. https://doi.org/10.1093/ecam/nem027.
13 Taavoni S, Darsareh F, Joolaee S, et al. The effect of aromatherapy massage on the psychological symptoms of postmenopausal Iranian women. *Complement Ther Med*. 2013;21(3):158–163. https://doi.org/10.1016/j.ctim.2013.03.007.
14 Abbaspoor Z, Siahposh A, Javadifar N, et al. The effect of citrus aurantium aroma on the sleep quality in postmenopausal women: a randomized controlled trial. *Int J Community Based Nurs Midwifery*. 2022;10(2):86–95. https://doi.org/10.30476/IJCBNM.2021.90322.1693.
15 Darsareh F, Taavoni S, Joolaee S, et al. Effect of aromatherapy massage on menopausal symptoms: a randomized placebo-controlled clinical trial. *Menopause*. 2012;19(9):995–999. https://doi.org/10.1097/gme.0b013e318248ea16.
16 Tsai J, Chung YC, Chen FP. Effect of aromatherapy on menopausal symptoms, heart rate variability, and sleep quality in women. *Hu Li Za Zhi*. 2020;67(1):44. https://doi.org/10.6224/JN.202002_67(1).07.
17 Gürler M, Kızılırmak A, Baser M. The effect of aromatherapy on sleep and quality of life in menopausal women with sleeping problems: a non-randomized, placebo-controlled trial. *Complement Med Res*. 2020;27(6):421–430. https://doi.org/10.1159/000507751.
18 dos Reis Lucena L, dos Santos-Junior JG, Tufik S. Lavender essential oil on postmenopausal women with insomnia: double-blind randomized trial. *Complement Ther Clin Pract*. 2021;59, 102726. https://doi.org/10.1016/j.ctim.2021.102726.
19 Putri P. Literatur review: the effect of lemon aromatherapy on labor pain. *IJ-ChiProf*. 2022;1(2):110–116. https://doi.org/10.56988/chiprof.v1i2.17.
20 Ezzati Arasteh F, Shobeiri F, Mafakheri B. The effect of lemon aromatherapy on nausea and vomiting of pregnancy: a randomized clinical trial. *IJOGI;*. 2019;22(1):46–52. https://doi.org/10.22038/IJOGI.2019.12852.
21 Joulaeerad N, Ozgoli G, Hajimehdipoor H. Effect of aromatherapy with peppermint oil on the severity of nausea and vomiting in pregnancy: a single-blind, randomized, placebo-controlled trial. *J Reprod Infertil*. 2018;19(1):32–38.
22 Thabet HA, Mourad MA, Alahadal AM, et al. Prevention of nipple cracks with peppermint water versus breast milk in lactating primiparous women. *Life Sci J*. 2013;10(4):2010–2017.
23 Altman DG, Schulz KF, Moher D, et al. The revised CONSORT statement for reporting randomized trials: explanation and elaboration. *Ann Intern Med*. 2001;134(8):663–694. https://doi.org/10.7326/0003-4819-134-8-200104170-00012.
24 Maybe, Harlow SD, Gass M, Hall JE, et al. Executive summary of the stages of reproductive aging workshop + 10: addressing the unfinished agenda of staging reproductive aging. *Menopause*. 2012;19(4):387–395. https://doi.org/10.1097/GME.0B013E31824D8F40.
25 Hawkins J, Hires C, Keenan L, Dunne E. Aromatherapy blend of thyme, orange, clove bud, and frankincense boosts energy levels in post-COVID-19 female patients: a randomized, double-blinded, placebo controlled clinical trial. *Complement Ther Clin Pract*. 2022;67, 102823. https://doi.org/10.1016/j.ctim.2022.102823.
26 Schneider HPG, Heinemann LAJ, Rosemeier HP. The menopause rating scale (MRS): reliability of scores of menopausal complaints. *Climacteric*. 2000;3(1):59–66. https://doi.org/10.3109/13697130009167600.
27 Gürkan Ö. The validity and reliability of Turkish version of menopouase rating scale. *Nurs Forum*. 2005;3:30–35.
28 Avis NE, Colvin A, Bromberger JT, et al. Change in health-related quality of life over the menopausal transition in a multiethnic cohort of middle-aged women: study of women's health across the nation (SWAN. *Menopause (New York, NY)*. 2009;16(5):860. https://doi.org/10.1097/gme.0b013e3181a3cdaf.
29 Buckle J. *Clinical Aromatherapy-E-Book: Essential Oils in Healthcare*. St. Louis, MO, USA: Elsevier; 2015.
30 Nikjou R, Kazemzadeh R, Asadzadeh F, Fathi R, Mostafazadeh F. The effect of lavender aromatherapy on the symptoms of menopause. *J Natl Med Assoc*. 2018;110(3):265–269. https://doi.org/10.1016/j.jnma.2017.06.010.
31 Ali B, Al-Wabel NA, Shams S, Ahamad A, Khan SA, Anwar F. Essential oils used in aromatherapy: a systemic review. *Asian Pac J Trop Biomed*. 2015;5(8):601–611. https://doi.org/10.1016/j.apjtb.2015.05.007.
32 Sirkeci I, Cagan O, Koc S. The effect of ylang oil and lemon oil inhalation on labor pain and anxiety pregnant women: a randomized controlled trial. *Complement Ther Clin Pract*. 2023, 101748. https://doi.org/10.1016/j.ctcp.2023.101748.
33 Mahdavikian S, Fallahi M, Khatony A. Comparing the effect of aromatherapy with peppermint and lavender on the sleep quality of cardiac patients: a randomized controlled trial. *Sleep Sci Pract*. 2021:1–8. https://doi.org/10.1155/2021/9925945, 9925945.
34 Özmen T, Doğan H, Güneş GY. Effect of classic massage with peppermint oil on muscle soreness and muscle strength during recovery from exercise. *SPD*. 2020;11(2):103–111, 10.17155/omuspd.60624710.17155/omuspd.606247.
35 Rambod M, Rakhshan M, Tohidinik S, et al. The effect of lemon inhalation aromatherapy on blood pressure, electrocardiogram changes, and anxiety in acute

myocardial infarction patients: a clinical, multi-centered, assessor-blinded trial design. *Complement Ther Clin Pract*. 2020;39, 101155. https://doi.org/10.1016/j.ctcp.2020.101155.

36 Fung TKH, Lau BWM, Ngai SPC, Tsang HWH. Therapeutic effect and mechanisms of essential oils in mood disorders: interaction between the nervous and respiratory systems. *Int J Mol Sci*. 2021;22:4844. https://doi.org/10.3390/ijms22094844.

37 Liu B, Kou J, Li F, et al. Lemon essential oil ameliorates age-associated cognitive dysfunction via modulating hippocampal synaptic density and inhibiting acetylcholinesterase. *Aging (Albany NY)*. 2020;12(9):8622. https://doi.org/10.18632/aging.103179.

38 Kamrani F, Nazari M, Sahebalzamani M. Effect of aromatherapy with lemon essential oil on anxiety after orthopedic surgery. *Iran J Rehabil Res Nurs*. 2016;2(4):26–31. https://doi.org/10.21859/ijrn-02044.

39 Khairiah R, et al. A eucalyptus and lemon essential oils as an alternative for symptoms management of COVID-19: a single-blinded randomized controlled trial. *Mal J Med Health Sci*. 2022;18(17):7–14.