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The effects of aromatherapy on the mood state and resilience of pregnant women: A clinical trial

Fatemeh Hajibagheri, Fariba Fahami¹, Mahboubeh Valiani¹

Abstract:

BACKGROUND: Pregnancy has always been associated with rapid physiological, emotional, and social changes that can cause mothers' stress and anxiety, eventually leading to psychological effects. Therefore, resilience and knowing how to deal with stress during pregnancy are of great importance. As a result, this study aimed to investigate the effects of aromatherapy on pregnant women's mood and resilience.

MATERIALS AND METHODS: This clinical trial study was conducted on 70 pregnant women in 2021. Participants were randomly selected from Isfahan's health centers and then divided into two groups. A handkerchief sprinkled with orange blossom essential oil was given to the experimental group to inhale for an hour, three times a week for a month. However, the control group received only the usual care. The mood state and resilience of the participants were evaluated before the intervention, immediately after, and also one month after the intervention. Data analysis was carried out using Statistical Package for the Social Sciences (SPSS) 24.0, independent-samples *t*-test, Chi-square, and Mann–Whitney U-test.

RESULTS: According to the results, the score of mood state in the experimental group was $60/97 \pm 14/26$ before the intervention, $40/97 \pm 14/30$ immediately after receiving the intervention, and $49/86 \pm 11/78$ one month after the intervention. These findings indicated that the score of mood state in the experimental group was significantly lower than that in the control group ($P < 0/05$). Moreover, the mean score of resilience in the experimental group was $60/83 \pm 13/02$ before the intervention, $66/54 \pm 7/85$ immediately after receiving the intervention, and $62/80 \pm 8/07$ one month after the intervention. The results showed that the mean score of this variable was significantly higher in the experimental group compared with the control group immediately after the intervention and insignificantly higher than the control group one month after the intervention.

CONCLUSION: Aromatherapy with orange blossom oil can enhance mothers' mood state and resilience during the third trimester. As a result, orange blossom oil can be used as a complementary therapy.

Keywords:

Aromatherapy, Mood, Resilience, Pregnant women

Introduction

Pregnancy is a natural and joyful journey of becoming a mother.^[1,2] Pregnancy and becoming a mother are associated with profound physiological and psychological changes which require special attention.^[2] These changes may cause mental disorders,

consequently affecting some aspects of mothers' personal lives and their relationships with others. Their level of adaptation determines whether they will be exposed to psychological problems.^[1]

Psychiatric disorders such as depression and anxiety during pregnancy and postpartum depression are common global issues. In fact, 10_15% of women suffer from psychiatric

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Department of Midwifery
and Reproductive Health,
School of Nursing and
Midwifery, Isfahan
University of Medical
Sciences, Isfahan, Iran,
¹Department of Midwifery
and Reproductive Health,
Nursing and Midwifery
Care Research Center,
Isfahan University of
Medical Sciences, Isfahan,
Iran

Address for correspondence:

Ms. Fariba Fahami,
Department of Midwifery
and Reproductive Health,
Nursing and Midwifery
Care Research Center,
Isfahan University of
Medical Sciences, Isfahan,
Iran.
E-mail: fahami@nm.mui.
ac.ir

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disorders, and mothers' stress during pregnancy is related to these psychiatric disorders.^[3] Maternal stress and mothers' mental state can directly or indirectly affect them and also their fetus' health during pregnancy and after childbirth.^[4] Mental health is fundamentally linked to joy and happiness and increased self-confidence in families. Moreover, a lack of mental health will lead to anxiety, stress, apprehension, and despair.^[5]

Resilience is explained as a dynamic process of an individual's positive adaptation to stress and adversity.^[6] Resilience and health enhancement are priorities of the World Health Organization (WHO).^[7] Resilience is a process of adapting well to difficult situations and allows individuals to cope with adversities and stress; it can reduce negative emotions that result in life satisfaction and mental health.^[8] Moreover, resilience has an impact on life components and strengthens parent-child relationships.^[9]

When individuals with low resilience face misfortunes and setbacks, they experience a surge of apprehension, depression, and restlessness. In addition, low resilience results in aggressive behaviors, insomnia, and loss of appetite. Consequently, prolonged stress and challenging situations lead to mental and physical disorders.^[10] Effective and active coping strategies decrease the possibility of physical and mental disorders related to stress and behavioral and functional skills.^[11] Therefore, conducting a resilience intervention to manage stress is necessary; in this regard, many studies have been conducted.^[12]

Drug therapy is a resilience intervention, among other interventions. In drug therapy, released chemicals affect the sensory nerve endings. It should be stated that drug therapy comes with side effects.^[13]

Most women tend to receive complementary therapy and non-pharmacological interventions.^[14] Today, complementary therapy has increasingly been integrated into maternity care, childbirth, and postpartum, and it has become a novel method among midwives. Most complementary interventions have advantages, including cost-effectiveness, availability, fewer side effects, increased family cooperation, anxiety reduction, healthcare cost reduction, and lowering bed occupancy.^[15]

Aromatherapy is one of the non-pharmacological interventions that is widely used as a complementary therapy.^[16] Aromatherapy is the use of essential oil from aromatic plants to prevent and treat disorders^[17]; it is a natural way of improving the health of the mind, body, and spirit^[18] and can exert its influence on individuals either directly or indirectly.^[14]

Aromatherapy stimulates the olfactory system and then affects the hypothalamus. As a result, it reduces cortisol and anxiety by reducing corticotropin-releasing hormone. When aromatic scents are inhaled, the brain releases enkephalin, endorphin, and dynorphin as neurotransmitters that reduce anxiety and pain.^[14]

Orange blossom (*Citrus aurantium*) is a volatile and aromatic oil widely used in aromatherapy. *Citrus aurantium* belongs to the family of Rutaceae. It directly affects the central nervous system and comes with more benefits: calming effects, mood enhancer, antidepressant, antianxiety, antispasmodic, antioxidant, and sleep induction.^[19] In traditional therapy, the flowers of this plant are used to treat nervous disorders such as hysteria, convulsions, and neurasthenia. In addition, it is known as a sedative, sleep inducer, appetite stimulant, and a remedy to stop palpitation.^[15] According to a study by Mahmoodi *et al.*^[20] (2005) on medicinal plants, bitter orange flavonoids are sedative and antianxiety. Namazi *et al.*^[21] (2004) showed that the orange spring scent reduces anxiety in the first stage of labor^[21].

Pregnant women are viewed as very delicate and vulnerable people in society, and their mental health condition is integrated with families, societies, and children's mental health. Therefore, pregnant women's psychological distress can adversely affect their mental ability. Improving pregnant women's mood and resilience is of great importance since their mental state and stressors during pregnancy (especially during the third trimester) can affect the health of the mother and the fetus during pregnancy and after that. The researcher decided to investigate the effect of aromatherapy as a non-pharmacological, straightforward, and cost-effective approach on stress and anxiety reduction, mood and resilience improvement due to the sedative effects of the orange blossom and the lack of intervention regarding the effect of orange blossom oil on the mood state and resilience of pregnant women in their third trimester.

Material and Methods

Study design and setting

This clinical trial study was conducted on two pregnant women groups in 2021. Seventy pregnant women were selected using simple random sampling from Isfahan's healthcare centers.

Study participants and sampling

The participants were divided into two groups using two numbered envelopes (envelope number 1 corresponds to the experimental group and envelope number 2 corresponds to the control group). The inclusion criteria are as follows: primiparous women, singleton pregnancy, women during their 26th to 28th weeks of

pregnancy, having Iranian citizenship, having at least elementary education and above, a healthy sense of smell, no history of allergy and eczema to flowers, plants, and aromatics, no history of respiratory diseases such as asthma, no history of psychiatric disorders, no history of blood pressure disorders, headaches, and migraines, no history of unwanted pregnancy, having no obstetric problem during pregnancy that requires absolute rest or particular drugs, and no history of taking complementary therapy during the last month. The exclusion criteria are as follows: nonparticipation at any research stage, not following the regular aromatherapy practice at home, showing allergy to the orange blossom during the research, using any complementary therapy during the research, and occurrence of any adverse events such as hospitalization.

Data collection tool and technique

The data collection tool included three questionnaires: demographics, Profile of Mood State (POMS), and Connor_Davidson Resilience Scale. The demographic questionnaire included questions regarding age, education, the occupation of the participant and their spouse, and their economic status.

The Connor_Davidson Resilience Scale consists of a 25-item tool on a four-point Likert scale (0 = not true all time, 4 = nearly true all the time). The total score is obtained from the sum of all the questions, ranging from zero to 100. A score higher than 50 indicates high resilience. Validity (by factor analysis method and convergent and divergent validity) and reliability (by retest method and Cronbach's alpha) of the scale have been confirmed in different groups (normal and at risk).

The POMS questionnaire measures the participants' mood swings from one month or one week before and up until now. The POMS measures six dimensions: tension_anxiety, depression_dejection, anger_hostility, vigor_activity, fatigue_inertia, and confusion_bewilderment. The participants are asked to score each item on a Likert scale from 0 to 4. A total mood disturbance score is evaluated by summing the total for the negative scales and then subtracting the total for the positive subscales (vigor). The validity and reliability of this questionnaire were investigated on 20 mastectomy patients by Fazel *et al.* [22]; Cronbach's alpha was calculated, and then, the POMS questionnaire was confirmed ($\alpha = 0.81$).

The participants were made fully aware of the purpose and process of this research. Then, three questionnaires were completed by all the participants at the beginning of the research. In the healthcare centers, the experimental groups were given the necessary instructions on how to perform aromatherapy. To investigate and confirm whether the

participants were allergic to orange blossom oil, a skin patch test was employed. The researcher applied one drop of orange blossom oil to the participant's wrist and waited two minutes to determine whether there was a possible allergic reaction.^[23] The participants were asked not to apply perfume on the day of the intervention. Before the intervention, a test was used to determine the participants' normosmia or normal sense of smell. Two dark bottles of lime juice and rose water were placed in front of the participants, and they were asked to sniff and recognize the smell.^[24] The participants were asked to squeeze three drops of orange blossom oil from the dropper on a non-absorbable handkerchief and pin it to their collar and then breathe it for an hour and remove the handkerchief.^[25] The participants were asked to stop the intervention in case of any breathing problems or discomfort and inform the researcher. The researcher showed them where and how to pin the handkerchief. The researcher also made a phone call on intervention days to remind the participants of the aromatherapy sessions. The intervention was performed three times a week on even days for one month (12 sessions). The participants completed the POMS questionnaire and the Connor_Davidson Resilience Scale the day after the end of the intervention and one month later. Finally, the collected data were analyzed using the Statistical Package for the Social Sciences (SPSS) 24.0 software, with a statistically significant level of $P < 0.05$.

Ethical consideration

This study is based on a master's thesis (a proposal approved by the deputy of research at Isfahan University of Medical Sciences) with the ethics code of IR.MUI.NUREMA.REC.1400.119 and thesis no. 3400351. It was conducted with the funding support of the Isfahan University of Medical Sciences Research Council.

Findings

According to the statistical analysis of the data, there was no significant difference between the two groups regarding demographics such as age, education, occupation, and economic status ($P < 0.05$) [Table 1].

Based on the independent-samples *t*-test, the mean score of the mood state among pregnant women in the experimental group was significantly less than that in the control group ($P < 0.05$). There was no significant difference in the mean score of the mood state in the two groups before the intervention ($P = 0.921$). However, the mean score of the mood state was significantly different immediately and one month after the intervention between the two groups ($P = 0.001$). According to the analysis of variance (ANOVA), the mean score of the mood state is statistically different in all three stages among the experimental group [Table 2]. The least significant difference (LSD) *post hoc* test showed that the mean score of the mood state was significantly

Table 1: Frequency distribution of demographics among pregnant women in the intervention and control groups

| Variable | | Experimental group (n=35) | Control group (n=35) | Test |
|-------------------------------|-------------------------------|---------------------------|----------------------|---------------------------------------|
| Age | | 28.49±4.93 | 29.43±4.80 | Independent-samples t-test P=0.420 |
| Wife's occupation | Housewife | 19 (54.3%) | 24 (68.6%) | Chi-square P=0.299 |
| | Employee | 14 (40%) | 8 (22.8%) | |
| | Self-employed | 2 (5.7%) | 3 (8.6%) | |
| Husband's occupation | Unemployed | 0 (0%) | 1 (2.9%) | Chi-square P=0.537 |
| | Employee | 10 (28.6%) | 8 (22.9%) | |
| | Self-employed | 25 (71.4%) | 26 (74.3%) | |
| Wife's education | Less than high school diploma | 6 (17.1%) | 6 (17.1%) | Mann-Whitney U-test P=0.712 |
| | High school diploma | 13 (37.1%) | 15 (42.9%) | |
| | Academic degree | 16 (45.7%) | 14 (40%) | |
| Husband's education | Less than high school diploma | 4 (11.4%) | 6 (17.1%) | Mann-Whitney U-test P=0.639 |
| | High school diploma | 17 (48.6%) | 16 (45.7%) | |
| | Academic degree | 14 (40%) | 13 (37.1%) | |
| Economic status (self-report) | Upper | 19 (45.3%) | 24 (68.6%) | Mann-Whitney U-test P=0.308 |
| | Middle | 14 (40%) | 8 (22.9%) | |
| | Lower | 2 (5.7%) | 3 (8.6%) | |

Table 2: Comparison of the mean score and the standard deviation regarding mood state and resilience in the experimental and control groups, before intervention, immediately after, and one month after the intervention

| Variable | Intervention group (mean±standard deviation) | Control group (mean±standard deviation) | Significance level (independent-samples t-test) |
|-----------------------------------------------|-------------------------------------------------|--------------------------------------------|----------------------------------------------------|
| Mood state before the intervention | 60.97±14/26 | 60.57±19/12 | P=0.921 |
| Mood state immediately after the intervention | 40.97±14/30 | 62.34±11/75 | P=0.001 |
| Mood state one month after the intervention | 49.86±11.78 | 64.34±15.52 | P=0.001 |
| Resilience before the intervention | 60.83±13.02 | 61.11±9.16 | P=0.916 |
| Resilience immediately after the intervention | 66.54±7.85 | 60.54±10.48 | P=0.009 |
| Resilience one month after the intervention | 62.80±8.07 | 57.86±8.33 | P=0.014 |

different among the experimental group in these three stages [Table 3].

Moreover, according to the independent-samples *t*-test, the mean score of resilience in the experimental group was significantly more than that in the control group ($P < 0.05$). There was no significant difference in the mean score of resilience between the two groups before the intervention ($P = 0.916$). However, the mean score of resilience was significantly different between the two groups immediately and one month after the intervention. According to the ANOVA, the mean score of resilience in the experimental group is statistically different in all three stages [Table 2]. Therefore, the LSD *post hoc* test was used to investigate the difference in the experimental group concerning all three stages. The LSD test showed that the mean score of resilience was significantly different among the experimental group in three stages (before the intervention, immediately after, and one month after the intervention). However, there was no significant difference before the intervention and one month after that [Table 3].

Discussion

The results showed that aromatherapy improves pregnant women's mood and resilience in their third

trimester. In addition, according to the findings, the mean score of the mood state in the experimental group was significantly less than that in the control group immediately after and one month after the intervention. This shows that aromatherapy significantly affects the mood state and resilience of pregnant women. From a scientific point of view, it can be stated that aromatherapy can be psychologically and physiologically beneficial. Aromas are believed to activate the olfactory system and consequently take a direct route to the limbic system. However, there is a connection between the sense of smell and human emotions, indicating that odors affect souls and bodies. In fact, odors influence mood and change human feelings.^[26]

There is no similar study on the effects of aromatherapy on the mood state and resilience of pregnant women. Nevertheless, the effects of aromatherapy on mood swings (such as stress, anxiety, depression, fatigue, and inertia) have been investigated. Moreover, the effects of complementary therapy and other educational techniques have been conducted to assess the resilience of pregnant women.

In regard to the present study, Mohammadi Payandar *et al.*^[19] (2002) investigated the effects of *Citrus aurantium*

Table 3: Comparison of the mean score of mood state and resilience in the experimental group, regarding two stages of intervention based on the LSD post hoc test

| Stages of the intervention | Significance level (Mood state score) | Significance level (Resilience score) |
|-------------------------------------------------------------------------|---------------------------------------|---------------------------------------|
| Before the intervention and immediately after the intervention | $P=0.001$ | $P=0.001$ |
| Before the intervention and one month after the intervention | $P=0.001$ | $P=0.185$ |
| Immediately after the intervention and one month after the intervention | $P=0.001$ | $P=0.001$ |

aromatherapy on anxiety in women at risk of preterm labor. According to this study, in the experimental group, changes in overt and covert anxiety scores of the stages were significant (before the intervention, one week after the intervention, and two weeks after the intervention). However, there was no significant difference between overt and covert anxiety regarding stage changes in the placebo group. The results showed that using *Citrus aurantium* aromatherapy decreased the anxiety scores of pregnant women at risk of preterm labor. Therefore, it could benefit women at risk of preterm labor as an easy, inexpensive, and non-invasive intervention. In addition, it reduces the anxiety of pregnant women at risk of preterm labor. However, it has only evaluated the effects of one variable, and the results were consistent with the current study.

Zaremobini *et al.*^[27] (2010) also investigated the effects of lavender oil on the level of anxiety during the first stage of labor in primigravida women. The results showed a significant decrease in labor anxiety immediately and 60 minutes after the intervention in the experimental group. However, the most significant anxiety reduction occurred immediately after the intervention; therefore, the anxiety reduction was more significant immediately after the intervention compared with 60 minutes after the intervention. Although different oils were used in the labor stage, the results were consistent with the current study, indicating a meaningful relationship between anxiety reduction and aromatherapy, as well as loss of strength and effectiveness over time.

In another study by Kartilah *et al.*^[28] (2020), the effectiveness of progressive muscle relaxation and aromatherapy on fatigue among pregnant women showed that progressive muscle relaxation exercises and aromatherapy are effective in reducing fatigue scores among pregnant women. Although it was conducted only on one of the mood swings (fatigue), its results are consistent with the present study.

Scandurra *et al.*^[29] (2022) investigated the effectiveness of neroli essential oil in relieving anxiety and perceived pain in women during labor; according to the result, there was a significant difference in the mean anxiety and pain scores of the experimental group compared with those of the control group after labor. Neroli oil helped reduce pain and anxiety in the progress of labor among all the participants; however, the experimental group experienced less pain than the control group. In Scandurra's study, the control group received no intervention, and the mood score increased in ascending order, which was consistent with the present study. However, in Scandurra's study, not only did aromatherapy prevent the mood score from increasing, but it also had some positive effects that led to mothers' mood enhancement. This part of the study differed from Scandurra's study, which could be due to the different stages of the intervention because mothers experience more pain during childbirth stage.

In the study conducted by Tayebi *et al.*^[25] aromatherapy with lavender essential oil reduced depression and stress among hemodialysis patients in the experimental group, which is consistent with the present study. However, there was no significant relationship between aromatherapy and anxiety reduction in the experimental group, which is inconsistent with the present study and can be due to different statistical populations. Put simply, the anxiety caused by labor and hemodialysis is different. In other words, labor is a temporary condition that will pass; however, hemodialysis is a chronic condition compared with labor.

Josheghani investigated the effectiveness of acupressure on happiness and resilience in pregnant women. According to the findings, there is a meaningful relationship between acupressure and resilience and happiness among pregnant women ($P < 0.01$). In other words, acupressure can enhance resilience and happiness among pregnant women. Although the researcher had also conducted other complementary therapy, the results were consistent with the present study. In fact, both studies showed a positive effect between complementary therapy and resilience among pregnant women.^[23]

Moreover, Jafari *et al.*^[24] (2020) investigated the effects of mindfulness training on resilience and cognitive emotion regulation. The results showed that mindfulness therapy significantly affects resilience and emotion regulation strategies in pregnant women ($P < 0.01$) and the level of resilience and the use of adaptive emotion regulation strategies in the experimental group increased compared with the control group. Therefore, it could be concluded that group-based mindfulness training is effective in pregnant women's resilience and emotion regulation strategies. Although educational methods were applied

in Jafari's study, the results are consistent with the present study.

Conclusion

The results of the present study showed that orange blossom aromatherapy improves pregnant women's mood state and resilience. Most pregnant women prefer complementary therapies; therefore, it is suggested to apply orange blossom aromatherapy as a non-pharmacological, cost-effective, and noninvasive method to enhance pregnant women's mood state and resilience in their third trimester.

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Conflicts of interest

There are no conflicts of interest.

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