

Examining the Effect of an Orientation Tour and Aromatherapy on Stress and Depressed Mood in Birthing Parents with Preterm Infants: A Quasi-Experimental Study

Abstract

Background: Hospitalization of infants in the Neonatal Intensive Care Unit (NICU) may result in psychological morbidities, particularly among birthing parents. This study aimed to evaluate the impact of an orientation tour, both with and without orange aromatherapy, on stress levels and depressive symptoms among birthing parents of preterm infants. **Materials and Methods:** In this quasi-experimental, single-blind, three-group study, 130 birthing parents with hospitalized preterm infants were placed in two intervention groups and one control group. This study was undertaken in the NICU of Shahid Akbar Abadi Hospital in Tehran, Iran, from 2020 to 2021. Convenience sampling was used. A 30-minute orientation tour was undertaken by two intervention groups: 1) orientation tour only and 2) orientation tour with aromatherapy. Samples in the orientation tour-aromatherapy group additionally inhaled four drops of 2% orange oil. Data analysis was performed using Chi-square, Fisher's exact test, one-way analysis of variance, and repeated measures analysis of variance tests. **Results:** 24 hours (but not 1 hour) after visiting the NICU, the average scores for depressed mood ($F = 8.53, p < 0.001$), the PSS ($F = 5.437, p = 0.005$), infant behavior and appearance ($F = 3.611, p = 0.038$), and parental role alteration ($F = 4.541, p = 0.006$) in the two intervention groups were statistically, significantly lower than those in the control group. **Conclusions:** Orientation tours, regardless of the use of orange aromatherapy, are effective in improving participants' depressive mood and reducing their stress. Consequently, it is recommended that an orientation tour be provided during parents' initial visit to their infants' hospitalization.

Keywords: Aromatherapy, depression, infant, intensive care units, neonatal, patient education, preterm, psychological, stress

Introduction

Preterm birth remains a significant clinical and public health challenge associated with high rates of mortality and morbidity.^[1] Preterm infants may be admitted to the Neonatal Intensive Care Unit (NICU) for several weeks or even months.^[2] Yet the NICU environment is one of the most stressful environments for birthing parents^[3] and contributes to adverse impacts on their mental health as they experience higher rates of depression, posttraumatic stress, and anxiety.^[4] During the hospitalization of their preterm infants in the NICU, birthing parents face many stress factors relating to the infant's appearance, uncertainty in their changing health status, physical and emotional separation from the infant, feeding issues, changes in role, distortion of family routines, and their

newfound physical environment.^[4] Adverse medical conditions frequently prevent birthing parents from immediately taking care of their preterm newborns, leading to higher levels of stress as their parental role is marginalized.^[4,5] Such parental stress can in turn have a negative impact on parenting behaviors, leading to long-term emotional and health problems.^[6] Ultimately, providing birthing parents with psychological support from the time of giving birth is crucial to ensure their wellbeing and prevent future problems.^[7]

One commonly used intervention for reducing stress in unfamiliar environments is the orientation tour.^[8] Orientation tours are a promising intervention to familiarize individuals with wards, hospitals, and personnel.^[9,10] One study in particular

**Azam Amzajerdi¹,
Maryam Keshavarz²,
Elham Babaei³,
Sally Pezaro⁴,
Fatemeh Sarvi⁵,
Bahar
Morshed-Behbahani³**

¹School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran, ²Reproductive Sciences and Technology Research Center, Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran, ³Department of Midwifery and Reproductive Health, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran, ⁴Research Centre for Healthcare and Communities, Coventry University, UK, ⁵Department of Public Health, School of Health, Larestan University of Medical Sciences, Larestan, Iran

Address for correspondence:
Prof. Maryam Keshavarz,
School of Nursing and
Midwifery, Rashid Yasemi St.,
Valiasr St., Tehran,
P.O Box: 1996713883, Iran.
E-mail: MKmarkesh@gmail.
com; keshavarz.m@iums.ac.ir

Access this article online

Website: <https://journals.iwv.com/jnmr>

DOI: 10.4103/ijnmr.ijnmr_14_25

Quick Response Code:



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How to cite this article: Amzajerdi A, Keshavarz M, Babaei E, Pezaro S, Sarvi F, Morshed-Behbahani B. Examining the effect of an orientation tour and aromatherapy on stress and depressed mood in birthing parents with preterm infants: A quasi-experimental study. Iran J Nurs Midwifery Res 2026;31:489-96.

Submitted: 11-Jan-2025. **Revised:** 17-Oct-2025.

Accepted: 19-Oct-2025. **Published:** 16-Jun-2026.

reported positive effects of a 30-minute educational program about infants and the NICU on parents' stressors of preterm infants.^[11] Training parents based on their educational needs in this context,^[12] along with the provision of emotional support for parents, decreased stress.^[13,14] Thus, it will be important to explore the efficacy of such an intervention in this context.

Recently, Complementary and Alternative Medicine (CAM) methods have also focused solely on reducing stress. Aromatherapy, such as the use of orange essential oil, is indeed known to relieve daily anxiety, depression, and stress.^[15] Aromatic compounds found in essential oils have the ability to influence mood and decrease anxiety. They achieve this by acting through both the olfactory and respiratory pathways, which then lead to the activation of specific brain regions, regulation of hormones, and alterations in blood biochemistry.^[16] Nevertheless, limited combined interventions have been rigorously tested in the NICU, and with such lacking sufficient evidence, more studies are required.^[17] Considering the above, this study was designed to investigate the effects of an orientation tour combined with and without aromatherapy using orange essence oil on the stress and depressed mood of birthing parents of preterm infants. The hypothesis is that the orientation tour with orange aromatherapy will decrease depressed mood and stress in birthing parents of preterm infants in the NICU more effectively than an orientation tour alone will.

Materials and Methods

This quasi-experimental study involved three parallel groups: two intervention groups, 1) orientation tour only and 2) orientation tour with aromatherapy, and a control group. Sampling was performed from August 2020 to June 2021 at Shahid Akbar Abadi Hospital in Tehran, Iran, which is affiliated with Iran University of Medical Sciences (IUMS).

Based on previous studies,^[18] a sample size of 126 participants (with at least 42 in each group) is required to detect the difference between three groups. If achieved, the study would have 80% power at a 5% significance level. An effect size of 1 was assumed, and a 10% dropout rate was also considered. To avoid participants from interacting with each other, they were assigned to either one of the interventions or control group biweekly. Participants were allocated to an orientation tour group, a control group, or an orientation tour with aromatherapy group during the first, second, and third weeks, respectively, continuing throughout the data collection period. Participants were placed in one of the three aforementioned groups weekly until the end of the study. Because the NICU has three separate units, infants are moved to the next unit once their condition stabilizes. This process limited opportunities for information exchange between participants.

Participants were Iranian birthing parents giving birth for the first time (primiparous) and aged between 18 and 40 years old. They had been pregnant with a wanted singleton and had given birth between the 30th and 36th weeks of pregnancy (210–252 days). Participants were excluded if they had olfactory issues, a history of sensitivity to orange oil, asthma, and mental illness and were currently smoking, drinking alcohol, or taking any psychotropic substances. Participants were also excluded if they had a history of recurrent miscarriages (≥ 3), were studying or working in medicine or psychology, and/or had experienced other stressful events in the past 3 months. Last, participants were excluded if they had taken herbal medications or sedatives the day before the intervention. The infants of potential participants had to have respiratory distress syndrome (RDS) and an Apgar score of 7 or above in the first 5 minutes after birth. Participants were excluded during the intervention period if infant death had occurred and/or if participants became overly sensitive to the smell of orange oils.

The 30–35-minute orientation tour was delivered individually and included a 4-minute training session focused on compliance with hygiene and health principles in NICU. There was also a 3-minute training session designed to familiarize the birthing parents with the nursing station, the birthing parents' resting place, and the available facilities, supplies, and tools delivered. Next, a 2 to 3-minute training session was delivered to familiarize participants with the nursing staff and doctors. Subsequently, there was an 8 to 10-minute training session delivered to explain the condition and characteristics of the infant. Then there was a 4 to 5-minute training session for participants to become acquainted with the concepts and frequently used words in the NICU. A 5 to 6-minute training session was then delivered to familiarize participants with the equipment in the NICU comprising a pulse oximeter, incubator, warmer, monitor, phototherapy device, ventilator, and thermometer. Last, a 4 to 5-minute training session was delivered to familiarize participants with the common rules and regulations in the NICU. Information about the visiting times, staff shift schedules, doctor's visiting schedules, human milk bank at Akbar Abadi hospital, and human milk donation was also offered at the end of the orientation tour.

In the orientation tour-aromatherapy group, in addition to the orientation tour, 4 drops of 2% orange oil (produced by Barij Essence Company) were placed on a 10 × 10 cm handkerchief and attached to the collar of participants' clothes. This amount was suggested owing to the need for direct inhalation in aromatherapy.^[19] Participants in this group inhaled the orange oil for 30 minutes prior to entering the NICU. Before going to bed, participants again inhaled 4 drops of 2% orange essence for 30 minutes. To promote consistent participation in aromatherapy, participants received a daily aromatherapy registration

checklist and were instructed to submit it following the completion of the intervention.

In the orientation tour only group, 4 drops of distilled water were poured onto a 10 × 10 cm handkerchief which was attached to the collar of their clothing as a placebo. Subsequently, they inhaled the distilled water for 30 minutes. Following this, they were taken to the NICU by the researcher and went through the same individual orientation tour as previously described. Participants in the orientation tour only group reinhaled distilled water for 30 minutes again before bedtime.

Participants in the control group inhaled distilled water as described above for 30 minutes and subsequently met their infants for the first time in the usual manner without the researcher present. Participants reinhaled distilled water for 30 minutes' bedtime. Finally, both intervention groups received a brief informational pamphlet about the NICU. They were also invited to ask questions about their infant's condition, treatment, or the NICU in general. Participants were informed of potential warning signs such as running nose, skin rash, itching, headache, and burning eyes. They were advised to stop the aromatherapy if such signs and symptoms appeared. No cases of allergy were reported in this study.

Measurements taken via the Parental Stress Scale (PSS) and the depressed mood section of the Profile of Mood States Questionnaire (POMS) were considered as primary outcomes. With regard to data collection, participants completed the depressed mood section of the POMS at three time points, 1) prior to the intervention, 2) 1 hour following the intervention, and 3) 24 hours after participants left the NICU. The PSS was completed by all participants 24 hours after they left the NICU. All participants also completed a demographic characteristics questionnaire prior to the intervention period. These questionnaires were collected by a research assistant who was unaware of the study's purpose.

Our demographic and obstetric characteristics questionnaire required information relating to age, occupation, education, length of marriage, mode of birth, gestational age, infant gender assigned at birth, infant weight, history of any type of infertility treatment, Apgar score (at 5 minute interval), insurance status, economic status, time interval between childbirth, and the first admission to the NICU, and the number of times the birthing parent had contact with the infant after the first 24 hours following the intervention.

The PSS was developed by Miles in 1993 to assess the perceived level of stressors caused by the physical and psychosocial environment in the NICU.^[20] This scale has 6 items relating to parents' experiences in the NICU (e.g., lights and sounds). There are also 17 items related to appearance and behavior and 11 items related to the change of parental role and communication. Each

item is scored on a six-part Likert scale, which ranges from 1 (no stress) to 5 (extreme stress) and 0 (never experienced it). The range of scores for the environment of the NICU is 0 to 30 points. Scores relating to the behavior and appearance of the infant range from 0 to 85 points; scores related to the change in the role of parents and the relationship between parents and the infant range from 0 to 55.^[20] The final score is the sum of all item scores.

The Cronbach's alpha obtained for the PSS in general and in each area has been 0.73 to 0.92, respectively.^[20] The reliability of the PSS in Persian was confirmed with a Cronbach's alpha coefficient of 0.918.^[21] To determine the reliability of the PSS and the depressed mood section of the POMS, these questionnaires were completed by 15 birthing parents of preterm infants who were hospitalized in the NICU but who were not part of our sample. The questionnaires were administered twice with a 2-week interval. In our study, the Cronbach's alpha was obtained at 0.97 for the PSS.

The POMS is a widely used measure for assessing an individual's mood. The POMS questionnaire assesses six mood subscales: tension-anxiety, depression, anger-hostility, vigor, fatigue, and confusion.^[22] It uses a five-point Likert scale ranging from 0 (not at all) to 4 (extremely). The final score is the sum of all item scores. Higher scores indicate a greater level of mood disturbance. The validity of this tool has been confirmed in various studies. A depressed mood score is determined by responses to 15 questions of the depressed mood questionnaire with scores ranging from 0 to 60.^[23] The reliability of the depressed mood scale in the Persian language was confirmed by a Cronbach's alpha coefficient of 0.89.^[24] In our study, the Cronbach's alpha was obtained at 0.90 for depressed mood.

Recruitment commenced after ethical approval was granted by the Research Ethics Committee of IUMS. Subsequently, the researcher explained the objectives and procedure of the study to birthing parents of preterm infants who met the inclusion criteria. Potential participants were encouraged to ask any questions about the research prior to providing their informed consent. Written informed consent was then obtained from those who were willing to participate in the study. All questionnaires were collected by a research assistant who had no information about the aim of this study.

IBM SPSS Statistics 16.0 was utilized to analyze statistical data. The Kolmogorov-Smirnov test was conducted to verify the normality of the data. Chi-square and Fisher's tests were employed to compare qualitative variables. Additionally, one-way analysis of variance (ANOVA) and Tukey's *post hoc* test was applied to compare groups, given that the normality assumption was met. The repeated measures test was also utilized to examine changes over time across the three groups. A *p* value of <0.05 was deemed statistically significant in all tests, with an effect size of 1.

Ethical considerations

The study protocol was written in accordance with the Declaration of Helsinki and was approved by the Research Ethics Committee of IUMS, Tehran, Iran (ethics code: IR.IUMS.REC.1399.241). It was registered in the Iranian Registry of Clinical Trials Center. Informed consent was obtained from all participants who were also ensured confidentiality, and informed of their right to leave the study at any time without consequence and without giving a reason. All data were kept in a secured and locked personal file which was only accessed by the research team. The Consolidated Standards of Reporting Trials (CONSORT) guidelines were followed in reporting this study.

Results

Overall, 130 participants with preterm infants met the criteria for enrolment. Six participants were excluded due to their non-Iranian nationality, two were excluded as they experienced drug use, and three were unwilling to continue with participation [Figure 1]. There were no significant differences between the three groups in terms of demographic and obstetric characteristics [Table 1].

Prior to the intervention, there were no significant differences between the three groups in relation to the mean scores of PSS and depressed mood of POMS [Tables 2 and 3].

Twenty-four hours after leaving the NICU, the mean score of depressed mood section of POMS was significantly

different between the three groups ($F = 8.54$, $p < 0.001$). There was no significant difference between the three groups in terms of the mean score of depressed mood section of POMS, 1 hour after leaving the NICU. Results of the *post hoc* test in the two intervention groups did not show a statistically significant difference twenty-four hours after leaving the NICU. However, there was a statistically significant difference between the orientation tour group and the orientation tour with aromatherapy group compared to the control group ($p < 0.001$). There was also a statistically significant decrease in the mean score of depressed mood in the two intervention groups ($p < 0.001$), and a statistically significant increase in the mean score of depressed mood in the control group over time ($p < 0.001$) [Table 2, Figure 2].

Twenty-four hours after leaving the NICU, the mean score of the PSS, infant behavior and appearance, and parental role alteration were statistically significantly different between the three groups ($F = 5.437$, $p = 0.005$; $F = 3.611$, $p = 0.038$, and $F = 4.541$, $p = 0.006$, respectively); based on the results of the *post hoc* test, the two intervention groups did not show a significant difference [Table 3].

Discussion

In this study, scores associated with depressed mood significantly declined in both the orientation tour group and the orientation tour combined with aromatherapy group 24 hours after the intervention. No significant change was observed at the 1-hour mark. Furthermore, a comparison

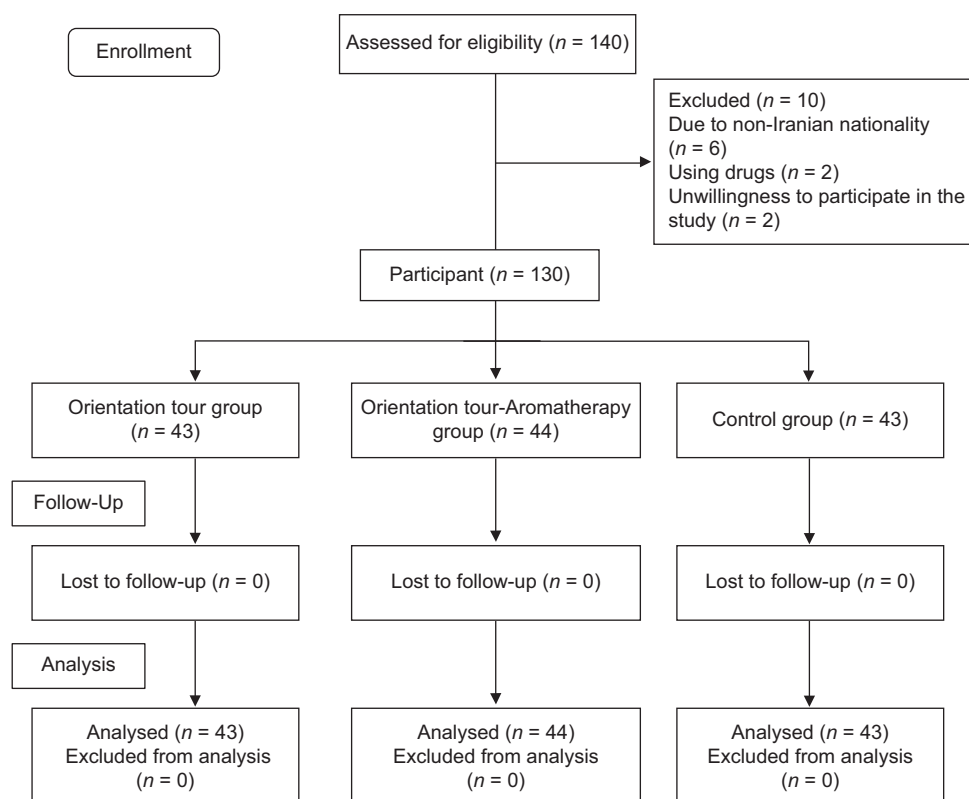


Figure 1: Consort diagram

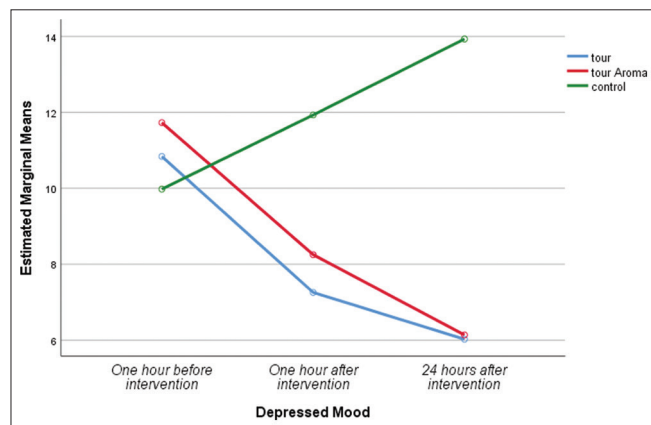
Table 1: Comparison of demographic-obstetric characteristics in the three groups (a)

Variables	Groups				<i>p</i>
	Orientation tour (<i>n</i> =43)	Orientation tour-aromatherapy (<i>n</i> =44)	Control (<i>n</i> =43)	Total (<i>n</i> =130)	
Age (year)	30.07 (6.62)	28.57 (5.83)	29.77 (6.27)	29.46 (6.23)	<i>p</i> =0.496* <i>F</i> =0.71
Marriage duration (year)	5.77 (3.18)	5.37 (3.18)	4.18 (3.23)	5.32 (3.20)	<i>p</i> =0.376* <i>F</i> =0.99
Educational level					
High school and diploma	11 (25.50)	18 (40.90)	15 (34.90)	44 (33.80)	<i>p</i> =0.565**
Academic degree	6 (14)	8 (18.20)	9 (20.90)	23 (17.70)	
Economic status					
Undesirable	15 (34.90)	14 (31.8)	18 (41.90)	47 (36.20)	<i>p</i> =0.348***
History of infertility or infertility treatment	15 (34.90)	13 (29.50)	7 (16.30)	35 (26.90)	<i>p</i> =0.134***
Time interval from birth to the participant's first entry in the unit (hour)	23.44 (12.96)	23.44 (11.74)	22.73 (11.77)	23.20 (12.08)	<i>p</i> =0.952* <i>F</i> =0.05
The number of participant's visiting times from her infant up to 24 hours after the intervention (Time)	2.47 (1.00)	2.27 (0.99)	2.72 (1.38)	2.48 (1.15)	<i>p</i> =0.191* <i>F</i> =1.7
Gestational age (day)	235.88 (11.01)	237.09 (11.92)	235.84 (10.24)	236.28 (11.07)	<i>p</i> =0.838* <i>F</i> =0.18
Infants' weight (g)	2005.81 (404.47)	2102.39 (416.80)	2023.72 (433.34)	2044.42 (417.27)	<i>p</i> =0.520* <i>F</i> =0.68
Infants' gender					
Boy	25 (58.10)	25 (56.80)	29 (67.40)	79 (60.80)	<i>p</i> =0.544***

(a) Values are expressed as *n* (%) or Mean±SD. *ANOVA (One-way analysis of variance). **Fisher Test. ***Chi-Square**Table 2: Comparison of depressed mood scores in the three groups (a)**

Time	Groups			<i>F, p*</i>
	Orientation tour (<i>n</i> =43)	Orientation tour-aromatherapy (<i>n</i> =44)	Control (<i>n</i> =43)	
One hour before the first entry	9.98 (12.19) ^a	11.73 (14.030)	10.48 (9.45)	0.23 0.796
One hour after leaving the NICU**	11.93 (13.74)	8.25 (10.56)	7.26 (8.25)	2.12 0.124
24 hours after leaving the NICU	13.93 (13.09)	6.14 (8.82)	6.020 (7.96)	8.53, <0.001
Repeated measurement	<i>p</i> <0.001			6.064
Group × depressed mood	<i>p</i> <0.001			11.174

(a) Values are expressed as Mean±SD. *ANOVA (One-way analysis of variance). **NICU: Neonatal Intensive Care Unit

**Figure 2: Trend in the mean scores of depressed mood at 1 hour before the first entry and 1 and 24 hours after leaving the ward according to the repeated measurement analysis**

between the two intervention groups suggests that the addition of orange oil aromatherapy did not result in a greater improvement in depressed mood compared to the orientation tour alone. Twenty-four hours after leaving the NICU, the mean score of the PSS and its subscales, except the sights and sounds subscale, were significantly different between the three groups. The orientation tour focused on familiarizing participants with the environment, rules, and regulations of the NICU. It also included education on infection control methods, routine care, and treatment procedures. Such findings suggest that on their first visit to their infants' hospitalization, parents should be offered an orientation tour.

Similar to the results presented here, training sessions conducted in the NICU have previously shown evidence

Table 3: Comparison of the PSS and its subscale scores 24 hours after the intervention in the three groups (a)

Variables	Groups			<i>F, p*</i>
	Orientation tour (n=43)	Orientation tour-aromatherapy (n=44)	Control (n=43)	
Sights and sounds in NICUs**	12.58 (5.82) ^a	11.23 (4.60)	13.63 (5.40)	2.25 0.110
Infant behavior and appearance	24.12 (19.46)	20.68 (14.41)	30.70 (18.69)	3.61 0.038
Parental role alteration	20.23 (9.86)	17.77 (10.00)	23.88 (8.58)	4.54 0.006
Total PSS	56.93 (27.99)	49.68 (25.33)	68.21 (25.77)	5.541 0.005

(a) Values are expressed as Mean±SD. *ANOVA (One-way analysis of variance). **NICU: Neonatal Intensive Care Unit

of reducing stress in birthing parents elsewhere.^[11,12] In one study, parents of preterm infants admitted to the NICU received stress-reducing nursing interventions within 10 days. This included a 30-minute educational program about their infants and the NICU. Parents in this group were found to have lower PSS scores for every subscale other than the infant's appearance and behaviors subscale.^[11] The results presented here thus add to and strengthen evidence suggesting that orientation tours should be provided for all parents of preterm infants as an effective intervention in this context. Nevertheless, there are some notable differences in study designs in terms of the timing of intervention, data collection, and participant groups. It is important to note that only primiparous participants whose infants had respiratory distress syndrome participated in our study. Other studies include both parents with no previous experience of the NICU. Therefore, it will be important for future studies to ascertain who benefits from which intervention most and at which time. For example, parental role training based on parental needs has been evidenced to significantly decrease the PSS and its subcategories scores on the tenth day compared to the control group.^[12] This decrease could be attributed to the fact that the educational sessions were tailored to the needs expressed by each parent. Yet participants in this study had already met their babies. In contrast, birth parents in our study had never visited the NICU.

An Emotional Support Program consisting of two phases, 1) an informational phase (participants attended a 95-minute face-to-face training conference) and 2) a supportive phase (participants received psychological training and had the opportunity to share their experiences and express their feelings with other birth parents of preterm infants during six 95-minute sessions), has been shown to have a positive impact on acute stress disorder.^[13] The Stanford Acute Stress Reaction Questionnaire (SASRQ) of preterm infants in the NICU was used to measure the effects. Yet again, the measurement time and tools used to assess stress in this study differed from those used in the current study, which focused specifically on acute stress. Another study found that providing early educational and emotional support training programs, which included a 60-minute face-to-face training session 2–4 days after the infant's admission as well as providing two books and a booklet to

parents with infants (gestational age of less than 35 weeks) in the NICU, could reduce the total scores of PSS and its subscales.^[14] The intervention time and methods used in this study were again different from those in our study. What is clear in all of the above is that parents in NICU require information and effective communication through educational means. In our study, the mean score of depressed mood in the control group increased. This may be due to exposure to the stressful NICU environment without receiving any supportive intervention. Indeed, unfamiliarity with the hospital setting, concerns about the infant's condition, and lack of sufficient information could have contributed to heightened anxiety. Further research is required to examine such variables in greater detail.

Current research on the impacts of orientation tours and aromatherapy on depressive symptoms remains limited. One study utilizing the Edinburgh Depression Inventory indicated that inhaling orange essential oil for 10 minutes twice daily, from the second day to the sixth week postpartum, may effectively prevent postpartum depression.^[25] Essential oils enter the body through the integumentary and olfactory systems, directly affecting the brain. Olfactory aromatherapy has the ability to optimize mood and alleviate depression. Inhaling essential oils is a fast, convenient, and safe method.^[15] Thus, such oils may be a useful tool in this context, particularly orange extract, which contains linalool, linalyl acetate, and limonene, an essence known to reduce mental stress.^[23]

Various clinical trials have reported that placebo may exert its role because a person's belief about the treatment and suggestibility positively affects the sensory experience.^[26] Nevertheless, it is clear that orientation tours alone can be effective in reducing anxiety and stress by increasing knowledge, information, experience, and oral and cognitive capabilities.^[27,28] We recognize that our intervention period was short. There was also a possibility of information exchange between participants in this study. To minimize this, the study was conducted as a semi-experimental study at 1-week intervals, and sampling was not conducted on Fridays to reduce the possibility of information exchange. A key and novel aspect of this research is that the intervention was conducted with birthing parents who had given birth experiencing their first visit to the NICU with their preterm infants. It is so

important that educational needs of participants makes them responsible for learning.^[29] In light of its successful implementation, the intervention tested here (orientation tour), we propose that larger programs of this nature are rolled out across more NICUs to enhance the quality of care for parents of preterm infants. Future studies could usefully focus on non-birth parents in this environment.

Conclusion

An orientation tour, whether accompanied by orange aromatherapy or not, was found to effectively alleviate participants' depressive mood and decrease their PSS scores. The data indicate that orange essence did not produce a significantly greater effect on stress and depressed mood compared to orientation tours alone. However, the results clearly demonstrate that orientation tours contribute to reductions in anxiety and stress by imparting knowledge, providing information and hands-on experience, and fostering oral and cognitive engagement. These findings substantiate the value of implementing orientation tours in NICU settings more widely.

It is recommended that birthing parents of preterm infants participate in orientation tours, particularly during their initial visit to the NICU. Additionally, it is crucial for healthcare teams to create a welcoming and supportive atmosphere, potentially incorporating pleasant aromatherapy, to assist parents in managing the initial stress related to the NICU environment.

Considering the resource-intensive nature of individual orientation tours, future research should investigate the efficacy of group orientation tours as a more time-efficient alternative.

Acknowledgements

The authors would like to thank all the participants, staff, and NICU personnel of Akbar Abadi hospital. Researchers also would like to express their gratitude to the Research Vice President for financial support (17809), the Research Ethics Committee of the IUMS, and Barij Essence Company.

Financial support and sponsorship

Iran University of Medical Sciences

Conflicts of interest

Nothing to declare.

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