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The Effect of Orientation Tour, with and without Orange Essence Aromatherapy, on Anxiety Level in Birthing Parents of Premature Neonates: A Quasi-experimental Study

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ABSTRACT

Background & aim: Birthing parents of premature neonates experience anxiety after the hospitalization of their neonates in neonatal intensive care units (NICU). This study examined how orientation tours, with and without orange essence aromatherapy, impact birthing parents' anxiety level.

Methods: This quasi-experimental study was conducted on 130 participants whose premature neonates were hospitalized in a NICU in Tehran, Iran. Participants were selected using convenience sampling and enrolled into three groups: orientation tour, orientation tour-aromatherapy and control group. In the orientation tour group, a tour of orientation was undertaken in the NICU for 30 minutes. In the orientation tour-aromatherapy group, four drops of orange essence were inhaled for 30 minutes before participants' first entry into the NICU followed by an orientation tour for 30 minutes. Four drops of essence were also inhaled for 30 minutes before bed at the first night. Participants in the control group met their neonates for the first time in the usual manner. The State -Trait Anxiety Inventory was completed by all participants one hour before the first entry into the NICU and also one and 24 hours after participants left it. One-way analysis of variance and repeated measures analysis were used to analyse data.

Results: At one and 24 hours post-NICU visit, both intervention groups showed significantly lower state and trait anxiety scores than the control group ($P < 0.001$). No difference was observed between the two intervention groups at either time period.

Conclusion: Orientation tours may be useful to reduce stress and anxiety in parents of premature neonates who are subsequently hospitalized in the NICU.

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Introduction

Preterm birth and subsequent infant hospitalization in neonatal intensive care units (NICU) can have harmful and negative effects on parents, leading to anxiety, especially among birthing parents (typically mothers) of premature neonates (1). The higher levels of tension, stress, anxiety, and depression among

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birthing parents of premature neonates are well known (2). Birthing parents have a prominent role in taking care of premature neonates and can experience high levels of anxiety (3-4), especially after the hospitalization of their neonates (5). This is concerning as anxiety and stress can challenge bonding relationships (6-7).

Preterm birth is a critical and global public health issue (8). Consequently, the number of parents spending time in the NICU has increased (9). The unfamiliar environment, devices, and equipment in NICU can make the environment appear threatening, leading to further fear, anxiety, and a lack of trust (1, 10). As such, the first visit to the NICU can be unduly anxiety-provoking (11-12). Where birthing parents are left without adequate care and communication in this context, negative effects upon their mental health, quality of life, decision-making, and interpersonal relations are observed (13). Thus, immediate preventative interventions are required for these populations (11, 14). One of the most commonly used interventions in this context is orientation tours (15). Yet these alone may not be sufficient to alleviate the negative effects of uncertainty in the NICU.

There is a dearth of studies which investigate the effect of orientation tours upon anxiety among birthing parents of premature neonates. Yet in one study, a 15-minute familiarization program conducted in a NICU was found not to reduce anxiety in this population (16). In another, a three-session familiarizing and face-to-face program conducted outside of the NICU was also reported to be ineffective (17). Yet single infant care training sessions conducted within the NICU have been found to effectively reduce anxiety among birthing parents of premature neonates (18, 19). Such conflicting results call for further, and more nuanced research in this area.

In a contemporary context, complementary medicine has been expanded globally in pursuit of decreasing anxiety and stress levels and is favoured over more expensive medical treatments, which also come with greater side effects (20). Aromatherapy in particular is popular due to its user-friendliness and accessibility (21-22). It is considered safe and can easily be prescribed by healthcare workers (23). In particular, orange essence is considered domestic in Iran and can be found in abundance. Orange essence has muscle-relaxing and anxiety-relieving properties (21). However, this and few other compound interventions, have been tested for their effectiveness in the NICU with regard to reducing anxiety levels, particularly in combination with orientation tours. Considering the aforementioed issue, it was hypothesized that a combination of two or more non-medicinal methods could be more effective than one method alone (24). Consequently, in this study, we examined the effect of orientation tour, with and without orange essence aromatherapy on anxiety levels among birthing parents of premature neonates in NICU.

Materials and Methods

The present study was a quasi-experimental study with three groups. A total of 130 mothers of premature neonates hospitalized in the NICU took part in this semi-experimental study. Sampling occurred from Aug 2020 to Jun 2021 in one of the teaching hospitals in Tehran, which is affiliated with Iran's University of Medical Sciences (IUMS), Tehran, Iran.

To estimate sample size, a statistical significance level of 0.05 and a power of 80% was set for this study. As such, the sample size required was calculated to be 126 participants (at least 42 samples in each group). A probability of 10% drop was also considered and accounted for (26). Samples included birthing parents of premature neontes who met the inclusion criteria. They were divided between an orientation tour group (n=43), an orientation tour-aromatherapy group (n=44), and a control group (n=43). The sampling method was convenience. Given that participants might exchange information during the study period, participants were assigned to one group each week. Accordingly, participants were assigned to the orientation tour group in the first week, the control group in the second week, and the orientation tour-aromatherapy group in the third week on a rolling basis until the end of the recruitment period. Neonates were transferred to the most appropriate NICU department as their condition improved throughout the study.

Participants met the inclusion criteria if they were Iranian mothers, primiparous, could read

and write, and were between 18 to 40 years old. Birthing parents of premature neonates with no prior experience of the NICU were also eligible if they had a planned singleton pregnancy and a gestational age of between 30 to 36 weeks (210-252 days). Those who entered the NICU were required to have no olfactory problems, asthma, or mental illness. They were also required to be non-smokers who were not drinking alcohol or taking psychotropic substances. Participants with a history of recurrent miscarriages (≥3), who were studying or working in medicine or psychology, or had a history of a stressful life event (e.g., bereavement) within (≤3) months or were taking herbal medications or sedatives the day before the intervention, were excluded. The neonates of potential participants were required to have respiratory distress syndrome (RDS), an Apgar score of ≥ 7 in the first 5 minutes of the birth, and no congenital anomalies present. Participants were excluded from the study during the intervention period if either infant death or sensitivity to the smell of orange occurred.

The research tools consisted of the demographic and obstetric characteristics questionnaires and state-trait anxiety inventory (STAI). To collect data demographic and obstetric characteristics questionnaires consisting of 13 questions were completed both using the neonate's medical documentation and by questioning adult participants. Both demographic and obstetric characteristics questionnaires were completed, both using the neonate's medical documentation and self report.

The state-trait anxiety inventory (STAI) was also used. This consists of two parts, including state and trait anxiety on a four-point Likert scale (no = 1, a little = 2, a lot = 3, and totally = 4). The first 20 questions of this questionnaire are related to state anxiety, and the following 20 questions are concerning trait anxiety. Total scoring for state-trait anxiety varies within the range of 20-80. Categories include mild anxiety (20-39), moderate anxiety (40-59), and severe anxiety (60-80). Construct validity of the state-trait anxiety scale has been examined following its use in a training program (25). In an Iranian study, its reliability was reportedly 0.80 (17). In our study, Cronbach's alpha was 0.92 and 0.90 for state and trait anxiety, respectively.

Up to two days following childbirth, and one hour before first entry into the NICU, all participants were given 20 minutes of rest in a room away from the NICU to complete the STAI.

In the orientation tour group, four drops of distilled water were poured as a placebo on a 10 × 10 cm handkerchief and attached to the collar of participants' clothes. Next, they inhaled distilled water for 30 minutes. After the inhalation of distilled water, participants entered the NICU, accompanied by the researcher. An orientation tour was subsequently undertaken with participants one by one. During this 30-minute orientation, they were briefly acquainted with devices, staff, rules, and regulations within the NICU, the appearance and specific conditions related to the premature baby, as well as methods of infection control (e.g., hand washing), along with routine care, and treatment procedures. Participants in this group also re-inhaled distilled water for 30 minutes before bed, at the first night.

Participants in the orientation tour-aromatherapy group, 4 drops of 2% orange essence (made by the Barij Essence Company) were poured onto a 10 × 10 cm handkerchief and attached to the collar of participants' clothes. Next, they inhaled the orange essence for 30 minutes. After which time, participants entered the NICU accompanied by the primary researcher for the first time, and undertook the same individual orientation tour as described above. They then re-inhaled the 2% orange essence for 30 minutes before bed, at the first night. In the basic process for the extraction of high-quality essential oils from citrus was via cold pressing. The oldest method is the completely manual sponge process. This is where each fruit is cut in half, the flesh is extracted, and the peel is soaked in water for 2≥ hours before being pressed between two sponges, which absorb the mixture of essential oils, aqueous components, colloids, peel cells, and other materials. The wringing out of the sponges then releases the liquid, from which the essential oil is separated by decantation.

Participants in the control group inhaled distilled water as described above for 30

minutes and subsequently met their neonates for the first time in the usual manner without the researcher accompanying them. In addition, the NICU nurse asked these participants if they had questions about the condition of their infant, their treatment, or the NICU in general.

One hour before participants' first entry into the NICU, as well as one and 24 hours after participants left the NICU, all participants completed the STAI in a quiet room away from the NICU. All questionnaires were then collected by a research assistant who had no information about the aim of this study.

SPSS statistics 16.0 was used to analyze statistical data. To check whether the data were normal, the Kolmogorov-Smirnov test was used. Chi-square and Fisher's exact tests were used to compare qualitative variables. Furthermore, a one-way analysis of variance with Tukey's post hoc test was used to compare groups, as the normality hypothesis was established. The repeated measures analysis was also used to examine changes over time among the three groups. A result of <0.05 was considered statistically significant in all tests.

Results

There was no statistically significant difference between the demographic and obstetric characteristics of participants among the three groups, specially for the age, educational level, economic and occupation status, also the number of participants visiting times of the NICU (Table 1).

Table 1. Comparison of demographic-obstetric characteristics in the three groups (N=130)

Variable	Groups				
	Orientation tour (N=43) M±SD/ No (%)	Orientation tour-aromatherapy (N=44) M±SD/ No (%)	Control (N=43) M±SD/ No (%)	Total (N=130) M±SD/ No (%)	P-Value
Age (Year)	30.07 ± 6.62	28.57 ± 5.83	29.77 ± 6.27	29.46 ± 6.23	0.496*
Educational level					0.565**
Literacy	3 (7)	3 (6.8)	4 (9.3)	10 (7.7)	
Elementary	23 (53.5)	15 (34.1)	15 (34.9)	53 (40.8)	
High school and diploma	11 (25.5)	18 (40.9)	15 (34.9)	44 (33.8)	
Academic degree	6 (14)	8 (18.2)	9 (20.9)	23 (17.7)	
Occupation status					0.204**
Unemployed	41 (95.3)	44 (100)	40 (93)	125 (96.2)	
Employed	2 (4.7)	0 (0)	3 (7)	5 (3.8)	
Economic status					0.348***
Desirable	8 (18.6)	6 (13.7)	2 (4.6)	16 (12.3)	
Rather desirable	20 (46.5)	24 (54.5)	23 (53.5)	67 (51.5)	
Undesirable	15 (34.9)	14 (31.8)	18 (41.9)	47 (36.2)	
History of infertility					0.134***
No	28 (65.1)	31 (70.5)	36 (83.7)	95 (73.1)	
Yes	15 (34.9)	13 (29.5)	7 (16.3)	35 (26.9)	
Time interval from birth to the first entry in the NICU (Hour)	23.44 ± 12.96	23.44 ± 11.74	22.73 ± 11.77	23.20 ± 12.08	0.952*
Visiting times up to 24 hours after the intervention	2.47 ± 1.00	2.27 ± 0.99	2.72 ± 1.38	2.48 ± 1.15	0.191*
Insurance status					0.324***
No	9 (20.9)	11 (25)	15 (34.9)	35 (26.9)	
Yes	34 (79.1)	33 (75)	28 (65.1)	95 (73.1)	

Variable	Groups				
	Orientation tour (N=43) M±SD/ No (%)	Orientation tour-aromatherapy (N=44) M±SD/ No (%)	Control (N=43) M±SD/ No (%)	Total (N=130) M±SD/ No (%)	P-Value
Mode of birth					0.509***
Vaginal delivery	11 (25.6)	11 (25)	7 (16.3)	29 (22.3)	
Cesarean section	32 (74.4)	33 (75)	36 (83.7)	101 (77.7)	
Gestational age (Day)	235.88 ± 11.01	237.09 ± 11.92	235.84 ± 10.24	236.28 ± 11.07	0.838*
Neonates' weight (g)	2005.81±404.47	2102.39 ± 416.88	2023.72 ± 433.34	2044.42 ± 417.27	0.520*
5-minute Apgar score	9.40 ± 0.82	9.16 ± 0.98	9.42 ± 0.87	9.32 ± 0.90	0.331*
Sex of neonate					0.544***
Female	18 (41.9)	19 (43.2)	14 (32.6)	51 (39.2)	
Male	25 (58.1)	25 (56.8)	29 (67.4)	79 (60.8)	

*One-Way Anova; **Fisher Test; ***Chi-Square

The mean score of the state and trait anxiety did not differ significantly among the three groups before participants' first entry into the NICU. However, comparing the groups over time at one hour and at 24 hours following participants left the NICU, state and trait anxiety scores in the two intervention groups were observed to be statistically significantly lower than those recorded in the control group (Table 2).

Table 2. Comparison of the mean of state-trait anxiety scores in the three groups (N=130)

Groups	Orientation Tour (N=43)	Orientation Tour-Aromatherapy (N=44)	Control (N=43)	P-Value
State anxiety				
One hour before the first entry	46.88 ± 11.15	45.95 ± 12.70	42.35 ± 11.27	P = 0.171*
One hour after leaving the NICU	37.60 ± 9.55	35.68 ± 8.90	46.09 ± 10.25	P < 0.001*
24 hours after leaving the NICU	34.40 ± 11.15	32.64 ± 10.20	48.77 ± 10.29	P < 0.001*
Repeated measurement	P < 0.001			
group × state anxiety	P < 0.001			
Trait anxiety				
One hour before the first entry	45.84 ± 10.51	45.57 ± 11.61	41.79 ± 10.63	P = 0.134*
One hour after leaving the NICU	37.53 ± 8.67	36.98 ± 8.77	46.53 ± 9.55	P < 0.001*
24 hours after leaving the NICU	34.14 ± 9.67	33.05 ± 9.23	49.58 ± 10.14	P < 0.001*
Repeated measurement	P < 0.001			
group × trait anxiety	P < 0.001			

* One-way ANOVA

The Tukey's post-hoc test indicated that at one and at 24 hours after participants left the NICU, there were no statistically significant differences in the mean score of the state and trait anxiety among the two-orientation tour and orientation tour-aromatherapy groups.

Overall, results confirmed that the mean scores relating to both state and trait anxiety decreased significantly over time in the two intervention groups. Conversely, these scores increased significantly in the control group (Table 2) (Figure 1 and Figure 2).

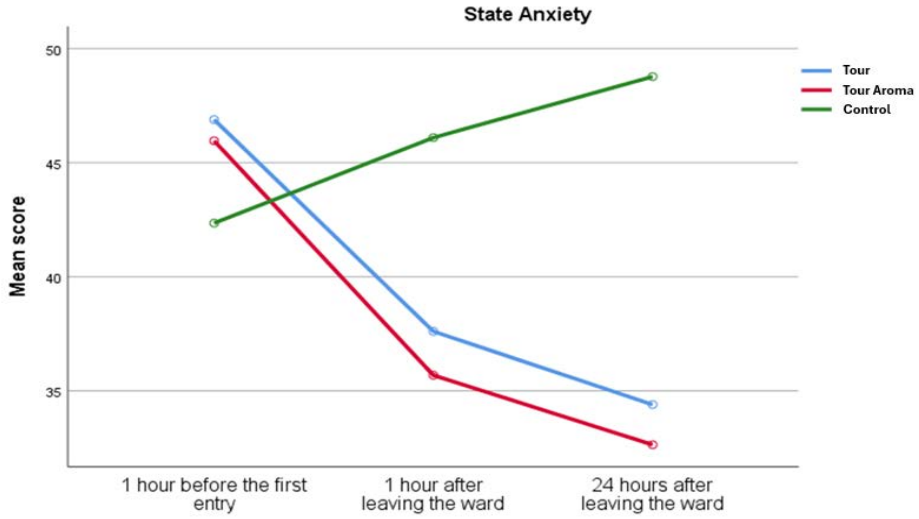

Figure 1. Trend in the mean scores of State Anxiety at 1 hour before the first entry into the NICU, one and 24 hours after leaving the ward

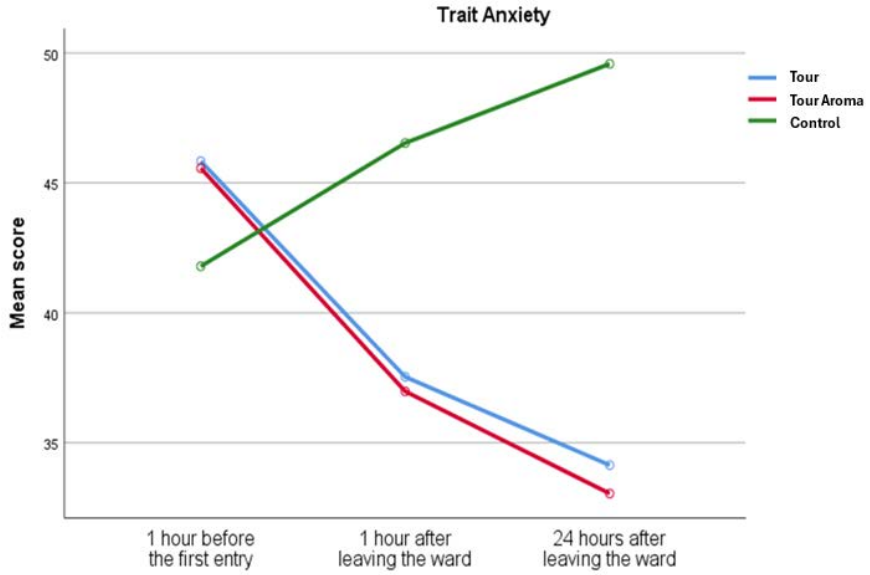

Figure 2. Trend in the mean scores of Trait Anxiety at the 1 hour before the first entry into the NICU, one and 24 hours after leaving the ward

Discussion

This study aimed to investigate the effect of orientation tours, with and without orange essence aromatherapy, upon anxiety levels among birthing parents of premature neonates, who were admitted to the NICU. Participants in both the orientation tour and orientation tour-

aromatherapy group had statistically significantly reduced state and trait anxiety scores at both one and 24 hours following the intervention. Nevertheless, comparisons between the two intervention groups indicate that the use of orange essence did not result in more positive effects for participants than those in the orientation tour only group. This indicates that an orientation tour alone is effective in reducing both state and trait anxiety in birthing parents of premature neonates hospitalized in the NICU.

Few studies have been conducted on the effects of orientation tours on anxiety levels among birthing parents of premature neonates. Training sessions conducted in the NICU have similarly been evidence to reduce anxiety in birthing parents (18-19). Yet in one of these studies, the average hospitalization time of neonates was not reported, and the state anxiety was measured whilst the infant was being discharged (18). In an Iranian study (2014), participants' medical conditions were not recorded, and anxiety levels of premature neonates hospitalized in the NICU mothers' were measured during the first 10 days after the intervention (19). Nevertheless, educational content prepared to emphasize caring for premature neonates in these cases were probably beneficial in reducing anxiety in this context, as has also been demonstrated here in relation to orientation tours.

In our study, the orientation tour focused on getting participants acquainted with the environment, rules, and regulations of the neonatal unit. A key feature of this research is that the intervention was performed with those experiencing their first visit to the NICU with their preterm neonates. The NICU department orientation program (16) and the "creation of opportunities for parent empowerment program" evaluated elsewhere have also been evidenced to significantly reduce levels of state anxiety among those with premature neonates (27). Yet in both cases, the main intervention was not performed in the NICU, as is the case in the present study. This emphasizes the unique contribution this research has made.

In other studies, educational programs have also emphasized parents' acquaintance with the NICU using other methods such as films, pamphlets, and cassettes (16, 27). State anxiety in one of these studies significantly decreased (16). However, the intervention did not exert a significant effect on trait anxiety. Equally, three sessions of 20-30 minutes of "a face-to-face orientation educational program" did not significantly affect the mean score of state and trait anxiety among participants (17). Generally, providing parents with information could lead to their relaxation and satisfaction (28), and an orientation tour is considered a useful method via which to provide information to individuals to help them adapt and feel more secure (29). Further research is required to understand the mechanisms and factors behind such differences in results.

In inhalation aromatherapy, fat-soluble essence molecules are assimilated by olfactory receptors containing mucous. Accordingly, the olfactory message is transmitted to the limbic brain system through the olfactory nerve, and the aroma is processed in the limbic system. The olfactory message, using aromas in the limbic system, triggers release of neurotransmitters, such as endorphin and encephalin, in target tissues, leading to feelings of ecstasy, relaxation, pain, and anxiety relief (30-31). Limonene is one of the major components of citrus fruits, specifically oranges, which have an essential role in sympathetic nervous system stimulation (32). The relaxing effect of orange essence is well known (21). Thus, , it has not resulted in a greater beneficial effect for those engaging in orientation tours. Indeed, the use of orange essence has been reported to be effective in reducing anxiety in birthing parents of sick children elsewhere (33). However, the use of this essence has proved ineffective in reducing anxiety and depression during the postnatal period (34).

It is well established that the combination of two or more non-medical methods can be more effective when utilized together as they address numerous senses (24). However, based on the results presented here, orange essence did not have a stronger impact on anxiety than the provision of orientation tours alone did.Respiratory Distress Syndrome (RDS) was identified as the predominant cause of hospitalization among the neonates in the NICU,potentially exacerbating stress and anxiety

levels among mothers of premature neonates.Orientation tours alone may be effective as they reduce anxiety and stress by promoting knowledge, information, experience, as well as oral and cognitive capabilities (36). In addition, such tours are known to help individuals adapt to new environments (29). Thus, these may usefully be scaled up in future to ameliorate some of the negative effects parents experience as a result of entering the NICU with premature neonates (11). Indeed, parents in this context need information to support their neonates effectively (11), and focusing people on their educational needs makes them responsible for learning (37). Thus, continuing to provide such evidence-based support will be vital for future NICU services.

As sampling in this study occurred during the COVID- 19 pandemic, it was not possible to hold extended orientation tours in the NICU. One of the main strengths of this study is that the intervention was conducted with birthing parents who had given birth experiencing their first visit to the NICU with their preterm infants.

We also note limitations in that participants may have exchanged information during the intervention period, though we attempted to mitigate this risk by conducting sampling at one-week intervals. There are also limitations inherent to quasi-experimental studies such as lack of randomization and the risk of selection biases. Future studies may be enhanced through the recruitment of larger sample sizes to randomized controlled trials. It is recommended that future research implement group-based orientation tours for mothers of premature neonates in the NICU and compare their effectiveness with individual sessions.

Conclusion

Orientation tours administered both in isolation and in combination with orange essence aromatherapy effectively reduced both state and trait anxiety in new birthing parents with premature neonates entering the NICU. However, the use of orange essence does not have an increased statistically significant effect on reducing anxiety in this context. It is also important to note that anxiety levels in our control group increased throughout the intervention period. Given these findings and the absence of any negative side effects, orientation tours may usefully be administered to reduce stress and anxiety in birthing parents of premature neonates who are subsequently hospitalized in the NICU. Such reductions may secure greater parent bonding and enhanced perinatal outcomes.

Declerations

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Conflicts of interest

One of the authors (RB) is a member of Barij Medicinal Plants Research Center. But he was blind to the intervention and control groups and had no contribution in data analysis and interpretation.

Ethical considerations

All procedures were conducted according to the Declaration of Helsinki Before the study, written informed consent was obtained from all participants involved in this research.

Code of Ethics

This research approved by the Research Ethics Committee at the IUMS under ethical code of IR.IUMS.REC.1399.241.

Use of Artificial Intelligence (AI)

The authors acknowledge that no AI software was used in writing, data analysis, interpretation, content generation or editing of this manuscript.

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Authors' contribution

EB and MK contributed in the study design, data curation, analysis of the data and writing of the manuscript. SP participated in the writing and editing of the manuscript. FS performed the analysis of data and contributed in methodology. MS was consulted for design and

methodology of the research. RB carried out the formulating and supplying the aromatherapy oils used in the study. All authors read and approved the final version of the submitted manuscript.

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