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Use of Aromatherapy in Neonatal Care: Benefits, Risks, and Nursing Practices



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Abstract

This review comprehensively evaluates the effects of aromatherapy on neonatal health based on current scientific evidence. The potential impacts of essential oils on skin integrity, physiological development, sleep patterns, and stress management in newborns have been discussed. The benefits of the controlled use of oils such as lavender, chamomile, coconut, sunflower, and sesame are highlighted. In addition, the review provides detailed guidance on situations requiring caution in premature infants, possible side effects, and protocols for safe usage. Literature-based recommendations for nursing practices are presented, including key considerations during application and oils that should be avoided. It is particularly emphasised that aromatherapy can provide benefits as a complementary method when applied under appropriate conditions, but it should never replace medical treatments.

Keywords

Aromatherapy, neonate, nursing, neonatal, newborn, review



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INTRODUCTION

Aromatherapy is a widely used modality within complementary and alternative medicine that involves the therapeutic application of plant-derived essential oils to help prevent, alleviate, or manage physical and psychological symptoms (1). With growing global and scientific interest, it is increasingly being integrated into clinical practice as an adjunctive treatment approach (2). When applied in a controlled and evidence-based manner, essential oils have shown potential benefits across a range of populations and conditions, including anxiety, pain, and sleep disturbances in both adults and children (3). However, their use warrants particular caution in physiologically vulnerable groups. Neonates, in particular, require careful consideration due to their immature skin barrier, underdeveloped metabolic systems, and heightened sensitivity to external agents (4). This review critically examines the physiological and psychological effects of aromatherapy in neonatal care, outlines the principles for safe application, and synthesises current scientific evidence supporting its integration into nursing practice.

Methods of Aromatherapy Application in Neonates

Aromatherapy applications in neonates should be conducted cautiously due to their physiological sensitivity and developmental characteristics. Aromatherapy application methods during this period include inhalation (olfactory method) and topical application (massage or bath). Oral administration is not recommended for neonates because of the potential risks.

Inhalation (Application via Olfaction)

In this method, essential oils are applied without direct skin contact by dispersing them into the ambient air. The most common form involves diffusing aromatic compounds into the room via a diffuser or by using a cloth infused with essential oils. Because neonates' sense of smell is active from birth, aromatherapy through inhalation can yield positive effects such as stress reduction, calming, and facilitating sleep onset (5,6). Additionally, in premature or medically unstable infants, this noncontact method aligns with the principles of minimal stimulation and minimal touch adopted to prevent sensory overload, making it a safer and more suitable option (7).

The mechanism of inhalation aromatherapy begins when essential oil molecules bind to olfactory receptors in the nose, converting into biological signals. These signals travel via the olfactory bulb to the limbic system and hypothalamus, stimulating the release of neurotransmitters such as serotonin and endorphins. This process creates

connections between the nervous and other physiological systems, promoting relaxation (8). Furthermore, aromas exert regulatory effects in subcortical brain regions associated with emotions and cortisol release, increasing parasympathetic activity while reducing sympathetic autonomic responses (9). However, the duration of this application should be short (limited to several times per day, not exceeding 5-10 minutes each), and continuous monitoring of the infant is essential (7).

Topical Application: Aromatherapeutic Massage

Massage-based delivery involves diluting essential oils in carrier oils (e.g., coconut, sunflower, or olive oil) and applying them via gentle massage (10). This method combines tactile and olfactory stimulation, promoting physiological relaxation and strengthening parent-infant bonding. Aromatherapeutic massage serves as a complementary care strategy for colic, agitation, and sleep disruptions. Even without oil, massage alone is a potent tactile intervention that reduces pain and improves sleep quality (11).

Using suitable essential oils enhances the physiological benefits delivered through the skin and engages the neonate's sense of smell for a holistic soothing effect (12,13). For example, circular abdominal massage with chamomile oil alleviates gas and calms infants through chamomile's antispasmodic compounds (14).

Evidence from meta-analyses and systematic reviews recommends a total daily oil dose of 5 mL/kg, divided into 2-3 massage sessions. This regimen strengthens the skin barrier integrity in premature infants, support weight gain, and reduce nosocomial infections (15,16,17). Carrier oils high in linoleic acid, such as coconut and sunflower oils, demonstrate superior outcomes (18,19). Exceeding the recommended dosage offers no additional benefit and may provoke skin irritation; thus, adherence to these guidelines is essential in clinical practice (15).

Aromatherapy Bath Applications

In some neonatal care practices, a small amount of essential oil is added to warm bath water to promote relaxation. However, because newborns have highly permeable skin, only very low concentrations of diluted essential oils should be used, or lighter aromatic preparations such as hydrosols may be chosen (10). Randomised controlled trials have shown that lavender-oil baths reduce stress levels, improve sleep quality, and significantly shorten infant crying time (20,21). Başdaş et al. (21) recommend adding a single drop of lavender oil to the bath, maintaining a dilution ratio of approximately 0.25-0.5%. Bath sessions should be brief,



reserved only for infants with intact skin, and the baby's responses must be carefully monitored throughout (20).

Contraindicated Conditions in the Application Methods

To ensure neonate safety during aromatherapy applications, both frequency and duration must be limited, and low doses should be used. Accordingly, room diffusers should be operated only several times per day for up to 5-10 minutes each session, and massage treatments should be performed just once and kept brief. When these limits are observed, aromatherapy can be considered a safe adjunctive care method for newborns (22).

A systematic review of existing studies reported that most trials documented no adverse effects; only a few provided safety data, and none described serious events (7). However, this does not imply that aromatherapy is entirely risk-free. Neonates are particularly vulnerable to the potential toxic effects of essential oils and thus constitute a high-risk group. Therefore, essential oils should be treated as potential toxins stored out of children's reach, with both dose and exposure time rigorously restricted. Furthermore, oral administration is contraindicated in this population (23).

Physiological and Psychological Effects of Essential Oils on Neonates

When appropriately selected and applied, essential oils are considered a potential supportive approach for alleviating physiological and psychological symptoms in newborn infants, such as pain, colic, sleep disturbances, and stress (6,14,24,25,26,27).

Pain Management

Neonates are capable of perceiving pain both physiologically and behaviourally, and inadequately managed pain can lead to adverse developmental outcomes in both the short and long term (28,29). In addition to pharmacological strategies, non-pharmacological interventions such as breastfeeding, non-nutritive sucking, kangaroo care, and facilitated positioning are widely implemented in neonatal intensive care units due to their safety and cost effectiveness. Complementary approaches, including massage, music therapy, distraction techniques, and aromatherapy, engage multiple sensory modalities (taste, smell, touch, and hearing) to provide supportive relief (30). Among these, the olfactory system, whose development is largely complete by 26-28 weeks of gestation, constitutes the most mature sensory pathway in the newborn (31,32). Accordingly, aromatherapy, which acts directly via olfactory receptors, has been recognised as a potent adjunct in neonatal pain management.

Recent studies show that certain essential oils may reduce pain responses in newborns. Usta et al. (24) demonstrated in preterm infants that the inhalation of lavender essential oil significantly reduced procedural pain during invasive interventions, highlighting its low cost, safety, and ease of integration into nursing care. Vaziri et al. (25) reported significant reductions in pain scores, observable relaxation behaviours, and decreased crying duration following lavender aromatherapy. Maya-Enero et al. (6) found that the scents of lavender and breast milk produced anxiolytic and comfort-enhancing effects comparable to those of amniotic fluid, with no serious adverse events observed; these benefits are attributed to lavender constituents such as linalool and linalyl acetate, which are thought to exert sedative effects on the central nervous system and thereby modulate pain perception (6,33).

Colic (Infantile Colic)

Infantile colic, seen in the first months of life and characterised by prolonged episodes of crying, is a highly challenging condition for both the infant and the parents. The antispasmodic and carminative properties of specific essential oils make their use as a complementary approach in managing colic symptoms possible (26). In this context, chamomile and lavender oils are particularly noteworthy. In a randomised controlled trial conducted in Iran, infants diagnosed with colic underwent abdominal massage with chamomile oil applied three times a day. As a result of the 14-day intervention, the group in which chamomile oil was applied showed a significant decrease in daily crying duration and an increase in sleep duration compared with the placebo group (paraffin oil) (14). These findings indicate that massage with chamomile oil can be a safe and effective complementary method in colic management. Similarly, in the study by Çetinkaya and Başbakkal (26), abdominal massage performed with lavender oil was reported to be effective in alleviating colic symptoms in newborns. Owing to its sedative, antispasmodic, and anticolitic properties, Lavender oil is considered an aromatic agent that can reduce colic symptoms.

Sleep

Neonates may experience sleep disturbances characterised by frequent awakenings, difficulty in initiating sleep, or brief sleep periods. Owing to its calming properties, aromatherapy is expected to facilitate sleep onset and prolong sleep duration (27). Arbianingsih et al. (34) proposed lavender oil massage as an alternative intervention to reduce sleep disturbances in infants aged 6-12 months. Field et al. (20) reported that adding a few drops of lavender oil to



warm bath water before bedtime promoted deeper sleep in infants. Consequently, although aromatherapy alone does not constitute a comprehensive solution for sleep disorders, incorporating lavender baths or lavender-infused massage into the sleep routine may ease sleep initiation and enhance both the duration and quality of sleep.

Stress Reduction and Calming Effects

Neonates are susceptible to environmental stimuli, and stress responses can be provoked by painful procedures, exposure to unfamiliar settings, or separation from the mother (35). Certain odours exert sedative effects on the central nervous system. Indeed, studies in preterm infants have demonstrated that exposure to lavender scent during painful interventions significantly reduces physiological stress markers (5,6). Moreover, in a randomised controlled trial by Başdaş et al. (21), neonates receiving either lavender-oil massage or lavender-infused baths exhibited statistically significant decreases in stress levels compared to controls.

The olfactory system is among the earliest maturing sensory modalities in infancy, and thus, familiar, pleasant aromas serve as effective distractive and soothing stimuli for newborns (5). The calming effects of aromatherapy were corroborated by objective measures such as shortened crying duration, lowered heart rate, and reduced respiratory rate. Accordingly, the appropriate application of essential oils in stressful situations may promote greater tranquility and calmness in neonates (5).

Effects on Skin Health

Various vegetable oils such as olive, coconut, sunflower, almond, and sesame oils are widely employed in neonatal skin care to moisturise the epidermis, bolster barrier function, and protect against external insults (36). Neonatal skin, particularly in preterm infants, is exceedingly thin and permeable; with an underdeveloped barrier, these infants experience increased transepidermal water loss and heightened susceptibility to infection (17). Accordingly, many cultures have traditionally used oils on the skin of infants as protective measures. The literature documents the use of olive, coconut, sunflower, mustard and almond oils to support neonatal skin health (16,18,36,37). Essential oils may also contribute to skin care; however, oil selection must be cautiously undertaken, given each oil's potential to produce either beneficial or adverse cutaneous effects. Recent evidence indicates that oils rich in oleic acid (e.g., olive and mustard oils) can weaken the skin barrier. In contrast, oils high in linoleic acid (e.g., sunflower, coconut, and almond oils) more effectively maintain the barrier integrity (38). In

Salam et al.'s (18) trial, preterm infants who received twice-daily coconut oil massage for 7 days demonstrated improved skin integrity preservation. In this context, nurses and other healthcare professionals must educate parents and caregivers on the appropriate and safe selection of oils for neonatal skin care.

Effects of Aromatherapeutic Massage on Neonates

Infant massage, a practice traditionally employed across many cultures and whose benefits have been scientifically validated in modern medicine, has demonstrated particular efficacy in preterm populations. Regular massage accelerates weight gain, reduce stress-hormone levels, and strengthen the mother–infant bond in preterm infants (12,39,40). Moreover, numerous investigations have examined the combined effects of massage and aromatherapy on neonatal outcomes. Oil-based massages have been reported to enhance skin hydration, improve thermoregulation, and support weight gain (41). In a study from India (18), very low birth weight preterm infants who received twice-daily coconut oil massage exhibited significantly reduced transepidermal water loss after 7 days compared with controls. These findings revealed that oil-mediated massage mechanically stimulates growth hormone release and delivers additional calories and skin protection through absorbed fatty acids.

The psychological and behavioural impacts of aromatherapeutic massage are equally noteworthy. The skin-to-skin and eye contact established during the massage reinforce feelings of security and promote mother-infant attachment (12). Pleasant aromas introduced via the oils further soothe the infant and reduce crying. Nighttime massage with lavender oil has been associated with fewer nocturnal awakenings and extended sleep periods in infants (34). The rhythmic tactile stimulation calms the newborn's nervous system, while the scent of oils such as lavender and chamomile can lower cortisol and other stress-hormone levels. Consequently, infants receiving aromatherapeutic massage typically exhibit greater overall calmness, reduced irritability, and improved feeding and sleep patterns (12,14).

Safety Principles and Adverse Effects

Aromatherapy interventions cannot be uniformly applied across all neonates and clinical settings. Individual variability in sensory sensitivity necessitates continuous monitoring of each infant's response; if a particular aroma provokes agitation rather than relaxation, its use must be discontinued (37). Moreover, aromatherapy should be regarded strictly as a complementary modality and must not replace conventional medical treatments. For example, in cases of infantile colic



secondary to cow's milk protein allergy, aromatherapy alone will not resolve the underlying pathology. Nonetheless, with appropriate oil selection and application methods, aromatherapy can provide valuable support in alleviating neonates' physiological pain and psychological stress (22).

The improper or indiscriminate use of essential oils may precipitate a range of adverse effects in newborns, manifesting as either local cutaneous reactions or systemic toxicity. While essential oils are generally well tolerated in low concentrations, they can act as potential allergens (23). Although rare, there are case reports of contact dermatitis and sensitivity reactions following exposure to certain oils, including airborne exposure (42).

Applying non-sterile or contaminated oils may disrupt the cutaneous microbiome and promote the overgrowth of pathogenic bacteria and fungi. For instance, traditional mustard oil massage increased *Staphylococcus aureus* colonisation on infant skin. Furthermore, leaving an excessive oil film on the skin is inadvisable, constant moisture on the lipid barrier can promote the growth of microbes (43). Ingestion of volatile oils carries an even greater risk: ingesting just a few millilitres of peppermint or oregano oil is potentially fatal in infants. Accordingly, essential oil containers must be stored well out of infants' reach, and oils should never be applied to areas accessible for mouthing (e.g., hands or feet) (44).

When used under strict safety protocols, aromatherapy can serve as an adjunctive element in neonatal care; however, the infant's safety must always remain the overriding priority.

The following guidelines should be observed when employing essential oils in neonatal aromatherapy (16,22,36):

- Aromatherapy in newborns should be performed only under the guidance of trained and qualified healthcare professionals, given the extreme sensitivity of the neonatal skin barriers and respiratory systems.
- Essential oils must always be properly diluted before application; the recommended dilution ratios for infants should remain well below those used for adults.
- Only paediatric-approved, dermatologically tested essential oils should be employed to minimise the risk of unexpected-allergic reactions and skin irritation.
- Because certain oils may induce phototoxicity, infants must not be exposed to direct ultraviolet radiation following application.
- Strict adherence to product labels and manufacturer instructions is fundamental to ensuring both safety and efficacy.

- Parents and caregivers must collaborate closely with healthcare providers and receive thorough education before initiating any aromatherapy regimen.
- Scientific evidence supports the use of aromatherapy as a supportive intervention for promoting relaxation or alleviating mild symptoms only under specific, controlled conditions.
- Nurses must obtain written consent from the parents during this process.
- In conclusion, when executed with accurate dilution, judicious oil selection, standardised application protocols, and professional oversight, aromatherapy may confer potential benefits in neonatal care; nevertheless, every procedural step must be implemented with the highest degree of vigilance.

Approach to Aromatherapy in Nursing Practice

Clinical nursing aromatherapy involves the use of essential oils to manage patient symptoms, with outcomes assessed in a structured clinical setting. In neonatal care, nurses undertake several professional responsibilities when aromatherapy is incorporated into patient management. These include conducting a comprehensive health history, assessing vital signs, identifying the target symptom, educating families, monitoring clinical outcomes, evaluating effectiveness, and documenting the care process. The selection of essential oils must be grounded in robust scientific evidence, with careful consideration of their chemical properties and potential bioeffect. Additionally, the determination of appropriate blending ratios, compatibility of essential and carrier oils, and the frequency and duration of applications must be individualised for each neonate (45). Nurses are also expected to closely monitor infants for physiological or behavioural responses following aromatherapy interventions and provide families with accurate, evidence-based guidance on safe use.

Within the framework of Türkiye's Regulation on Traditional and Complementary Medicine Practices, nurses are permitted to implement aromatherapy interventions only under specific conditions: a written medical order from a certified physician, compliance with institutional protocols, successful completion of formal training and certification programs, and documented informed consent from the family (46). Although nurses cannot initiate or perform aromatherapy independently, they are vital in delivering physician-collaborative, evidence-based care. Furthermore, nurses may participate in clinical research on aromatherapy in partnership with physicians, contributing to study implementation, patient monitoring, data collection,



and reporting. This structured and collaborative approach promotes the safety of neonatal and paediatric populations and the professional integrity of nursing practice. Expanding nurses' roles through accredited education and interdisciplinary collaboration supports a more holistic, continuous model of care within complementary health practices. Universities' continuing education and research centres, along with specialised private organisations and professional associations, usually provide training in this field. Some programs are designed specifically for health professionals and are considered within the scope of complementary medicine practices. At the international level, it is aimed for individuals to develop their aromatherapy knowledge at a professional level through accredited training offered online or face-to-face.

CONCLUSION

With appropriate oil selection, correct application techniques, and careful dosage, aromatherapy can be used as a potential complementary care approach for newborn health. Evidence suggests that massage with essential oils such as coconut, sunflower, and sesame may promote weight gain, support skin barrier function, and reduce the risk of infection, especially in preterm and low birth weight infants. Additionally, essential oils such as lavender may have calming effects and contribute to symptom relief when used in controlled settings and for short periods of time. However, other essential oils such as tea tree, eucalyptus, and peppermint have been associated with adverse effects in newborns in some case reports. Therefore, their use in newborn care is not recommended unless supported by robust safety data and under professional supervision. Clinicians should base aromatherapy interventions in newborns on evidence-based protocols, personalised care plans, and thorough family education. Future research should focus on developing standard clinical guidelines and improving the training of healthcare professionals in newborn aromatherapy to improve both efficacy and safety.



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