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Mini-Review

Aromatherapy and Essential Oils in Pediatric Care: Applications and Future Directions

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Abstract: Aromatherapy has emerged as a complementary therapeutic modality in pediatric care, leveraging the bioactive properties of essential oils for managing anxiety, pain, and sleep disturbances. This mini-review examines the diverse administration routes—topical, inhalational, and oral—and their respective impacts on safety, absorption, and efficacy. Emphasis is placed on non-pharmacological interventions in pediatric dentistry, pain relief, and overall well-being. Current evidence highlights the anxiolytic effects of essential oils such as lavender, jasmine, and *Rosa damascena* in reducing procedural anxiety and enhancing comfort during medical and dental procedures. Despite the growing acceptance of aromatherapy, challenges such as standardization, caregiver acceptance, and limited clinical guidelines persist. This review underscores the need for rigorous research and educational initiatives to optimize aromatherapy's integration into pediatric healthcare. Aromatherapy offers a promising, non-invasive approach to enhance pediatric patient outcomes, supporting its incorporation into holistic care models.

Keywords: Aromatherapy; Essential Oils; Pediatric Care.

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1. Introduction

The essential oils have gained significant attention in recent years as complementary therapies across various medical disciplines, including pediatrics. These natural, plant-derived products are lauded for their therapeutic potential, offering a non-invasive and therapeutic approach to health and wellness. In pediatric care, where safety and prudence are paramount, the use of essential oils is particularly well accepted for the management of common conditions such as anxiety, sleep disturbances, respiratory ailments, and minor skin irritations [1].

The bioactive compounds in essential oils, including terpenes, esters, and phenols, interact with the body through olfactory pathways, transdermal absorption, and direct pharmacological effects. Lavender, for instance, is widely recognized for its calming properties, while eucalyptus is frequently used to alleviate respiratory symptoms. These effects, supported by growing scientific evidence, have prompted healthcare providers and caregivers to explore aromatherapy as an adjunctive option in pediatric care [2].

However, the use of essential oils in children raises important questions about safety, efficacy, and standardization. Children's physiological differences necessitate careful consideration of dosages, application methods, and potential risks, such as allergic reactions or toxicity. As the popularity of aromatherapy continues to grow, it is critical to balance its perceived benefits with evidence-based practice and rigorous safety protocols [3]. This article aims to provide a comprehensive overview of the use of essential oils and aromatherapy in pediatrics, exploring their mechanisms of action, clinical applications, and potential limitations. By critically evaluating the current evidence, we seek to establish a

foundation for their safe and effective integration into pediatric care, while identifying areas for future research.

2. Non-Pharmacological Interventions and Essential Oils in Pediatric Dentistry

The use of non-pharmacological interventions, including essential oils, has gained significant prominence as a complementary approach in pediatric dentistry, offering innovative solutions to improve patient outcomes. Essential oils, such as lavender, jasmine, and chamomile, have been particularly recognized for their calming and anxiolytic properties, making them ideal for use in children who may experience heightened anxiety during dental visits [4].

Recent studies have demonstrated the potential of aromatherapy not only to reduce anxiety but also to create a more pleasant and reassuring environment for young patients. These interventions work through olfactory pathways to influence the limbic system, helping to modulate stress responses and emotional regulation. Moreover, the simplicity and accessibility of aromatherapy make it a practical tool for integration into routine dental practices, particularly in managing challenging cases. By addressing the psychological and emotional dimensions of dental care, non-pharmacological techniques such as aromatherapy have proven to enhance the overall patient experience, contributing to better cooperation, reduced distress, and potentially improved clinical outcomes during dental procedures [4-6].

A randomized, placebo-controlled trial evaluated the anxiolytic effects of jasmine aromatherapy on children aged 7 to 12 years undergoing restorative dental treatments. The study revealed significant reductions in anxiety and pain perception, as measured by the Modified Child Dental Anxiety Scale (MCDAS) and Visual Analogue Scale (VAS). Children in the jasmine aromatherapy group reported notably lower scores compared to the control group, highlighting the practicality and cost-effectiveness of aromatherapy as an adjunct in pediatric dental care [5].

A systematic review and network meta-analysis further assessed the efficacy of non-pharmacological interventions for reducing dental anxiety and heart rate during pediatric dental treatments. Among 12 evaluated approaches, aromatherapy emerged as the second most effective intervention for reducing anxiety, following music, which ranked highest. The analysis also emphasized the value of integrating aromatherapy with other techniques, such as relaxation, to achieve comprehensive management of anxiety in pediatric patients [4]. Another study focusing on Brazilian pediatric dentists explored their knowledge and practices regarding sleep bruxism (SB) in children [6]. The findings indicated that aromatherapy is increasingly recognized as a viable management strategy for SB, often used alongside other methods like occlusal splints and homeopathy. The study also highlighted the multidisciplinary approach adopted by dentists, with most referring suspected cases of bruxism to other healthcare providers for further evaluation and treatment [6].

A randomized controlled trial evaluated the efficacy of combining aromatherapy with Lavender-Neroli essential oil and background music in managing dental anxiety and pain during anesthesia in children. The study involved 56 children aged 6–10 years undergoing dental treatment with inferior alveolar nerve block anesthesia (IANB). Participants were divided into two groups: an experimental group that inhaled Lavender-Neroli essential oil via a modified nasal mask while listening to their favorite music, and a control group that wore an empty nasal mask without aromatherapy or music.

The results indicated that children in the aromatherapy with music group exhibited significantly lower levels of anxiety, as measured by the Facial Image Scale (FIS), and reduced vital signs associated with stress, such as heart rate and blood pressure, compared to the control group. However, no significant differences were observed in pain perception, as assessed by the FLACC (Face-Legs-Activity-Cry-Consolability) observational scale [7]. The study concluded that the combination of Lavender-Neroli oil aromatherapy and music is a safe and effective non-pharmacological technique for reducing dental

anxiety in children. This approach provides a valuable, minimally invasive strategy to improve the patient's experience during dental procedures [7].

A cluster-randomized, controlled, single-blinded study (AROMA_dent) investigated the impact of essential-oil vaporization on dental fear and anxiety (DFA) in dental practices. This study, conducted across four dental practices, evaluated five weekly cycles of vaporization using various scents: Orange (*Citrus sinensis*), Swiss Pine (*Pinus cembra*), Good Mood (a blend of citrus oils and Osmanthus), Forest Walk (a blend of coniferous and citrus oils), and water as a control. The primary outcome was acute anxiety measured by the State-Trait Anxiety Inventory (STAI-S), while secondary outcomes included trait anxiety, dental anxiety, and pain perception during treatment [8].

Across 486 patients, the intervention groups exhibited slightly lower levels of acute anxiety (STAI-S 38.4 ± 10.5) compared to the control group (40.7 ± 11.6). Subgroup analyses revealed a robust effect among female patients ($n = 296$, $p = 0.044$) and patients with high trait anxiety (STAI-T ≥ 42, $n = 131$), where the intervention groups showed significantly reduced acute anxiety compared to controls (46.8 ± 9.6 vs. 51.1 ± 11.9, $p = 0.0379$). Additionally, anecdotal feedback from dental staff highlighted the calming atmosphere created by essential-oil vaporization [8]. The findings suggest that essential-oil vaporization may effectively reduce dental anxiety, particularly in patients with higher baseline anxiety levels and in female patients. The study advocates for further exploration of essential-oil vaporization, both as a standalone intervention and in combination with other techniques, to address DFA in diverse patient populations [8].

These findings underscore the growing acceptance of essential oils and aromatherapy as effective, non-invasive interventions in pediatric dentistry. By reducing anxiety, enhancing comfort, and managing conditions such as bruxism, these techniques provide valuable tools for improving the quality of dental care for children. However, further research is needed to standardize protocols and optimize their application in clinical practice.

3. Aromatherapy in Pediatric Pain Relief and Well-Being: Evidence and Implementation

Pain and Well-being in pediatric management are critical components of healthcare, especially in scenarios involving vulnerable populations such as preterm infants and patients undergoing invasive medical procedures. While pharmacological interventions remain the cornerstone of pain relief, non-pharmacological approaches like aromatherapy have gained attention for their ability to complement traditional methods. Aromatherapy, leveraging the bioactive properties of essential oils, offers a gentle and holistic alternative for reducing pain and improving patient comfort. Recent studies have explored its effectiveness in diverse contexts, such as venipuncture in preterm infants and catheter insertion pain in hemodialysis patients. By modulating physiological responses and alleviating procedural distress, essential oils like *Lavandula stoechas*, *Rosa damascena*, and lavender have demonstrated significant potential as non-invasive interventions. This section examines these studies to provide insights into the role of aromatherapy in pain management and its implications for improving patient care [9-13].

Two recent studies highlight the efficacy of aromatherapy in managing procedural pain and related symptoms across diverse patient groups. In the first study, researchers compared the effects of aromatherapy with breast milk, *Lavandula stoechas*, and *Rosa damascena* on venipuncture pain in preterm infants [9]. The randomized trial revealed that all three aromatherapy methods significantly reduced pain intensity during and after venipuncture compared to the sham group. Notably, breast milk odor proved more effective than *Lavandula stoechas* and *Rosa damascena*, although the latter two performed similarly. Additionally, oxygen saturation (SPO_2) levels were higher in the *Lavandula stoechas* and *Rosa damascena* groups, highlighting their calming physiological effects [9].

The second study, a systematic review and meta-analysis, focused on the use of lavender aromatherapy for managing pain associated with arteriovenous fistula (AVF)

catheter insertion and restless legs syndrome (RLS) in hemodialysis patients. The findings demonstrated that lavender significantly reduced the pain intensity of catheter insertion compared to no intervention and alleviated the severity of RLS. However, its efficacy was less pronounced when compared to placebo groups, suggesting the need for more rigorous placebo-controlled studies [10].

Postoperative nausea and vomiting (PONV) are a common complication in surgical patients, particularly in pediatric populations, where children are twice as likely as adults to experience these distressing symptoms. PONV can lead to prolonged hospital stays, increased healthcare costs, and diminished patient and caregiver satisfaction. While antiemetics are the primary treatment modality, complementary therapies like aromatherapy have gained attention for their potential to enhance patient comfort and reduce reliance on pharmacological interventions [11].

A recent evidence-based practice project investigated the perceived barriers to the use of aromatherapy among perioperative nurses caring for pediatric patients with PONV. The study, involving 27 nurses, utilized pre- and post-educational surveys to assess knowledge and identify challenges to aromatherapy implementation. Findings revealed that while antiemetics remain the standard approach to PONV, several barriers hinder the adoption of aromatherapy in clinical settings. These included limited availability of aromatherapy products, refusal by caregivers, and patient-specific factors such as allergies or sensitivities. Following an educational in-service, nurses reported an increased familiarity with aromatherapy techniques and expressed greater openness to incorporating them into their practice. The results underscore the importance of education in addressing misconceptions and building confidence among healthcare providers in using complementary therapies [11].

To facilitate the integration of aromatherapy into pediatric postoperative care, the study highlights the need for institutional policies that ensure consistency and standardization. These policies should address key aspects such as product selection, administration protocols, documentation, and patient monitoring. By overcoming these barriers, aromatherapy could serve as a valuable adjunctive therapy, offering a holistic approach to managing PONV and improving the overall care experience for pediatric patients [11].

Children undergoing surgery often experience distress from various sources, including discomfort, nausea, nervousness, and sleep disturbances. A quality improvement project explored the implementation and outcomes of an aromatherapy program as a complementary approach to managing these challenges in pediatric surgical patients. Over an 8-month period, 191 patients aged 3 to 22 years received aromatherapy as part of their care. Lavender and peppermint oils were the most frequently used, primarily for upset stomachs, nervousness, and general discomfort. The retrospective review of patient records indicated that the majority of patients with documented responses reported symptom improvement, suggesting the effectiveness of aromatherapy in alleviating distress. Importantly, no adverse events were reported, highlighting the safety of this intervention. The project emphasized the importance of thorough documentation to evaluate new services and support ongoing quality improvement efforts. By successfully integrating aromatherapy into pediatric surgical care, this program demonstrates its potential as a safe and effective adjunct to traditional treatments, fostering a more holistic and healing environment for young patients [12].

Sleep problems in children are a growing public health concern with significant implications for their physical, cognitive, and behavioral development. A comprehensive review of pediatric sleep research over the past two decades highlights the wide-ranging consequences of sleep deficiencies and disorders. These include physical outcomes such as increased risk of obesity, neurocognitive challenges like impaired memory, attention deficits, reduced intelligence, and poor academic performance, as well as emotional and behavioral issues, including internalizing and externalizing behaviors and heightened risk of behavioral disorders. The review also discusses various prevention and intervention strategies aimed at addressing childhood sleep problems. Effective approaches

include promoting balanced nutrition, regular exercise, cognitive-behavioral therapy for insomnia (CBT-I), and complementary practices such as aromatherapy, acupressure, and mindfulness [13].

These interventions are especially relevant in the context of heightened stress and disrupted routines caused by the COVID-19 pandemic. Given the pervasive impact of sleep problems on children's overall health and development, the study emphasizes the need for targeted research and policy strategies. These should focus on addressing risk factors, enhancing the efficacy and accessibility of treatments, and incorporating sleep screening and interventions into public health initiatives. A comprehensive approach to improving childhood sleep could play a vital role in supporting better health outcomes and developmental trajectories [13].

In summary, aromatherapy emerges as a promising non-pharmacological intervention in pediatric healthcare, addressing both pain management and overall well-being in vulnerable populations such as preterm infants and surgical patients. Its ability to reduce procedural distress, improve physiological outcomes, and complement traditional treatments highlights its value in diverse clinical scenarios, including venipuncture, catheter insertion, and postoperative care. Moreover, the incorporation of aromatherapy into pediatric sleep interventions further underscores its potential to enhance physical, cognitive, and behavioral outcomes in children.

Despite its evident benefits, the broader adoption of aromatherapy requires overcoming barriers such as product availability, caregiver acceptance, and standardization of protocols. Educational initiatives and institutional policies are essential to equip healthcare providers with the knowledge and confidence needed to implement aromatherapy effectively and safely. As the evidence base continues to grow, aromatherapy stands poised to play an integral role in creating a more holistic, patient-centered approach to pediatric care, ultimately fostering improved health outcomes and developmental trajectories for children.

4. Conclusion

Aromatherapy presents a valuable adjunctive therapy in pediatric healthcare, offering non-invasive solutions for anxiety management, pain relief, and improved well-being. The documented benefits of essential oils, particularly in managing procedural distress and enhancing patient comfort, underscore their potential as a holistic alternative or complement to traditional treatments. However, the broader implementation of aromatherapy faces challenges, including the need for standardized protocols, enhanced caregiver education, and institutional support. Future research should prioritize these areas while exploring the therapeutic synergy of essential oils to validate their efficacy further. By addressing these challenges, aromatherapy could become an integral component of patient-centered care, fostering improved outcomes and developmental trajectories for children.

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References

1. Vora LK, Gholap AD, Hatvate NT, Naren P, Khan S, Chavda VP, Balar PC, Gandhi J, Khatri DK. Essential oils for clinical aromatherapy: A comprehensive review. J Ethnopharmacol. 2024 Aug 10;330:118180. doi: 10.1016/j.jep.2024.118180. Epub 2024 Apr 16. PMID: 38614262.

2. Masyita A, Mustika Sari R, Dwi Astuti A, Yasir B, Rahma Rumata N, Emran TB, Nainu F, Simal-Gandara J. Terpenes and terpenoids as main bioactive compounds of essential oils, their roles in human health and potential application as natural food preservatives. Food Chem X. 2022 Jan 19;13:100217. doi: 10.1016/j.fochx.2022.100217. PMID: 35498985; PMCID: PMC9039924.
3. Rigon MR, Donatello NN, Volpato LK, Piovezan AP. The Use of Essential Oils in Pediatric Care: An Integrative Review. Ann Pediatr Child Health. 2021;9(8):1258.
4. Kong X, Song N, Chen L, Li Y. Non-pharmacological interventions for reducing dental anxiety in pediatric dentistry: a network meta-analysis. BMC Oral Health. 2024 Sep 28;24(1):1151. doi: 10.1186/s12903-024-04919-x. PMID: 39342194; PMCID: PMC11439256.
5. de Sena AKM, de Sá Nass M, Castro IO, Corrêa-Faria P. What do Brazilian paediatric dentists know about bruxism in children? Cross-sectional study. Eur Arch Paediatr Dent. 2024 Oct;25(5):707-714. doi: 10.1007/s40368-024-00929-z. Epub 2024 Aug 16. PMID: 39152279.
6. Jafarzadeh Samani M, Ziaei S, Monjezi N, Fazaeli R, Sedaghat N, Panahi H, Mortazavi S. Anxiolytic Effect of Jasmine Aromatherapy in Pediatric Dental Procedures: A Single-Blinded Randomized Placebo-Controlled Trial. Front Dent. 2024 Oct 15;21:39. doi: 10.18502/fid.v21i39.16731. PMID: 39588286; PMCID: PMC11586644.
7. Abdalhai R, Kouchaji C, Alkhatib R. The effect of aromatherapy with Lavender-Neroli oil and music in management of pediatric dental anxiety: a randomized control trial. BDJ Open. 2024 Jan 29;10(1):5. doi: 10.1038/s41405-024-00186-8. PMID: 38286818; PMCID: PMC10825141.
8. Czakert J, Kandil FI, Boujnah H, Tavakolian P, Blakeslee SB, Stritter W, Dommisch H, Seifert G. Scenting serenity: influence of essential-oil vaporization on dental anxiety - a cluster-randomized, controlled, single-blinded study (AROMA_dent). Sci Rep. 2024 Jun 19;14(1):14143. doi: 10.1038/s41598-024-63657-w. PMID: 38898054; PMCID: PMC11187188.
9. Askarinia S, Razban F, Nematollahi M, Mangolian Shahrbabaki P. Comparing the effect of aromatherapy with breast milk, Lavandula stoechas, and Rosa damascena on venipuncture pain in preterm infants. Explore (NY). 2024 Mar-Apr;20(2):206-211. doi: 10.1016/j.explore.2023.08.002. Epub 2023 Aug 6. PMID: 37635050.
10. Izadi F, Mazhari SA, Najafi M, Ashoobi MT, Sarafi M, Karkhah S, Ghorbani Vajargah P, Takasi P, Firooz M, Hosseini SJ, Ozen N. The Effect of Aromatherapy with Lavender on Pain of Needle Insertion and Severity of Restless Legs Syndrome in Hemodialysis Patients; a Systematic Review and Meta-analysis. Arch Acad Emerg Med. 2023 Nov 5;12(1):e4. doi: 10.22037/aaem.v12i1.2071. PMID: 38022715; PMCID: PMC10674070.
11. Terry M, Spratling R, Gettis M. Perceived Barriers to Administration of Aromatherapy in Nurses Caring for Pediatric Patients With Postoperative Nausea and Vomiting: An Evidence-based Practice Project. J Pediatr Health Care. 2024 May-Jun;38(3):401-412. doi: 10.1016/j.pedhc.2023.11.004. Epub 2023 Dec 9. PMID: 38069964.
12. Czarnecki ML, Michlig JR, Norton AM, Stelter AJ, Hainsworth KR. Use of Aromatherapy for Pediatric Surgical Patients. Pain Manag Nurs. 2022 Dec;23(6):703-710. doi: 10.1016/j.pmn.2022.08.003. Epub 2022 Sep 16. PMID: 36123297.
13. Liu J, Ji X, Pitt S, Wang G, Rovit E, Lipman T, Jiang F. Childhood sleep: physical, cognitive, and behavioral consequences and implications. World J Pediatr. 2024 Feb;20(2):122-132. doi: 10.1007/s12519-022-00647-w. Epub 2022 Nov 23. PMID: 36418660; PMCID: PMC9685105.