

# Can the Use of Lavender Aromatherapy Influence Anxiety and Pain Perception During Dental Treatment in Pediatric Patients?

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## Introduction

Dental anxiety is a common obstacle that impacts the delivery of efficient and comfortable dental care to pediatric patients. Dental anxiety develops the most during childhood and adolescence [1]. Current methods to reduce dental anxiety and fear include various behavior management techniques such as tell-show-do, voice control and positive reinforcement. Additionally, pharmacological interventions commonly used include nitrous oxide, sedation and general anesthesia [2, 3].

Despite these tools in the office, previous studies have found that 10-20% of children still express high levels of anxiety during procedures [1]. To address this concern, we investigated the use of aromatherapy, an alternative therapeutic method that has been used in medicine for centuries [2]. To date, we believe that the full potential of aromatherapy use in dentistry has not been explored and its benefits are still not widely known.

Aromatherapy is a Complementary and Alternative Medicine (CAM) non-pharmacological method that uses the extract of essential oils to excite the olfactory system and reduce anxiety symptoms [5]. Essential oils, in general, stimulate pleasant feelings by the secretion of hormones such as encephalin, endorphins and serotonin [2]. Compared to other essential oils, lavender (*Lavandula angustifolia* and *Lavandula stoechas*) has been found to have a higher efficacy in reducing anxiety levels [4].

Prior studies have indeed found the beneficial effects of aromatherapy in reducing children's anxiety levels during stressful medical interventions. Arslan *et al.* found that use of lavender oil inhalation during pediatric tooth extractions reduced anxiety levels as measured by vital signs, Wong-Baker Pain Scale (WBS) and the Face Image Scale (FIS) [2]. This study explored the psychological and physiological effects of lavender essential oils on a larger sample size of children with a wide age range.

## Purpose

- To evaluate the impact of using lavender oil aromatherapy on anxiety and pain in children planned to undergo dental treatment.
- To learn if lavender aromatherapy can be used as an adjunct non-pharmacological method to reduce anxiety and fear in pediatric patients.
- To explore the psychological and physiological effects of lavender essential oils on a larger sample size of children with a wide age range.

## Methods

- A total of 31 subjects participated in the study and they were between the ages of 5 to 12 years old.

**Table 1** Demographic variables of the participants

Background variables		No Lavender and Lavender paired patients n(%)
Sex	Female	18 (58.1)
	Male	13 (41.9)
Age	6-7	4 (12.9)
	8-9	7 (22.6)
	10-12	20 (64.5)

- They had at least two sessions of restorative dental treatment such as Class I, Class II, pulpotomy, and stain-steel restorations.
- They were randomly assigned to Group A or Group B:
  - Group A received lavender aromatherapy at their first visit and a water mist as a neutral aroma at their second visit
  - Group B received water mist as a neutral aroma at their first visit and lavender aromatherapy at their second visit.
- Lavender aromatherapy was administered via the "RENWER Essential Oil Diffuser Model Number GM3500A."
- This diffuser held 500mL of water which was mixed with the 5 drops of pure 100% lavender essential oil.
- The diffuser was started 10 minutes prior the start of the procedure, ran during the entire duration of the procedure and was turned off at the completion of the procedure.
- Vital signs were monitored: systolic blood pressure, diastolic blood pressure, pulse rate using a finger pulse oximeter, and oxygen saturation.
- Patients were evaluated for their dental anxiety before, during, and after treatment using the Wong-Baker FACES scale.
- During both sessions, there were no distractions that may have confounded this study such as background music or TV.



## Results

**Table 2** Comparison of vital signs taken pre-procedure, during procedure and post-procedure

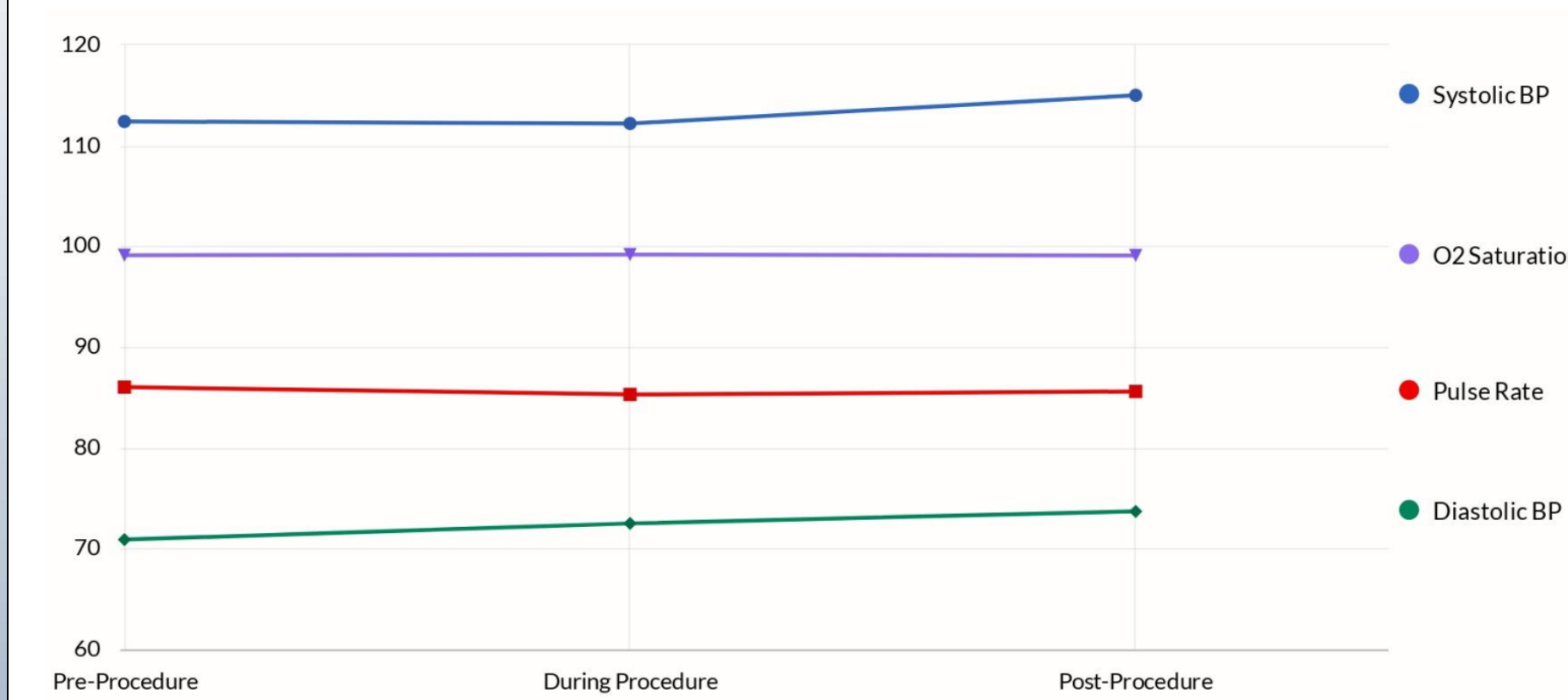
Vital Signs	Pre-Procedure Median (min-max)	During Procedure Median (min-max)	Post-Procedure Median (min-max)	p-value
No Lavender (No Intervention)	Blood pressure (systolic)	114 (88-140)	110 (79-142) <sup>1</sup>	0.697
	Blood pressure (diastolic)	69 (55-96)	72 (45-97) <sup>2</sup>	0.516
	Pulse/heart rate	87 (70-110)	85 (66-102)	0.950
Lavender (Intervention)	Saturation	99 (98-100)	99 (98-100)	0.639
	Blood pressure (systolic)	112 (88-143)	102 (63-165) <sup>1</sup>	0.069
	Blood pressure (diastolic)	67 (53-97)	66 (47-97) <sup>2</sup>	<b>0.049</b>
	Pulse/heart rate	85 (71-108)	85 (69-100)	0.871
	Saturation	99 (98-100)	99 (98-100)	0.492

**Table 2**  
Inter-exposure comparisons between no lavender and lavender sessions were compared using the Mann-Whitney U test. Superscript <sup>1</sup> and <sup>2</sup> show statistically significant comparisons of Systolic and Diastolic blood pressures, respectively, taken during procedures (p < 0.05).  
Intra-exposure comparisons between each session were compared using the ANOVA (One-Way Analysis of Variance) test. The diastolic blood pressure significantly changed between pre-procedure to during procedure and between pre-procedure and post-procedure (p < 0.05).

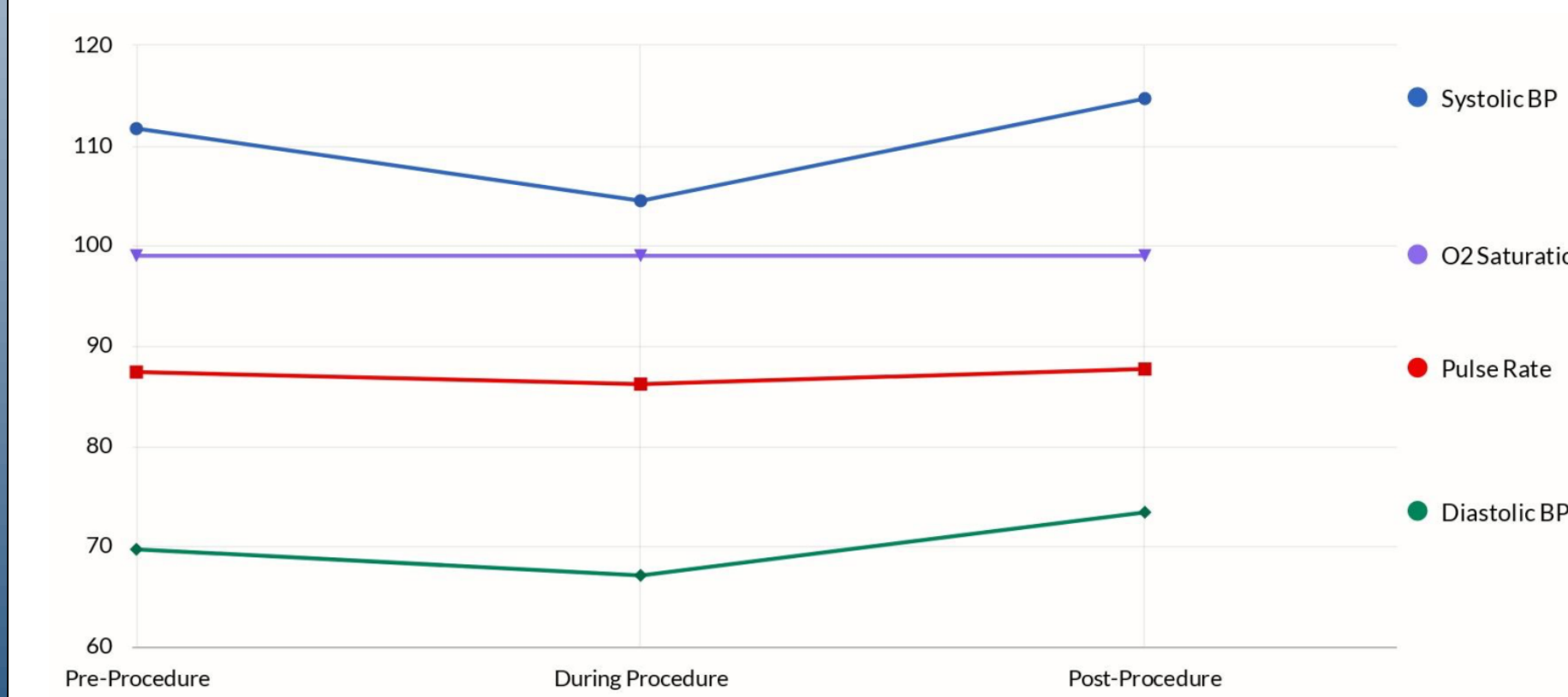
**Table 3** Comparison of Wong-Baker pain scores taken pre-procedure, during procedure and post-procedure

	Pre-Procedure Median (min-max)	During Procedure Median (min-max)	Post-Procedure Median (min-max)	p-value
No Lavender (No Intervention)	0 (0-8)	2 (0-8)	2 (0-6)	0.574
Lavender (Intervention)	2 (0-6)	2 (0-8)	0 (0-6)	0.370
p-value	0.396	0.396	0.1565	

**Table 3**  
Inter-exposure comparisons between no lavender and lavender sessions were compared using the Mann-Whitney U test. There was no statistical significance between pain scores between the sessions.  
Intra-exposure comparisons between each session were compared using the ANOVA (One-Way Analysis of Variance) test. There was no statistical significance between the pain scores during each session when comparing pre-procedure and during procedures scores, or when comparing pre-procedure and post-procedure scores.



**Figure 1: Average of Vital Signs of the No Lavender Sessions**



**Figure 2: Average of Vital Signs of the Lavender Sessions**

## Discussion

- As shown in Table 1, out of the participants, there were more females than males. There were also more patients between the ages of 10-12. This was likely because patients between ages 10-12 did not require supplementary pharmacological interventions such as sedation or general anesthesia during procedures.
- When comparing vital signs in Table 2, there were statistically significant changes in systolic and diastolic blood pressures between sessions only during the procedures. This demonstrates that Lavender aroma can help to reduce anxiety levels during procedures, but had no effect in reducing post-procedure anxiety levels. Perhaps, with more participants, more statistically significant changes in other vital signs may be found.
- As seen in Table 3, Lavender did not change the Wong-Baker pain levels between or during sessions. This elucidates that pain and anxiety are multifactorial and may be difficult to quantify as done in this study.
- Comparing Figure 1 and Figure 2, we were able to see a drop in the average systolic and diastolic blood pressures during procedures with Lavender use. Perhaps, blood pressure may be a key measurement of anxiety and pain scale.

## Conclusion

- This study shows that Lavender is a good adjunctive non-pharmacological method to help reduce anxiety during pediatric dental procedures.
- However, it may not be sufficient to be used by itself. It should be supplemented with other distraction management techniques such as television or music.
- It would be insightful to see trends in a larger population of participants.

## References

- Ghaderi, F; Solhjoui, N. (2020). The effects of lavender aromatherapy on stress and pain perception in children during dental treatment: A randomized clinical trial. Complementary Therapies in Clinical Practice, 40, 101182. <https://doi.org/10.1016/j.ctcp.2020.101182>
- Arslan I, Aydinoglu S, Karan NB. Can lavender oil inhalation help to overcome dental anxiety and pain in children? A randomized clinical trial. Eur J Pediatr. 2020;179(6):985-992. doi:10.1007/s00431-020-03595.
- Karan NB. Influence of lavender oil inhalation on vital signs and anxiety: A randomized clinical trial. Physiol Behav. 2019 Nov 1;211:112676. doi: 10.1016/j.physbeh.2019.112676. Epub 2019 Sep 7. PMID: 31505191.
- S P K, Aafaque S, S S, et al. (August 02, 2019) Effect of Aromatherapy on Dental Anxiety Among Orthodontic Patients: A Randomized Controlled Trial. Cureus 11(8): e5306. doi:10.7759/cureus.5306.
- Jafarzadeh M, Arman S, Pour FF. Effect of aromatherapy with orange essential oil on salivary cortisol and pulse rate in children during dental treatment: A randomized controlled clinical trial. Adv Biomed Res. 2013;2:10. Published 2013 Mar 6. doi:10.4103/2277-9175.107968.
- Wong, D. and Baker, C.: Pain in children: comparison of assessment scales, Pediatric Nursing, 14(1):9-17, 1988.