



---

**EFFECT OF ROSE OIL, LAVENDER OIL AND ORANGE OIL ON DENTAL ANXIETY IN PEDIATRIC PATIENTS UNDERGOING EXTRACTION UNDER LOCAL ANESTHESIA.**

**<sup>1</sup>Mohanraj Kamatchi, <sup>2</sup>Vijayakumar Anand Priyanka, <sup>3</sup>Jeyaraman Preethi, <sup>4</sup>Arumugasamy Niranjana, <sup>5</sup>Patil Disha, <sup>6</sup>Sakthivel Priya, <sup>7</sup>M Jevithaa**

<sup>1</sup>Associate Professor, Department of Pediatric and Preventive dentistry, Vivekanandha Dental College for Women, Tiruchengode, <sup>2</sup>Private Practitioner, V S Dental and Implant Centre, Coimbatore, <sup>3</sup>Assistant Professor, Department of Pediatric and Preventive dentistry, CSI College of Dental Sciences and Research Hospital, Madurai, <sup>4</sup>Former Postgraduate, Department of Pediatric and Preventive dentistry, Vivekanandha Dental College for Women, Tiruchengode, <sup>5</sup>Associate Professor, Department of Pediatric and Preventive dentistry, College of Dental Sciences, Davangere, <sup>6</sup>Private Practitioner, Dhegham Aesthetics, Chennai, <sup>7</sup>Private Practitioner, T.Ramanadhan dental clinic, Theni.

**Corresponding author:** Dr. Priyanka Anand, Private Practitioner, V S Dental and Implant Centre, Coimbatore.

**Abstract:**

**Introduction:** Fear and anxiety toward visiting dentists are major problems for a sizeable proportion of children and adolescents. Reducing dental anxiety is a major aspect of child management in dental visits. **Objective:** The aim and objective of our study is to evaluate the effect of rose oil, lavender oil and orange oil and to compare their effects in reducing dental anxiety on children before LA and after LA administration during extraction. **Methodology:** A total of 33 children aged between 6 and 9 years, who requires extraction of primary teeth were selected for the study. In the Group 1, 11 patients were treated with rose oil aroma, Group 2 of 11 patients treated with lavender oil, and group 3, 11 patients were treated with orange oil. Before starting the procedure, after giving the LA and after the procedure, blood pressure, pulse rate, oxygen saturation level, and anxiety level of the patient were checked. CBC scale was used to measure the anxiety in the subjective manner. **Results:** The orange oil was provided a significant reduction in dental anxiety of children than the lavender oil and rose oil when comparing the blood pressure, SpO<sub>2</sub>, pulse rate before and after LA administration. **Conclusion :** Aromatherapy with rose oil, lavender oil and orange oil, using decreased the dental anxiety of children, whereas, only orange oil could provide a significant reduction.

**Introduction :**

Dental anxiety has been identified as a major problem in children and is considered an obstacle in rendering quality dental care. It is “an abnormal fear or dread of visiting the dentist

for preventive care or therapy and unwarranted anxiety over dental procedures".<sup>1</sup> Fear and anxiety toward visiting dentists are major problems for a sizeable proportion of children and adolescents. The prevalence of dental fear and anxiety (DFA), i.e., dental fear and anxiety in children and adolescents range from 5% to 20% in various countries, with some cases being considered to be a dental phobia, severe DFA.<sup>2,3</sup>

Dental stimuli have the potential of inducing anxiety.<sup>4</sup> There are various anxiety-provoking factors in a dental setting such as the sights, needles, sounds, drilling, smells of cut dentine, medicaments, and sensation of high-frequency vibration.<sup>5</sup> To combat this, many non-pharmacological interventions for the prevention of anxiety and pain during pediatric dental care have been suggested in literature. In recent times, the use of complementary and alternative medicines is in an increasing front.<sup>6,7</sup>

Latterly, aromatherapy, an application of fragrant volatile essential oils for therapeutic targets has been propounded as a complementary approach in medical<sup>8</sup> and dental settings.<sup>9</sup> Most of the studies in dentistry assessed the anxiolytic effect of different aromas on patients by using questionnaires and in the waiting room. There are only limited studies investigating the effect of aromatherapy with different essential oils on dental anxiety in children during dental treatment.

Arslan et al. have demonstrated the calming effect of lavender aromatherapy on children during tooth extraction.<sup>10</sup> Jafarzadeh et al. revealed that orange aromatherapy can help decrease the child's anxiety while receiving fissure sealant therapy.<sup>11</sup> Ghaderi et al revealed that lavender aromatherapy can decrease dental anxiety and experienced pain in children undergoing restoration procedures.<sup>12</sup> Premkumar et al used the rose oil on dental anxiety level among orthodontic patients.<sup>13</sup> But the effect of rose oil on children's dental anxiety has not been studied much. Thus, this study aimed at evaluating the effect of orange oil, lavender oil and rose oil on paediatric patients undergoing extraction under local anaesthesia.

### **Methodology:**

A total of 33 children aged between 6 and 9 years, who attended the OPD of Pedodontics and Preventive dentistry were selected. The inclusion criteria used for selecting the patients were as follows: Children aged 6–9 years, who requires extraction of primary teeth under local anesthesia and Frankl's behavior rating 3 or 4 in cooperation. Children with any systemic problems, physical and mental disabilities, children with common cold and allergy, children with previous history of dental extractions were excluded from this study. Before the session, an informed consent was obtained from parents or legal guardian who accompanied the children.

33 children were randomly divided into 3 groups, 11 children in each group.

Group 1: Aromatherapy with rose oil

Group 2: Aromatherapy with lavender oil

Group 3: Aromatherapy with orange oil

To measure the anxiety level of the children using blood pressure, pulse rate, oxygen saturation and CBC as initial, secondary and tertiary outcome. All the vitals' mentioned prior was measured before, during the treatment (after the dental injection) and at the end of each dental visit, while the blood pressure was evaluated using digital sphygmomanometer. Pulse

rate and oxygen saturation was measured using a finger-base type pulse oximeter by a trained nurse.

The Chotta Bheem Chutki Scale (CBC) was used to determine patient's anxiety in a subjective way. The CBC is a pictorial scale with six figures of chotta bheem and chutki in 2 different sheets where the children were asked to choose the figure they identified with that instant and the scores were recorded. The first group was treated with rose aroma, second group with lavender aroma and the third group with orange aroma.

In all session, first, the dental assistant separated the child from his/her parents and carried him/her to a room. After 5 min, the nurse recorded the pulse rate and oxygen saturation using a finger type pulse oximeter, blood pressure was recorded using digital sphygmomanometer and which was named as the initial sample. The children were asked not to move their hand while the finger pulse oximeter was attached to their left index finger and while the sphygmomanometer was attached. Then, the child was taken to the isolated room, which was 14 m<sup>2</sup> in size.

A humidifier was used to diffuse the essential oil while it was out of patient's sight, five drops of pure lavender essential oil or rose essential oil or orange essential oil was poured in 100 ml water in the humidifier and diffused in the air half an hour before the patient's arrival in aromatherapy days. Between each experimental group the room was ventilated completely for 48 hours to remove each scent.

The procedure was started by topical application of anaesthetic gel. The injection site was dried by cotton gauze. A cotton tip applicator with 20% benzocaine gel was applied and left in place for 1 min. The inferior alveolar nerve block, greater palatine nerve block or infiltration technique was performed using a 27-gauge needle. Following aspiration, 2 ml of 2% lidocaine with 1:100,000 epinephrine was deposited over a 2-min time period. After the injection, the CBC was used to determine the patient's experienced pain as a subjective way and the score was recorded by the nurse. Blood pressure, pulse rate and oxygen saturation were also recorded after the injection as the second record. At the end of the treatment, the final readings of BP, pulse rate, SpO<sub>2</sub> and CBC picture scale measures were collected respectively and they were statistically analysed.

### **Results :**

The mean and standard deviation of systole, diastole, SPO<sub>2</sub>, pulse and CBC scale for Rose oil group before giving LA was 99.09±10.43, 67.63±15.59, 98.36±2.20, 98.45±24.31 and 2.55±1.13 respectively. The mean and standard deviation of systole, diastole, SPO<sub>2</sub>, pulse and CBC scale for Lavender oil group before giving LA was 105.64±11.48, 63.64±8.48, 97.91±2.12, 96±20.71 and 2.27±1 respectively. The mean and standard deviation of systole, diastole, SPO<sub>2</sub>, pulse and CBC scale for control oil group before giving LA was 115.36±19.83, 73.55±11.71, 98±1, 92.18±16.66 and 1.45±0.82 respectively. (Table 1).

**Table 1:** Comparison between three groups before LA

Group		Before LA Systole	Before LA Diastole	Before LA SPO2	Before LA Pulse	Before LA CBC scale
Rose oil	N	11	11	11	11	11
	Mean	99.0909	67.6364	98.3636	98.4545	2.5455
	Std. Deviation	10.42549	15.59021	2.20330	24.30787	1.12815
	Median	100.0000	60.0000	99.0000	104.0000	3.0000
Lavender oil	N	11	11	11	11	11
	Mean	105.6364	63.6364	97.9091	96.0000	2.2727
	Std. Deviation	11.48279	8.47671	2.11918	20.70749	1.00905
	Median	108.0000	63.0000	98.0000	104.0000	2.0000
Orange oil	N	11	11	11	11	11
	Mean	115.3636	73.5455	98.0000	92.1818	1.4545
	Std. Deviation	19.82560	11.70781	1.00000	16.66024	.82020
	Median	115.0000	71.0000	98.0000	93.0000	1.0000
p-value		.037	.189	.309	.653	.039

When comparing the means of systole before giving LA between the three study groups, it reveals that there is significant difference seen in the systole level, which is higher in the control group followed by lavender oil and it is lesser in the rose oil group. The p-value is statistically significant (0.037). There is a significant difference seen in the CBC scale before giving LA between the three study groups which shows that it is lower in the control group followed by lavender oil group and higher in the rose oil group. The result shows statistically significant with the p-value of 0.039. There was no difference seen in the values of diastole, SPO2 and pulse. (Table 1)

The mean and standard deviation of systole, diastole, SPO2, pulse and CBC scale for Rose oil group after giving LA was  $89.36 \pm 15.62$ ,  $63.36 \pm 13.02$ ,  $97.36 \pm 4.84$ ,  $98.73 \pm 12.78$  and  $2.18 \pm 0.40$  respectively. The mean and standard deviation of systole, diastole, SPO2, pulse and CBC scale for Lavender oil group after giving LA was  $105.27 \pm 9.51$ ,  $69.27 \pm 10.99$ ,  $98.55 \pm 1.29$ ,

99.45±15.47 and 2.55±0.69 respectively. The mean and standard deviation of systole, diastole, SPO<sub>2</sub>, pulse and CBC scale for control oil group after giving LA was 111.45±9.61, 72.91±9.02, 98.91±0.83, 103±14.35 and 2.64±0.81 respectively. (Table 2)

When comparing the means of systole after giving LA between the three study groups, it reveals that there is significant difference seen in the systole level, which is higher in the control group followed by lavender oil and it is lesser in the rose oil group. The p-value is statistically significant (0.001). There was no difference seen in the values of diastole, SPO<sub>2</sub>, CBC scale and pulse. (Table 2)

**Table 2:** Comparison between three groups after LA

Group		After LA systole	After LA Diastole	After LA SPO <sub>2</sub>	After LA Pulse	After LA CBC scale
Rose oil	N	11	11	11	11	11
	Mean	89.3636	63.3636	97.3636	98.7273	2.1818
	Std. Deviation	15.61584	13.02515	4.84299	12.78351	.40452
	Median	91.0000	62.0000	98.0000	98.0000	2.0000
Lavender oil	N	11	11	11	11	11
	Mean	105.2727	69.2727	98.5455	99.4545	2.5455
	Std. Deviation	9.50885	10.99173	1.29334	15.47491	.68755
	Median	109.0000	67.0000	99.0000	100.0000	2.0000
Control oil	N	11	11	11	11	11
	Mean	111.4545	72.9091	98.9091	103.5455	2.6364
	Std. Deviation	9.60587	9.01615	.83121	14.34827	.80904
	Median	110.0000	68.0000	99.0000	103.0000	2.0000
p-value		.001	.160	.755	.744	.267

The mean and standard deviation of systole, diastole, SPO<sub>2</sub>, pulse and CBC scale for Rose oil group after treatment was 98.82±21.2, 76.1±31.17, 96.1±8.06, 100.73±14.32 and 1.64±0.67 respectively. The mean and standard deviation of systole, diastole, SPO<sub>2</sub>, pulse and

CBC scale for Lavender oil group after treatment was  $108.18 \pm 8.66$ ,  $70.45 \pm 9.61$ ,  $97.18 \pm 2.99$ ,  $95.82 \pm 9.88$  and  $1.55 \pm 0.69$  respectively. The mean and standard deviation of systole, diastole, SPO2, pulse and CBC scale for control oil group after treatment was  $112.09 \pm 10.94$ ,  $73 \pm 11.55$ ,  $96.45 \pm 3.42$ ,  $98.18 \pm 14.91$  and  $1.82 \pm 0.75$  respectively. (Table 3)

When comparing the means of systole after treatment between the three study groups, it reveals that there is significant difference seen in the systole level, which is higher in the control group followed by lavender oil and it is lesser in the rose oil group. The p-value is statistically significant (0.024). There was no difference seen in the values of diastole, SPO2, CBC scale and pulse. (Table 3)

**Table 3:** Comparison between three groups after treatment

Group		After treatment Systole	After treatment Diastole	After treatment SPO2	After treatment Pulse	After treatment CBC scale
Rose oil	N	11	11	11	11	11
	Mean	98.8182	76.0909	96.0909	100.7273	1.6364
	Std. Deviation	21.19820	31.16554	8.05549	14.31846	.67420
	Median	99.0000	68.0000	99.0000	100.0000	2.0000
Lavender oil	N	11	11	11	11	11
	Mean	108.1818	70.4545	97.1818	95.8182	1.5455
	Std. Deviation	8.65815	9.60587	2.99393	9.87743	.68755
	Median	106.0000	69.0000	98.0000	100.0000	1.0000
Control oil	N	11	11	11	11	11
	Mean	112.0909	73.0000	96.4545	98.1818	1.8182
	Std. Deviation	10.94033	11.54989	3.41654	14.91186	.75076
	Median	117.0000	69.0000	98.0000	98.0000	2.0000
p-value		.024	.771	.507	.672	.650

When comparing the means of systole, diastole, SPO<sub>2</sub>, pulse and CBC scale of Rose oil group which reveals that there was no significant difference seen between before and after giving LA. (Table 4). When comparing the means of systole, diastole, SPO<sub>2</sub>, pulse and CBC scale of Lavender oil group which reveals that there was no significant difference seen between before and after giving LA. (Table 5).

**Table 4:** Values comparison within Rose oil group

	Paired Differences		Sig. (2-tailed)
	Mean	Std. Deviation	
Before LA Systole – After LA Systole	9.72727	18.39071	.154
Before LA Diastole – After LA Diastole	4.27273	17.20518	.262
Before LA SPO <sub>2</sub> – After LA SPO <sub>2</sub>	1.00000	2.82843	.272
Before LA Pulse – After LA Pulse	-.27273	14.89356	.767
Before LA CBC scale – After LA CBC scale	.36364	1.12006	.317

**Table 5:** Values comparison within lavender oil group

	Paired Differences		Sig. (2-tailed)
	Mean	Std. Deviation	
Before LA Systole – After LA Systole	.36364	8.13969	.341
Before LA Diastole – After LA Diastole	-5.63636	12.63545	.169
Before LA SPO <sub>2</sub> – After LA SPO <sub>2</sub>	-.63636	1.56670	.196
Before LA Pulse – After LA Pulse	-3.45455	14.49389	.507

Before LA CBC scale –	-.27273	.46710	.083
After LA CBC scale			

When comparing the means of systole and diastole of orange oil group which reveals that there was no significant difference seen between before and after giving LA. The result shows that there was a difference seen in the SPO2 level, pulse and CBC scale between before and after giving LA and the p-value is also statistically significant of about 0.026, 0.033 and 0.018 respectively..(Table 6).

**Table 6:** Values comparison within orange oil group

	Paired Differences		Sig. (2-tailed)
	Mean	Std. Deviation	
Before LA Systole - After LA Systole	3.90909	20.16162	.919
Before LA Diastole - After LA Diastole	.63636	14.52772	.878
Before LA SPO2 - After LA SPO2	-.90909	1.04447	.026
Before LA Pulse - After LA Pulse	-11.36364	16.46373	.033
Before LA CBC scale - After LA CBC scale	-1.18182	1.25045	.018

### Discussion :

Children's dental anxiety and fear are major problems in dental services as anxiety and fear deprive them of cooperation and increase dental treatment failures. The main reasons why some children do not visit dental personnel despite toothache are lack of time and dental anxiety and fear. As a result, children avoid visiting dental personnel, resulting in a decrease in their quality of life of the child.<sup>14</sup>

In this study we evaluated the effect of rose oil, lavender oil and orange oil on dental anxiety of pediatric patients undergoing local anesthetic procedures. CBC scale was used to analyse the anxiety in a subjective as this scale was suggested as a new tool for dental anxiety assessment in children.<sup>15</sup> The study results revealed that there was significance results seen in orange oil group than the other two groups in comparing the values before LA administration and after LA administration. Henceforth the orange oil was better in reducing the dental anxiety of the children.



Lehrner et al. studied the effect of orange odor and reported improved mood and less anxiety only in females.<sup>16</sup> 5 years later, in another study, they compared the effect of orange and lavender odor with a music condition and a control condition, demonstrated that odors are capable of reducing anxiety and altering emotional states in dental patients.<sup>17</sup>

Nirmala et al<sup>18</sup> evaluated the efficacy of orange oil and lavender oil using nebulizer and inhaler in reducing the dental anxiety and pain during LA procedure and concluded that aromatherapy with lavender or sweet orange, using either nebulizer or inhaler, decreased the dental anxiety of children, whereas, only sweet orange could reduce the pain as self-reported by children which was similar to our study results that orange oil was better.

Premkumar K. S et al<sup>13</sup> compared the effect of lavender oil and rose oil on dental anxiety level among orthodontic patients and revealed that lavender oil demonstrated a greater significance in reducing the anxiety level when compared to rose oil. Similarly in this study too the lavender oil demonstrated the greater significance than the rose oil but comparatively lesser than the orange oil. Not only in the pediatric patients, the aromatic odor of lavender essential oil had positive effects on reducing anxiety in adult patients from the age group of 20years to 80 years before the treatments.<sup>19</sup>

### **Conclusion :**

Based on the study results, provides significant evidence that the use of orange essential oil in dental settings reduces blood pressure, pulse rate, and anxiety due to child's anxious state when compared to rose oil and lavender oil. Hence, further studies should be taken up with larger sample size and are also recommended to evaluate the influence of aromatherapy on more complex and invasive dental procedures which can induce more anxiety and fear in child patients.

### **References :**

1. Encyclopedia of medical concepts. National Library of Medicine, Ontario, Canada; 2009. (Cited 2010 June 4). Available from [http:// www.reference.md/files/D016/mD016854.html](http://www.reference.md/files/D016/mD016854.html).
2. Chhabra N, Chhabra A, Walia G. Prevalence of dental anxiety and fear among five to ten year old children: A behaviour based cross sectional study. *Minerva Stomatol* 2012;61:83-9
3. Lee CY, Chang YY, Huang ST. Prevalence of dental anxiety among 5-to 8-year-old Taiwanese children. *J Public Health Dent* 2007;67:36-41.
4. Klingberg G, Broberg AG. Dental fear/anxiety and dental behaviour management problems in children and adolescents: A review of prevalence and concomitant psychological factors. *Int J Paediatr Dent* 2007;17:391-406.
5. King SL, Hegadoren KM. Stress hormones: How do they measure up? *Biol Res Nurs* 2002;4:92-103.
6. Goettems ML, Zborowski EJ, Costa FD, Costa VP, Torriani DD. Nonpharmacologic intervention on the prevention of pain and anxiety during pediatric dental care: a systematic review. *AcadPediatr*. 2017; 17(2): 110-9. doi: 10.1016/j. acap.2016.08.012
7. Adams D, Dagenais S, Clifford T, Baydala L, King WJ, Hervas-Malo M, et al. Complementary and alternative medicine use by pediatric specialty outpatients. *Pediatrics*.

2013; 131(2): 225-32. doi: 10.1542/peds.2012-1220

8. Karaman T, Karaman S, Dogru S, Tapar H, Sahin A, Suren M, Arici S, Kaya Z. Evaluating the efficacy of lavender aromatherapy on peripheral venous cannulation pain and anxiety: A prospective, randomized study. *Complement Ther Clin Pract*. 2016 May;23:64-8. doi: 10.1016/j.ctcp.2016.03.008.
9. Zabirunnisa M, Gadagi JS, Gadde P, Myla N, Koneru J, Thatimatla C. Dental patient anxiety: Possible deal with Lavender fragrance. *J Res Pharm Pract*. 2014 Jul;3(3):100-3. doi: 10.4103/2279-042X.141116.
10. 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/s00431-020-03595-7.
11. 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 6;2:10. doi: 10.4103/2277-9175.107968.
12. Ghaderi F, Solhjou N. The effects of lavender aromatherapy on stress and pain perception in children during dental treatment: A randomized clinical trial. *Complement Ther Clin Pract*. 2020 Aug;40:101182. doi: 10.1016/j.ctcp.2020.101182.
13. S PK, Aafaque S, S S, N N. Effect of Aromatherapy on Dental Anxiety Among Orthodontic Patients: A Randomized Controlled Trial. *Cureus*. 2019 Aug 2;11(8):e5306. doi: 10.7759/cureus.5306
14. Beena JP. Dental subscale of children's fear survey schedule and dental caries prevalence. *Eur J Dermatol* 2013;7:181-5.
15. Sadana G, Grover R, Mehra M, Gupta S, Kaur J, Sadana S. A novel Chotta Bheem–Chutki scale for dental anxiety determination in children. *J Int Soc Prevent Communit Dent* 2016;6:200-5
16. Lehrner J, Eckersberger C, Walla P, Pötsch G, Deecke L. Ambient odor of orange in a dental office reduces anxiety and improves mood in female patients. *Physiol Behav* 2000;71:83-6.
17. Lehrner J, Marwinski G, Lehr S, Johren P, Deecke L. Ambient odors of orange and lavender reduce anxiety and improve mood in a dental office. *Physiol Behav* 2005;86:92-5.
18. Nirmala K, Kamatham R. Effect of Aromatherapy on Dental Anxiety and Pain in Children Undergoing Local Anesthetic Administrations: A Randomized Clinical Trial. *J Caring Sci*. 2021 Aug 23;10(3):111-120. doi: 10.34172/jcs.2021.026
19. Chabria A, Tamgadge S, Tamgadge A. Effect of aromatherapy on dental patient anxiety: A cross-sectional study. *Int J Clinicopathol Correl* 2021;5:60-5.