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COMPARISON OF THE EFFECTIVENESS OF BACH FLOWER THERAPY AND AROMATHERAPY ON DENTAL ANXIETY IN PEDIATRIC PATIENTS: AN IN-VIVO STUDY

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ABSTRACT

Background: Managing a child's anxiety is crucial for successful pediatric dental treatment, as anxiety directly affects cooperation and treatment outcomes. Current trends in pediatric dentistry favor non-aversive behavior management techniques that focuses on reducing fear and building trust, creating a supportive environment, improving child cooperation, and promoting positive long-term attitudes toward dental care. **Aim and objective**: To compare the effectiveness of Bach flower therapy using rescue remedy and aromatherapy using orange essential oil on dental anxiety in pediatric patients. **Design**: Forty five children of the age group 5-9 years were divided into three groups of 15 each and required treatment was performed involving the use of aeroter without administering local anaesthesia under aromatherapy, using Bach flower therapy and without aromatherapy or Bach flower therapy, respectively. Facial image scale (FIS), pulse rate and oxygen saturation were recorded before and after the procedure. **Results**: Compared with controls, both the aromatherapy group and Bach flower therapy group showed significant post treatment change in anxiety levels with respect to Facial image scale, along with the reduction in pulse rate. When compared between Bach flower therapy and aromatherapy, it also yield statistical significance, though aromatherapy showed better results compared to Bach flower therapy. **Conclusion**: Both Bach flower therapy and aromatherapy with orange essential oil have been shown to be effective in managing anxiety, with aromatherapy demonstrating comparatively superior results. These non-invasive techniques, used either individually or in combination, can be effectively incorporated into pediatric dental practice to help reduce anxiety and foster cooperative behavior in children.

KEYWORDS: Dental anxiety, Aromatherapy, Bach flower therapy, Facial image scale.

INTRODUCTION

Dental anxiety in children is a widespread condition marked by feelings of fear or unease associated with the thought of attending dental visits. It is defined as an excessive and irrational fear associated with dental visits for preventive or therapeutic care, accompanied by undue anxiety toward dental procedures.[1] Dental anxiety has been reported to contribute to higher caries prevalence and increased behavior management challenges in children.[2] Additionally, affected children often exhibit compromised oral function and esthetics.

In a pediatric dental setting, factors such as the sight of needles, the sound of drilling, the smells of cut dentin and eugenol and the vibrations from high-frequency instruments often trigger anxiety. To reduce the impact of these factors, non-aversive techniques like flower therapy and aromatherapy can be used. Given their proven success in medical environments and with adult dental patients, many dentists believe these methods can effectively manage anxiety in pediatric patients as well.[3]

Bach flower therapy (BFT), developed by Dr. Edward Bach, postulates that many human illnesses stem from negative states of mind. He believed these ailments could be treated by alleviating negative emotions through flower remedies made from naturally grown wildflowers.[4]

Aromatherapy, another form of complementary alternative medicine, utilizes essential oils derived from plants. These oils can be administered through inhalation, oral intake, or topical application to provide therapeutic benefits, including reducing anxiety, alleviating pain, enhancing mood, and rejuvenating the body. The practice of using aromatic oils for healing has historical roots in Egyptian and Chinese cultures.[5]

Few studies have assessed the effectiveness of aromatherapy and Bach flower therapy in reducing fear and anxiety in pediatric dental patients. However, no research has yet compared the efficiency of these two non-invasive, cost-effective techniques.

MATERIALS AND METHODS

The present study has been conducted in the Department of Pediatric and Preventive Dentistry, People's Dental Academy, Bhopal and was approved by the University Ethical Committee with reference number IEC/2025/700/07. The study design used was randomized controlled trial.

Inclusion Criteria

1. Healthy Children with age group of 5-9 years.
2. Children with no previous dental experience.
3. Children undergoing treatment involving the use of aeroter without administration of local anesthesia.
4. Patients who are willing to participate in the study.
5. Potentially cooperative children.

Exclusion Criteria

1. Medically compromised and special children.
2. Children with previous dental experience.
3. Children undergoing treatment involving administering local anesthesia.
4. Patients who are not willing to participate in the study.
5. Co-operative children.
6. Patients without legal guardians.
7. Patients on metronidazole (flagyl)

METHOD

A total of forty five children between the age of 5 years to 9 years visiting the department of Pediatric and Preventive dentistry and fulfilling the selection criteria were selected. Informed consent was taken from the parents who agree to allow their children to participate in the study. The participants were divided into three equal groups.

- Group 1 (n = 15) four drops of "rescue remedy" (fig.1) diluted in 40 mL of water was administered orally 15 minutes before the treatment.
- Group 2 (n = 15) were provided dental treatment under aromatherapy. An electric aroma diffuser was used to diffuse the orange essential oil (fig.2), to create the pleasant smell of orange in the treatment room.
- Group 3 (n = 15) dental treatment was provided without employing aromatherapy or Bach flower therapy.

Preoperatively, the child's pulse rate and oxygen saturation was recorded using a pulse oximeter and the child was asked to point the images he/she felt resembling him/her at that moment from the five faces in the facial image scale (FIS) (Fig.3). The scores were noted.

Children from all the groups received the required treatment involving the use of aeroter without administration of local anesthesia.

After the completion of treatment, pulse rate and oxygen saturation were again recorded and the child was asked to point the image in the FIS. The scores were noted.

Fig. 1: Bach flower rescue remedy.

Fig. 2: Orange essential oil.

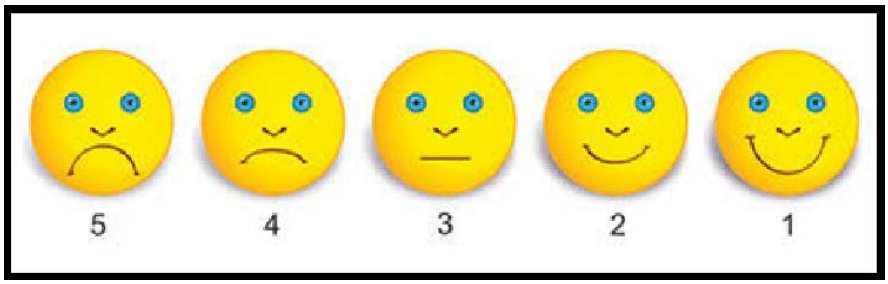

Fig. 3: Facial image scale.

STATISTICAL ANALYSIS

The data analysis was done using the statistical package of social sciences 26.0 software (SPSS Inc., Chicago IL). Results were statistically analyzed by tests including the Chi-square test, t-test, ANOVA and Post hoc test. A 'p' value of 0.05 was considered for statistical significance.

RESULTS

The three groups were comparable in terms of age and gender. No statistically significant difference was observed in mean age among the groups (p = 0.359). Gender distribution was identical across all groups, with 40% males and 60% females, showing no significant difference (p = 1.000). This indicates that the groups were demographically well matched at baseline. (**Table 1**).

Table 1: Demographic distribution of study participants (n-45).

Demographic variables	Groups			Statistical comparison
	GROUP 1 Aromatherapy	GROUP 2 Bach flower therapy	GROUP 3 Control group	
Age (Mean+SD)	6.20+1.22	7.00+1.49	6.40+1.07	p-0.359
Gender, n (%)				
Males	6(40.0%)	6(40.0%)	6(40.0%)	p-1.000
Females	9(60.0%)	9(60.0%)	9(60.0%)	

The inter- and intra-group comparison of mean pulse rate before and after the intervention among the three study groups. At baseline (pre-intervention), there was no statistically significant difference in mean pulse rate among the groups (p = 0.330), indicating comparable initial pulse rate levels. Post-intervention, a statistically significant difference in mean pulse rate was observed among the groups (p = 0.000), with Group 1 (Aromatherapy) showing the greatest reduction, followed by Group 2 (Bach flower therapy), while the control group showed an increase in pulse rate.

Intra-group analysis revealed a statistically significant reduction in pulse rate in Group 1 (t = −5.126, p = 0.000) and Group 2 (t = −2.496, p = 0.022) following the intervention. In contrast, no statistically significant change in pulse rate was observed in the control group (p = 0.244). Overall, these findings indicate that aromatherapy and Bach flower therapy were effective in reducing pulse rate, with aromatherapy demonstrating a more pronounced effect. (**Table 2**).

Table 2: Inter and intra group comparison of pre and post mean pulse rate among study groups.

Variable	Time	Groups (Mean+SD)			F-value	p-value
		GROUP 1 Aromatherapy	GROUP 2 Bach flower therapy	GROUP 3 Control group		
Pulse rate Mean+SD	Pre	105.8+11.5	102.0+9.23	99.6+5.9	1.155	0.330
	Post	85.6+4.8	93.6+5.3	103.6+8.7	18.814	0.000*
t-value		-5.126	-2.496	1.203		
p-value		0.000*	0.022*	0.2444		

***Statistically significant**

The pairwise comparison of post-intervention pulse rate among the study groups. A statistically significant difference was observed between Aromatherapy and Bach flower therapy (mean difference = 8.0; p = 0.029), indicating a greater reduction in pulse rate with aromatherapy. Aromatherapy also showed a significantly lower post-intervention pulse rate compared to the control group (mean difference = −10.0; p = 0.006). Furthermore, Bach flower therapy demonstrated a statistically significant reduction in pulse rate when

compared with the control group (mean difference = −18.0; p = 0.000). Overall, both interventions were effective in reducing pulse rate compared to the control group, with aromatherapy showing superior efficacy. (**Table 3**).

Table 3: Comparison of pulse rate among study participant's pair wise post-intervention.

Groups	Mean difference	Significance
Aromatherapy Vs Bach Flower therapy	8.00	0.029*
Aromatherapy Vs Control	-10.0	0.006*
Bach Flower therapy Vs Control	-18.0	0.000*

***Statistically significant**

The inter- and intra-group comparison of mean oxygen saturation levels before and after the intervention among the three study groups. At baseline, a statistically significant difference in mean oxygen saturation was observed among the groups (p = 0.006). Following the intervention, the difference among groups became highly significant (p = 0.000), with Group 1 (Aromatherapy) showing the highest post-intervention oxygen saturation, followed by Group 2 (Bach flower therapy), while the control group showed the lowest values.

Intra-group analysis revealed a statistically significant improvement in oxygen saturation in the aromatherapy group (t = 3.454, p = 0.002). Although mean oxygen saturation increased in the Bach flower therapy and control groups, these changes were not statistically significant (p = 0.09 and p = 0.104, respectively). (**Table 4**)

Table 4: Inter and intra group comparison of pre and post mean oxygen saturation among study groups.

Variable	Time	Groups (Mean+SD)			F-value	p-value
		GROUP 1 Aromatherapy	GROUP 2 Bach flower therapy	GROUP 3 Control group		
Oxygen Saturation Mean+SD	Pre	**93.40+4.55**	**89.80+4.59**	**87.20+2.15**	**6.267**	**0.006**
	Post	**98.40+0.843**	**93.20+4.19**	**88.8+2.03**	**26.69**	**0.000***
t-value		**3.454**	**1.749**	**1.711**		
p-value		**0.002**	**0.09**	**0.104**		

***Statistically significant**

The pairwise comparison of post-intervention oxygen saturation levels. A statistically significant difference was observed between aromatherapy and Bach flower therapy (p = 0.001), as well as between aromatherapy and the control group (p = 0.007). Bach flower therapy also differed significantly from the control group (p = 0.000). Overall, aromatherapy demonstrated the greatest improvement in oxygen saturation, indicating superior efficacy compared to Bach flower therapy and the control group. (**Table 5**).

Table 5: Comparison of oxygen saturation among study participant's pair wise post- intervention.

Groups	Mean difference	Significance
Aromatherapy Vs Bach Flower therapy	**-5.200**	**0.001***
Aromatherapy Vs Control	**4.400***	**0.007***
Bach Flower therapy Vs Control	**0.007**	**0.000***

***Statistically significant**

A highly statistically significant difference in postoperative dental anxiety was observed among the three groups (χ^2 = 41.40, p = 0.000). The aromatherapy group showed the lowest anxiety levels, with all participants reporting either *very happy* or *happy* facial expressions. Bach flower therapy demonstrated moderate anxiety reduction, while the control group showed the highest anxiety levels. Overall, **aromatherapy was the most effective intervention in reducing postoperative dental anxiety**. (**Table 6**).

Table 6: Comparison of postoperative patient-reported dental anxiety measured by Facial image scale (N-45).

FIS score	Postoperative FIS score n (%)			p-value
	Aromatherapy (n-15)	Bach Flower therapy (n-15)	Control (n-15)	
Very happy(0)	6(40.0%)	1(6.7%)	0(0.0%)	0.000 (χ^2=41.40)
Happy(1)	9(60.0%)	4(26.7%)	1(6.7%)	
Neutral(2)	0(0.0%)	7(46.7%)	3(20.0%)	
Sad(3)	0(0.0%)	3(20.0%)	8(53.3%)	
Very sad(4)	0(0.0%	0(0.0%)	3(20.0%)	

DISCUSSION

This study evaluated and compared the effectiveness of two non-invasive anxiety-reducing techniques, aromatherapy and Bach flower therapy, against a control group in pediatric patients. Anxiety levels were assessed using a subjective tool such as Facial Image Scale and objective parameters such as pulse rate and oxygen saturation.

Facial image scale is a reliable measures of self-portrayed anxiety in children. The Facial Image Scale (FIS) is a measure of children's dental anxiety and comprises a row of five faces ranging from very happy to very unhappy (scores ranging from 1- 5; 5 indicating the highest anxiety). Validation studies have shown that it is a suitable measure for assessing child dental anxiety even in very young children.[6]

Faazila Fathima et al.[7] assessed the validity of the Facial Image Scale (FIS) for measuring dental anxiety in children and demonstrated that it is a valid and practical assessment tool in clinical settings.

Pulse rate was choosen for analysis as it is the simplest biological parameter to measure and because an elevated heart rate is a common physiological indicator of anxiety and fear. This parameter has been shown to correlate more closely with anxiety experienced during dental visits than other physiological measures.[8]

Stress and anxiety can alter the respiratory rate, which in time, may alter oxygen saturation and/ carbon dioxide levels in the blood.[9] Hence, measurement of oxygen saturation rate was also used to assess the anxiety levels in the present study.

Aromatherapy was found to be very effective in reducing anxiety levels of the children compared to the controls. It is widely accepted that fragrances can influence human emotional states.[10] Recently, contemporary and alternative medical approaches, such as aromatherapy, have gained attention in dental settings. This approach is based on the premise that commonly used essential oils can elicit positive pharmacological, psychological, and physiological effects in humans through their aroma.[11]

The psychological effects of fragrance are mediated through the sense of smell, or the olfactory system, which may subsequently induce physiological responses. These physiological effects are believed to operate via the limbic system, particularly the hippocampus and amygdala.[12] Pleasant scents stimulate the release of anxiolytic neurotransmitters, such as serotonin and endorphins, which are associated with feelings of well-being, while simultaneously inhibiting the release of stress hormones, including adrenaline, noradrenaline, catecholamines, and corticosteroids.[12]

A randomized clinical trial conducted by Kamalapuram Nirmala et al.[13] evaluated the effectiveness of aromatherapy in reducing dental anxiety and pain during local anesthetic administration in children aged 8–12 years and findings suggest that aromatherapy, particularly with sweet orange, may be a useful adjunct for managing dental anxiety and pain in pediatric patients.

Orange peel essential oil is one of the most widely produced and commercially significant essential oils worldwide. Orange peel essential oil is characterized by clarity, a fresh and pleasant fragrance, broad therapeutic potential and sensory properties comparable to those of fresh orange fruit. The essential oil derived from orange peel (*Citrus sinensis*) primarily consists of limonene, along with other volatile compounds such as myrcene, linalool, octane, and decanal.[14]

In 2021, James J et al.[3] conducted a study to evaluate the effectiveness of aromatherapy using orange essential oil versus music distraction for managing anxiety in pediatric dental patients and concluded that both the aromatherapy and music distraction groups showed significant reductions in anxiety compared to the control group.

Bach therapy plays a significant role in dental medicine by promoting a sense of well-being in both patients and clinicians before, during, and after treatment, thereby facilitating a positive and effective therapeutic relationship.[15] Human responses to dental fear and anxiety manifest across emotional, autonomic (vegetative), and psychomotor domains. Bach Flower Remedies may be beneficial in addressing these responses, particularly at the emotional and psychological levels. They may assist patients with dental anxiety by reducing stress and anxiety and by promoting a calm and harmonious internal state, thereby contributing to a more relaxed clinical environment.[15]

Rescue Remedy is one of the most widely recognized Bach Flower Remedies. It is a composite preparation consisting of five individual flower remedies rather than a single plant extract. It has traditionally been used in acute or crisis situations, such as emergencies or accidents, particularly in circumstances associated with heightened stress, panic, or transient alterations in consciousness, including fainting.[15] The five plants used in the rescue remedy are: Clematis – for faint, far-away, disconnected feelings, loss of conscience, unconsciousness; Rock Rose – for terror; Star of Bethlehem – for shock and suffering; Impatiens – for irritability and tension; Cherry Plum – for hysteria or fear of loss of self-control.[15]

Uma B Dixit et al.[4] conducted a randomized controlled study comparing BFT and music therapy on dental anxiety in pediatric patients found both interventions to be effective in reducing anxiety. Pintov et al.[16] conducted a randomized controlled study to evaluate the effects of Rescue Remedy in children with attention-

deficit/hyperactivity disorder (ADHD); however, the results showed no significant differences in behavioral performance as assessed by teachers. Another randomized, double-blind controlled trial by Toyota S.[17] evaluated the effectiveness of Rescue Remedy as a preanesthetic intervention for reducing anxiety and tension in surgical patients and the findings indicate that Rescue Remedy may help reduce preoperative anxiety and tension when used as a preanesthetic adjunct.

The results of the present study suggests that aromatherapy, particularly with specific essential oils like orange, demonstrates more consistent evidence of anxiolytic effects in pediatric dental patients compared to Bach flower therapy . However, both modalities are generally considered safe and well-accepted by children and their parents, making them valuable adjunctive tools in behavior guidance strategies.

However, the limitations of this study include its small sample size and the inclusion of a specific age range, which may restrict the generalizability of the findings. Additionally, the study was conducted at a single center. Future large-scale randomized controlled trials are recommended to explore the effectiveness of aromatherapy and Bach flower therapy across diverse settings and age groups.

CONCLUSION

- Both the aromatherapy and Bach flower therapy groups demonstrated a significant reduction in anxiety levels compared with the control group, as measured by the Facial Image Scale. In addition, post-treatment assessments showed a significant decrease in pulse rate along with a slight increase in oxygen saturation levels.
- The control group exhibited an increase in post-treatment anxiety levels as measured by the Facial Image Scale. Additionally, post-treatment assessments revealed an increase in pulse rate accompanied by a reduction in oxygen saturation levels.
- When comparing aromatherapy and Bach flower therapy, statistically significant difference was observed in post-treatment outcomes. Aromatherapy demonstrated comparatively better results, with a greater reduction in pulse rate and a modest increase in oxygen saturation levels.

CLINICAL SIGNIFICANCE

This study highlights the use of aromatherapy and Bach flower therapy as effective approaches for reducing dental anxiety in children aged 5–9 years.

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