



RESEARCH ARTICLE

EFFECT OF LAVENDER OIL ON ANXIETY LEVEL IN PEDIATRIC PATIENTS

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ABSTRACT

Introduction: Dental fear and anxiety is a common and potentially distressing problem in children. Managing dental anxiety has been one of the most difficult task for pediatric dentist. The potential effects of essential oils have been associated with decreased anxiety, improved mood and increased sedation.

Aim: To determine the effect of lavender oil in alleviating dental anxiety.

Material and method: 30 children between 4-6 years were randomly allocated to either a control or an experimental group that received lavender oil before dental procedure. Child's anxiety level was measured by using CFSS-DS and Facial image scale. Physiological parameters were recorded and assessment of behaviour was carried out with North Carolina Behaviour Rating Scale.

Results: Student's t-test showed a significant reduction in pulse rate($p=0.049$) and respiratory rate($p=0.003$) in experimental group.

Conclusion: The positive effects of lavender oil on anxiety in children can be performed to reduce anxiety in children as appropriate.

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INTRODUCTION

Fear of dentists and dentistry is a common and potentially distressing problem, both for the public and for dental practitioners. Dental anxiety has been defined as an "abnormal fear or dread of visiting the dentist for preventive care or therapy and unwarranted anxiety over dental procedures" and can have physiological, cognitive and behavioral consequences.³ The term anxiety entered the field of psychology as a translation of the German word "Angst", which was used by Freud in 1936. Currently, anxiety is defined as a nonspecific feeling of apprehension towards a concrete situation that does not necessarily require previous experience, and is not proportional to the response that is triggered in the individual (Alwin *et al.*, 1991; Milgrom *et al.*, 1995; Rayen *et al.*, 2006). Many terminologies have been used over a period of time to explain the concept of dental anxiety, dental fear, and dental phobia. Dental fear is usually associated with known stimuli like injections or drills whereas dental anxiety is borne out of an unknown threat that is not immediately present. Dental anxiety is a multidimensional complex phenomenon, and no one single variable can account exclusively for its development. Within the literature, there are a number of factors that have consistently been linked with a greater incidence of dental anxiety, including personality

characteristics, fear of pain, past traumatic dental experiences, particularly in childhood (conditioning experiences), the influence of dentally anxious family members of peers which elicit fear in a person (vicarious learning), and blood injury fears.¹⁴ Anxiety's intensity varies from nervousness to dental phobia.³ The efficiency of dentists' work also has a direct influence on the patients comfort and satisfaction.¹² A long-term avoidance of dental treatment due to dental anxiety may decline the state of oral health, resulting in pain and distress. In addition, anxious patients are more sensitive to pain. Helping patients overcome fear and anxiety may increase regular and scheduled dental visits and may ultimately improve the quality of life.⁴ The prevalence of dental anxiety is 5-20 % in most of the populations which is seen more in children and this tends to decrease as age advances. It is also seen that females are more prone to dental anxiety as compared to their male counterparts.¹¹ Anxiety usually managed by both pharmacologically and nonpharmacological methods. One common way of managing anxiety in the dental surgery is through conscious sedation or general anesthesia. Pharmacologic management of anxiety can significantly improve patient outcomes; however, it is associated with some risks require additional equipment and cannot be applied to the patients with allergies and other medications. Different side effects such as fatigue, confusion, and restlessness are evident.⁹

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Recently, contemporary and alternative medicine approaches such as aromatherapy (use of essential oils, scented, volatile liquid substances for therapeutic purposes) have been considered in dental and medical settings. This method is supporting the concept that common oils can produce positive pharmacological and physiological effect by the sense of smell.⁴ Aromatherapy is one such alternative medical approach, which includes the inhaled, absorbed, or ingested use of essential oils for prophylactic treatment.³ The term aromatherapy was coined in 1937 by a French chemist named Rene Gattefosse. While working in a laboratory, Gattefosse burned his hand and consequently, submerged it into container of lavender. The healing process was hastened and Gattefosse set out to study the medicinal properties of essential oils. He continued to experiment with various oils, and eventually classified them according to their "healing" properties: antitoxic, antiseptic, tonifying, stimulating, calming.⁷ For centuries, the essential oils have found their importance as a fragrance with a curative potential on the body, mind and spirit. These aroma molecules are very potent organic plant chemicals that make the surroundings free from disease, bacteria, virus and fungus.⁵

The inhalation of different odors in aromatherapy been related to relaxation, alertness, attention, performance, and healing. Lavender (*Lavandula angustifolia* and *Lavandula stoechas*, from the Labiatae family) is a plant with an anxiolytic and relaxing aroma.¹⁰ Aroma of Lavender essential oil has been associated with parasympathetic stimulation of the autonomic nervous system, leading to decreased anxiety, improved mood, and increased sedation.³ The smell of the dental office was found to be highly effective in a study evaluating dental fear and anxiety.⁴ There have been very few studies evaluating the effect of lavender on dental anxiety. Hence, this study conducted with an aim to determine the effect of lavender oil in alleviating dental anxiety.

MATERIALS AND METHODS

The present study was conducted in the Department of Pedodontics and Preventive Dentistry in College of dental sciences and research centre, Ahmedabad. The fragrance used in this study was Lavender. A randomized controlled trial was conducted on an age group of 4-6 years to evaluate the effect of lavender odor on child anxiety during oral prophylaxis treatment. Thirty children (15 boys, 15 girls) were selected among patients who attended the pediatric department. The inclusion criteria used for selecting the patients were: children aged 4-6 years, patient's visit should be first to evaluate actual dental anxiety, informed consent was taken from the parents and who required oral prophylaxis treatment like fluoride gel application, scaling, or pit and fissure sealants just to make this study unbiased. Patients with respiratory allergies and cold were excluded. In this crossover design study, participants were assigned into two groups experimental and control. Half of the children were treated without any odor (control). Another 15 children received treatment under lavender aroma before the treatment. The natural essential oil of lavender (belonging to the family of lamiaceae) was used. The main components of essential oil were Camphor, Terpinen-4-ol, Linalool, Linalyl acetate, Beta-ocimene 1-8-cineole. Its constituent varies in concentration and therapeutic effects with the different species. Linalool shows sedative effects and linalyl acetate shows marked narcotic actions.

These two actions may be responsible for its use in reducing anxiety.⁵ Base line anxiety was evaluated by CFSS-DS and dental anxiety was evaluated by facial image scale. Pulse rate was recorded using pulse oximeter which was used for physiological assessment of child's anxiety level pre and post treatment. Child's anxiety level in each visit was assessed using a combination of three measures: 1) facial image scale- The Facial Image Scale (FIS) is a state 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 state child dental anxiety even in very young children. The scale is scored by giving a value of one to the most positive affect face and five to the most negative affect face.⁹

The Dental Subscale of the Children's Fear Survey Schedule (CFSS-DS) was developed to provide an instrument for assessing dental fear in children (Cuthbert and Melamed, 1982).¹ It consists of 15 items and each item can be given five different scores ranging from "not afraid at all (1)" to "very much afraid (5)." The CFSS-DS rates children's dental fear in 15 dentally related situations, such as "dentist," "injections," and "opening the mouth".¹⁴ The CFSS-DS has a total score range of 15 to 75 and a score of 38 or more has been associated with clinical dental fear.⁸ Finger pulse oximeter – for pulse rate measurement, which is a direct measure of physiological arousal since its increase is attributed to stress during dental procedures. It was used for physiological assessment of child's anxiety level pre- and post-treatment. Respiratory rate was also measured before and after the treatment. Respiratory rate and pulse rate as physiologic measures are considered as most reliable objective measures for the detection of anxiety in dental clinic (Hubert and Dejong 1991).²

RESULTS

30 children between 4-6 years were selected in this study. They were assigned randomly in two groups according to crossover design. The first group consisted of 15 children (9 girls and 6 boys) who were treated in the absence of lavender aroma. The second group consisted of (11 girls and 4 boys) who were treated under lavender aroma. Out of 30 children, 85% of them were anxious and it was measured by the CFSS-DS scale. Student's T-test was used to evaluate the association between the variables. Pulse rate before and after the procedure was found significant ($p=0.049$) Table 1. Respiratory rate in Table 1 before and after the procedure and there was a significant difference. ($p=0.003$). Respiratory rate in Table 2 was evaluated within the group i.e. Experimental & Control and results were significant. Pulse rate was evaluated within the group and results were significant too Table 2.

DISCUSSION

Anxiety is a form of emotion that is associated with physiological change in respiratory rate and heart rate. Child dental fear is a behavior problem that dentists may face in their practice. It has been reported that 27% of children with behavior management problems are fearful of dental procedures.⁶ Children usually show more disruptive negative behaviour during 4 to 6 years of age. Dealing with anxious patients leads to increased tension that may potentially compromise performance.¹³

Table 1. Comparison of Anxiety (Pulse Rate & Respiratory Rate before & after within the group)

	Mean	N	Std. Deviation	Std. Error Mean	Mean Difference	P Value
Respiratory Rate Before	27.13	15	2.232	0.576	-1.400	.003
Respiratory Rate After	25.73	15	2.840	0.733		
Respiratory Rate During	26.80	15	2.624	0.678	-1.067	.010
Respiratory Rate After	25.73	15	2.840	0.733		
Pulse Rate Before	83.93	15	21.245	5.485	12.000	.027
Pulse Rate During	95.93	15	5.946	1.535		
Pulse Rate Before	83.93	15	21.245	5.485	9.133	.049
Pulse Rate After	93.07	15	10.606	2.739		
Pulse Rate After	93.07	15	10.606	2.739		

Table 2. Comparison of Anxiety (Pulse Rate & Respiratory Rate before & after between the group)

GROUP		N	Mean	Std. Deviation	Std. Error Mean	Mean Difference	P Value
Respiratory Rate Before	Experimental	15	27.13	2.232	0.576	0.467	.511
	Control	15	26.67	1.543	0.398		
Respiratory Rate After	Experimental	15	25.73	2.840	0.733	2.667	.023
	Control	15	23.07	3.240	0.836		
Pulse Rate Before	Experimental	15	83.93	21.245	5.485	-2.533	.723
	Control	15	86.47	17.382	4.488		
Pulse Rate After	Experimental	15	93.07	10.606	2.739	9.333	.043
	Control	15	83.73	13.360	3.450		

Their behaviour is most difficult to manage. Hence, the children between 4-6 years were selected in this study. The children in experimental group were made to inhale lavender oil by sprinkling a few drops on a handkerchief as given by (Rahul bhayana *et al.*)⁷. In order to minimize the effect of pain during dental treatment on the physiological parameters, child reported dental anxiety and child's behaviour during dental treatment. A painless and less time consuming oral prophylaxis and fluoride treatment was selected. This study had a new approach toward aromatherapy that was accompanied with dental treatment in children, based upon the anxiolytic effect of lavender odor. The results of this study showed that the respiratory rate and pulse rate decreased in groups by using aromatherapy and that these differences were statistically significant. It has been seen that for anxious children even a small procedure like oral prophylaxis evokes anxiety. All children minimize the variation in the parameters studied. As we used a non-invasive and painless procedure for dental treatment and kept it uniform across the samples, the changes in physiological parameters can be attributed to the anxiety. In our study a significant change in the pulse rate was noted, which was seen in study by Messer and Myers *et al.*, (1972) in anxiety during dental treatment.

Essential oils have the power to influence emotional state in humans. Lavender oil has been demonstrated to act postsynaptically and it is suggested that it modulates the activity of cyclic adenosine monophosphate (cAMP). On inhalation of scented oils, volatile molecules of the oil reach the lungs and rapidly diffuse into the blood, causing brain activation via systemic circulation. However, these molecules also bind to olfactory receptors, creating an electrophysiological response which reaches the brain. Neocortex activation is expected to occur by this response, which has an effect on perception of odors and reaches the limbic system regions including amygdale and hypothalamus, the areas where levels of hormone and emotions are controlled. Essential oils activate olfactory nerve cells in the nasal cavity, then it sends impulses to the limbic system, the area of the brain associated with emotions and memory. Proponents of aromatherapy believe that the aromatic oils work both emotionally and physically.

Emotionally, they may help to relieve certain conditions by stimulating the immune, circulatory or nervous systems. Mehdi Jafarzadeh *et al.*, (2013) concluded that the use of aromatherapy with natural essential oil of orange could reduce salivary cortisol and pulse rate due to child anxiety state. J. Lehrner *et al.*, (2005) investigated the impact of the essential oils of orange and lavender on anxiety, mood, alertness and calmness in dental patients. Lehrner *et al.* (2005) showed that inhalation aromatherapy with lavender essence could decline anxiety of patients before dental procedures.¹⁵ And they have evaluated that the use of essential oil is helpful in reducing anxiety in dental patients. In this study the mean \pm SD of pulse and respiratory rates were calculated in each group before and after treatment.

Conclusion

This randomized control trial provides evidence in favour of the use of lavender essential oil in Pediatric dentistry by reducing respiratory rate and pulse rate. A recent increase in the popularity of alternative medicine and natural products has renewed interest in lavender essential oil as potential natural remedies. Lavender oil involves scientific used to enhance psychological and physical well-being, such as calming and sedative effects to enhance the Pediatric patients experience.

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