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Effect of Lavender Oil on Anxiety Level in a Group of Egyptian Children

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ABSTRACT

Purpose: This study was conducted to evaluate the effect of lavender oil on anxiety level in a group of Egyptian children. **Subjects and Methods**: A total number of 32 Egyptian children were included in this study. Children ages ranged from 4 to 7 years old in a good physical condition. Children were randomly distributed into two groups A & B each of 16 children. In children of experimental group B (using Lavender oil) each participant was instructed to inhale cotton with pure lavender oil for one minute before dental anesthesia. In control group (A) (children injected with dental anesthesia directly without lavender inhalation) facial image scale was used to evaluate anxiety level of children (FAS) and vital signs as pulse rate was measured using pulse oximeter for all children in both groups. **Results:** There was a significant reduction in anxiety level and pulse rate in experimental group. **Conclusion:** Lavender oil inhalation shows significant effect in reducing anxiety level and physiological parameters as pulse rate among children.

KEYWORDS

Lavender Oil, Pulse Rate, Dental Anxiety, Aromatherapy.

INTRODUCTION

Since dental anxiety is historically rooted in dentistry, the different ways of controlling pain have been developed over decades. Children's frustration and anxiety in dentistry is very important, appearing as negative behaviors during examination, such as fear, anxiety pain and anger. Anxiety and fear related behaviors in children are considered the most difficult aspects of child control [(1)].

One of the most common obstacles that faces the dental practitioner is how to treat children with higher anxiety level; so that they may

- Paper extracted from Master thesis titled "Effect of Lavender Oil on Anxiety Level in Pediatric Patients"

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fight to recognize anxiety reactions of their patients. Nowadays, there is increased demand on dental team perception of why children face dental anxiety and the result of that type of anxiety may have on the thoughts, behaviors and feelings of their pedodontic patients[2].

Conscious sedation as nitrous oxide or general anesthesia is considered one of the known practices of controlling anxiety in dental surgery. These pharmacological methods had been approved to be associated with some side effects and can't be applied to allergic patients as it is accompanied with fatigue, confusion or Restlessness[3-5].

It is broadly believed that the medicinal use of aromas play a role in alleviating the emotional states in human. The inhalation of different odors in aromatherapy has been related to relaxation, alertness, attention, performance and healing [6].

Aromatherapy is the use of essential oils to soothing emotional or physical annoyance as it's type of complementary medicine in which the volatile oil of plants as lavender is used to induce the level of physical, spiritual and psychological health[4]. So the aroma therapy as alternative approach have been considered in dental field by the use of essential natural oils through inhalation or absorption through massage or ingestion for prophylactic and anxiety relief [3,7].

One of these families is lavender oil which is a plant extract associated with relaxing and anxiolytic aroma with nearly no side effect for its excess use and related to sympatholytic effect on the autonomic nervous system. Lavender (lavandula angustifolia) has a long history of medical use and it has anxiolytic, calming and sedative effects [7-9].

Its structure contain linalool that cause sedation and linalyal acetate cause narcotic action, this method is highly cost saving compared to pharmacological methods[3,8]. So, this study was conducted to evaluate the effect of lavender oil as part of aromatherapy on anxiety level in a group of Egyptian pediatric patients.

SUBJECTS AND METHODS

This study was conducted on an age group 4-7 years to assess the sequel of using the lavender aroma on anxiety level amongst children who require administration of local anesthesia to avoid biases.

Sample size calculation:

The sample size was determined according to the following formula

- Formula:

$$n = \frac{t^2 p(1-p)}{m^2}$$

- Description:

  n= required sample size

  t= Confidence level which was set at 95%

  p= Estimated prevalence of variable of interest in the project area.

  (Set at 16%)

  m= Margin of error set at 4%

Sample design:

- Thirty two Children [16 girls and 16 boys] were selected amongst patients who attend to the pediatric department [1, 5].
- Research ethics committee (Code: Rec-PE-19-01) approval was obtained from Faculty of Dental Medicine for Girls' Branch, Al-Azhar University.
- Fully detailed treatment plan was explained to the children's guardian and informed consent was assigned by the guardians.

The inclusion criteria:

- Age 4-7.
- Informed consent was taken from parents
- Children who require administration of local anesthesia.

Exclusion Criteria:

- Avoided patient with special needs.
- Children with respiratory tract infection.
- History of bad dental experience.

Grouping:

Participants were randomly assigned into 2 groups:

Control Group:

(Group A)

16 subjects were treated without aroma.

Experimental Group:

(Group B)

16 subjects were treated under lavender aroma through inhalation by sprinkling 4 drops into piece of cotton or handkerchief [3, 5].

At first, the following data was collected from each child: name, age, sex, medical history and dental history.

Then, before starting the procedure and after it:-

Anxiety level and pulse rate (P.R) was measured for each child in each group] before dental anesthesia injection and after it in control group (A), before aroma and dental anesthesia injection and after them in experimental group (B).

Facial image scale in which each face assigned with score from 1-5; score 5 is the highest anxiety was used to evaluate dental anxiety. (Fig.1)

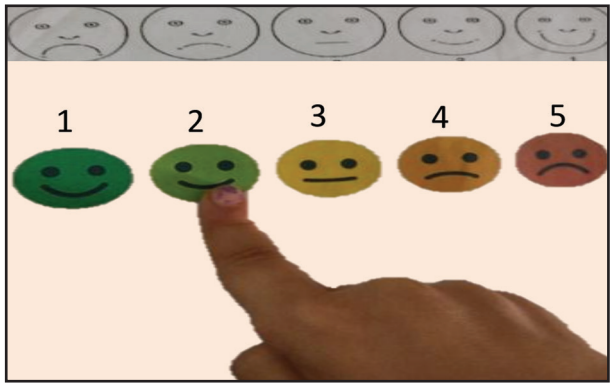

Figure (1) Facial image scale used to measure dental anxiety

Finger pulse oximeter used to measure pulse rate (Fig. 2)

Figure (2) Illustrates measuring of pulse rate by finger pulse oximeter.

Statistical Analysis

Values were presented as mean and standard deviation (SD) values. Data was explored for normality using Kolmogorov-Smirnov test of normality. The results of Kolmogorov-Smirnov test indicated that most of the data was normally distributed (parametric data), therefore independent t test was used for intergroup comparison, while intragroup comparison (before, after and within the same group) was performed using paired t-test [10, 11].

The significance level was set at $p \leq 0.05$. Statistical analysis was performed with SPSS 19.0 (Statistical Package for Scientific Studies, SPSS, Inc., Chicago, IL, USA) for Windows [10, 11].

RESULTS

Anxiety level

Comparison of anxiety level between the two groups

Before starting the treatment, a greater mean was recorded in experimental group (B). The mean anxiety level in experimental group was 2.06±1.06, while in control group (A) it was 2±1.1. Independent t-test revealed that the difference between groups was not statistically significant, **Table (1), (Fig. 3).**

After injection, a greater mean was recorded in control group (A). The mean anxiety level in experimental group (B) was 1.19±0.4, while in control group (A) it was 3.06±0.93. Independent t test revealed that the difference between groups was statistically significant, **Table (1), (Fig. 3).**

Table (1) *Descriptive statistics and comparison of anxiety level between the two groups*

	Group Statistics				Difference		95% Confidence Interval of the Difference	
	Groups	Mean	Std. Dev	Std. Error Mean	Mean	Std. Error	Lower	Upper
Anxiety. Before	Experimental group	2.06	1.06	.27	.06	.38	-.72	.84
	Control group	2.00	1.10	.27				
Anxiety. After	Experimental group	1.19	.40	.10	-1.88	.25	-2.40	-1.35
	Control group	3.06	.93	.23				

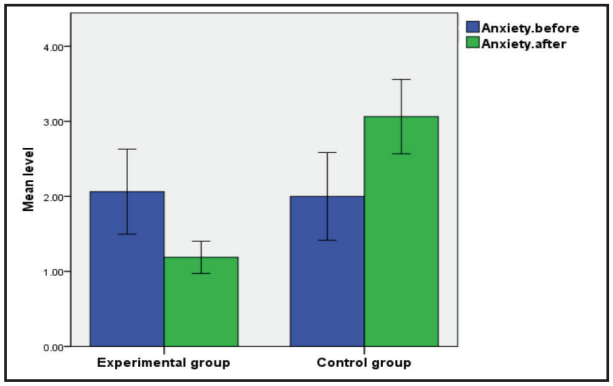

Figure (3) Bar chart illustrating mean anxiety level in experimental and control groups before and after.

Pulse rate (P.R)

Comparison of pulse rate between the two groups

Before starting treatment, a greater mean was recorded in control group (A). The mean pulse rate in experimental group was 106.63±7.29, while in control group it was 109.5±6.07. Independent t-test revealed that the difference between groups was not statistically significant, **Table (2), (Fig. 4)**

After injection, a greater mean was recorded in control group. The mean pulse rate in experimental group was 97.44±11.35, while in control group it was 113.8±8.84. Independent t-test revealed that the difference between both groups was statistically significant, **Table (2), (Fig. 4).**

Table (2) *Descriptive statistics and comparison of pulse rate between the two groups.*

	Pulse rate				Difference		95% Confidence Interval of the Difference	
	Groups	Mean	Std. Dev	Std. Error Mean	Mean	Std. Error	Lower	Upper
Before	Experimental group	106.63	7.29	1.82	-2.88	2.37	-7.72	1.97
	Control group	109.50	6.07	1.52				
After	Experimental group	97.44	11.35	2.84	-16.38	3.60	-23.74	-9.01
	Control group	113.81	8.84	2.21				

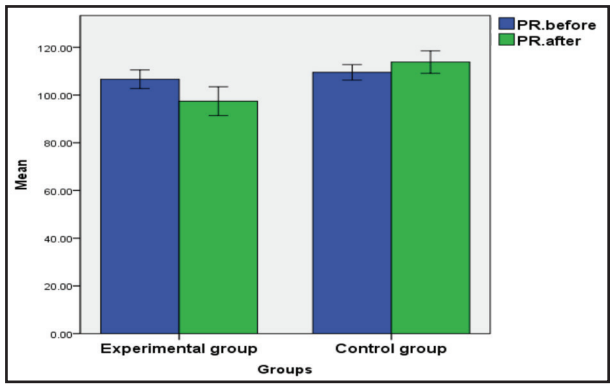

Figure (4): Bar chart illustrating the mean pulse rate in experimental and control groups before and after

DISCUSSION

In modern dentistry, one of the obstacles to protect children's oral health is to counteract the children's anxiety concerning dentistry. There are various approaches to control the dental anxiety such as cognitive therapy and aromatherapy [1].

Cognitive and exciting statuses of children influence the central nervous system, that cause rise in pulse rate and blood pressure. Fear of pain and pain related anxiety increases the degree of anxiety and leads to more harmful situations and bad impressions during dental procedures causing co-operation problems, so control of anxiety through many pharmacological and non-pharmacological methods becomes an important issue in pediatric dentistry. Aromatherapy is one of the potential non-pharmacological ways that gains more attention recently, as it's cost effective and safe for children [12].

Emotional status of humans is widely thought to be influenced with aromas. Recent alternative medicine approaches such as aromatherapy have been considered in dentistry[13]. This method ensures the concept those essential oils as lavender can produce positive pharmacological, psychological and physiological effects on humans [4].

Anxiety is an emotion that is accompanied by physiological change in respiratory rate, heart rate and blood pressure. One of the behavior problems that dental practitioners may face in their clinics is child anxiety. It has been reported that 27% of children with behavior management problems are fearful of dental procedures [3].

Age of 4 to 7 years amongst the pedodontic patients usually associated with much riotous negative behavior and their behavior is most difficult to control, so this study concentrates on this age. Dealing with anxious patients leads to tension increase that may potentially compromise performance. In accordance with the current study another one choose the same age[3]. In disagreement with this study, previous study choose depend on age from 6-9 years old as the child according to it will be mature enough to use logical thoughts or operations[4].

The subjects in experimental group were allowed to smell through a cotton of pure lavender oil, as it's considered most effective, less time consuming, less equipment and introducing more availability and simplicity. In agree with the present study another study has used handkerchief to inhale lavender [14].

In order to create more kindly and more comfortable situation to the child, we choose anxiety measuring scale (FIS) that is filled by the child him/herself; studies show that it is a advisable scale for measuring anxiety degree of pediatric patients[15]. As known, dental anesthesia injection is the most sensory triggering factor for anxiety, so this step is only selected to this study[1,16].This study introduce a denovo practice in aromatherapy that was used with dental treatment in children depending on anxiolytic action of the lavender essential oil [3].

Lavender oil can alternate emotional status of humans through acting post-synaptically suggesting that it changes the activity of cyclic adenosine monophosphate (cAMP). Upon inhaling the volatile molecules of lavender aroma, they reach the lungs and rapidly diffuse into blood causing brain stimulation [3].

However, these molecules also attach to olfactory receptors, creating a cranial electrophysiological

response. The resultant neocortex activation is expected to reach the limbic system regions including amygdale and hypothalamus, the areas where levels of hormone and emotions are controlled [3].

The result of current study showed that great reduction in dental anxiety occurred in experimental group (B) compared to control group (A) revealing the effect of lavender in reducing anxiety. The current study is in agreement with the results of a study conducted to assess the effect of lavender oil in alleviating dental anxiety that showed significant reduction in dental anxiety post aroma inhalation as show in table 1 and fig.3[3].

This study was also supported with a recent study conducted to estimate the relationship between psychological and physiological findings following smelling lavender aroma amongst pedodontic patients and there was statistically significant drop of facial image scale scores occurred after tooth extraction in lavender group compared with control one [12].

The present study was supported with previous studies that had used lavender fragrance to reduce dental anxiety amongst patients through inhalation [17-19]. one of these studies conducted to compare lavender and rose oils effect in reducing anxiety among orthodontic patients. The lavender group shows the greatest significance in controlling anxiety followed by rose group [17].

In accordance with the current study another one used orange essential oil to estimate its effect on anxiety amongst children with diabetes, there was a significant decrease in anxiety following aroma inhalation in experimental group [20].

This study was in disagreement with number of studies which showed that aroma was statistically non-significant in reducing dental anxiety[4,21]. One of these studies showed no statistical significance of aroma in anxiety level; this may be due to usage of diffuser rather than direct inhalation with cotton or handkerchief as in our study, so lower effect on the child[4]. Other reasons may be the usage of diluted oil rather than pure one and lower number of the sample in some studies as those mentioned in systemic review[21].

The result of current study showed that the greater reduction in pulse rate was obseved in lavender experimental group (B) after treatment with aroma and injection of anesthesia and the results was statistically significant compared to control group (A) as show in table 2 and Fig.4**.** This study was in accordance with number of researches [3, 4, 7].

In agreement with this study, a recent study shows significant pulse rate reduction in lavender group compared to control one amongst a group of children [3] .This study was also supported by previous studies conducted to evaluate effect of aromatherapy using orange essential oil on anxiety level in children and orange essential oil proved to be effective in reducing pulse rate in aroma group compared to control group [4, 7].

However, in disagreement with this study, a study showed non-significant reduction in intergroup comparison of heart rate among patients of orthodontic clinic following lavender and rose oils inhalation[17]. In contrast with the current study, a previous study concluded that lavender aroma had no effect on heart rate and no significant difference was found between the study groups [22].

CONCLUSIONS

1. This study provides results preferring the utilization of lavender essential oil among pedodontic patients; as it allows controlling the anxiety level and the physiological parameters as respiratory level. A modern trend in the usage of substitute medicine and natural medication has renewed the interest in lavender oil as an effective natural product.
2. Based on the outcomes of this study; lavender oil as a natural and easy to prepare with minimal side effects can be used as anxiolytic and soothing material to increase the positive impression of the child towards the dental clinic.

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