

## The Effect of Music and Lavender's Aroma on Patients Anxiety, during Periodontal Surgery

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### Abstract

**Statement of the Problem:** Anxiety is one of the most common factors hindering people from visiting dentists. Therefore, finding a solution for stress control has been a significant issue in recent studies. It seems that music positively affects inhibition of psychological stress. Other studies have shown that aroma may adjust perception, patience and moods. **Purpose:** This study investigated the effect of music and lavender's aroma on blood pressure, heart rate and anxiety. **Materials and Method:** Ninety patients were divided into three groups. At the beginning, patients were asked to complete Spielberger's questionnaire to assess the level of anxiety. Blood pressure and heart rate were also measured. In the first group, surgery was performed, while the patient smelled the fragrance of lavender; in the second group, surgery was accompanied by playing a relaxing music and in the third group, no intervention was done. Then, patients were again requested to complete the questionnaire and their blood pressure and heart rate were again measured. **Results:** In the control group, no statistically or clinically significant difference was observed in systolic and diastolic blood pressure or heart rate. In the aroma therapy and music groups, systolic and diastolic blood pressure values didn't change clinically but heart rates were decreased. In the control and music groups, anxiety levels didn't change significantly but in the aroma therapy group, anxiety had a significant decrease. **Conclusion:** Using aroma and relaxing music, regardless of whether it affects or not on anxiety, aroused pleasant feelings in patients.

**Keywords:** Anxiety, Periodontal Treatment, Music, Aroma.

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## Introduction

Anxiety sometimes occurs as a conditioned response to former painful and traumatic experiences related to visiting a dentist or it could be the result of patient's negative beliefs and misunderstandings regarding dental procedures which frightens patient to accept dental services and their complications such as pain (1). Several studies support this hypothesis that the pain or fear of pain is the primary cause of anxiety and is also a major obstacle to follow dental care (2). It is said that more than forty percent of people experience stress before dental procedures (3). Anxiety increases levels of cortisol and adrenaline in the body (4). Anxious patients feel the pain of local anesthesia injection more severely and for a longer time, compared with others (5). In the other words, anxious patients have lower threshold of pain (6). In addition to the pain of injection, dental instruments observation such as needles, the sound and vibration of turbines and handpieces and also smelling the odor of eugenol or burnt dentin, make it more difficult for patients to remain calm (7-8).

Obviously, if we can reduce fear and anxiety of patients through various methods, the possibility of

visiting dentists will increase (9) and ultimately the quality of their oral health will improve as well (10). Anxiety management techniques may be pharmaceutical or non-pharmaceutical. Using music is one of these non-medical methods (9). In recent years, several studies have been conducted to investigate the effect of music on healing. For example, Maleki et al. in 2006, conducted a clinical trial and concluded that the music of "Rain of Love" (as an example of a relaxing music), significantly reduced mental anxiety caused by root canal therapy; but, it had no significant effect on systolic and diastolic blood pressure of these people (11). In a study conducted by Roohi et al. the average blood pressure and anxiety of those patients who listened to music before surgery were reduced (12). In contrast, in another study conducted by Aitken et al, music intervention had no significant effect on pain and anxiety of children undergoing reconstructive dental treatment (13).

In addition, other studies conducted about finding ways to reduce anxiety have shown that Aroma may adjust perception. (14) patience (15) and moods (16); so that, extensive studies have been conducted in the field of aromatherapy (17). This treatment includes inhaling or incensing the essence of essential oils or herbal extracts for preventive or therapeutic care (18). It seems that there is a strong connection between scents and personal memories; especially those old memories that have been emotionally important; because there are anatomical connections between brain structures such as hypothalamus and limbic system which are involved in memories and emotions (19). Maybe that's why

recording the smell of dental office and specially eugenol- in the memory of patient has a significant impact in repeating the same fear and anxiety, caused by former unpleasant experiences, in the future referrals (20), because when a person is exposed to certain odor, odorant molecules will be transferred to the brain via limbic system and the brain will give an emotional response to it (21). Studies on replacing a pleasant smell in the medical environment or generally using fragrances of some plants to control anxiety have brought different results. In 2013, Jafarzadeh et al. pointed out the positive effect of aromatherapy with essential oils of orange in reducing children's anxiety during dental treatment (19). In contrast, Muzzarelli et al. in 2006 concluded that aromatherapy by using lavender essence is not effective in reducing anxiety in patients before colonoscopy (22).

As mentioned earlier, if no action is taken to control anxiety and fear of dental treatment, simple dental problems will turn in to complicated problems and it will not be possible to treat them simply and inexpensively because of late referral of patients to the dentist. Since no study has so far compared the effect of these two major non-pharmaceutical anxiety controlling methods simultaneously or due to the scarcity of these studies on surgical dentistry procedures, also as mentioned above, the results of previous studies (22-23) are contradictory; so, this study was conducted to investigate the effect of music and the fragrance of lavender oil, on systolic and diastolic blood pressure, heart rate and anxiety of patients.

## Materials and Method

This study was approved by Ethics Committee of Shahid Sadoughi University of Medical Science. The IRCT (Iranian registry of clinical trials) code for this study was 2015101324509N2. A whole number of 90 patients requiring crown lengthening surgery and referred to Periodontology department, Yazd, Iran were selected. Sampling started from 2016-01-17 and recruitment end date was 2016-06-16. Inclusion criteria for this study included patient satisfaction to participate in the study, no history of auscular and olfactory disorders, no mood disorders, no systemic diseases such as cardiovascular diseases and diabetes, using no tranquilizer and analgesic and no record of drug addiction and exclusion criteria included patient reluctance to listen to music or smell lavender oil during the surgery. Patients were divided, based on their age and gender distribution, into three similar groups. Before beginning the treatment, Persian version of Spielberg's Anxiety Test was given to all patients (24). The validity and reliability of this standardized questionnaire have been confirmed in numerous previous studies and it includes a section to measure

situational anxiety which contains 20 short questions and is set in the form of “positive and negative” questions (Likert scale) and each question has four choices: very low, low, medium and high and scores from 1 to 4 were assigned to them, respectively (the minimum score is 20 which means no anxiety and 80 means the maximum level of anxiety). Scores of 21 to 39 indicated mild anxiety, 40 to 59 moderate anxiety and scores of 60 to 80 indicated severe anxiety). Blood pressure and heart rate of patients were measured before surgery using a digital blood pressure monitor. During the surgical treatment, for first group (group A), ten drops of lavender extract composed of lavender essential oil plus permitted herbal emulsifiers (Zard band Company, Iran), were rubbed around the patient's

First of all, the significance was fixed at 0.05 ( $p < 0.05$ ). In this study, the mean age of the group A, group B and group C were  $38.25 \pm 4.62$ ,  $34.5 \pm 2$ , and  $36.37 \pm 2.6$ , respectively and there was no statistically significant difference between them ( $p\text{-value} = 0/070$ ). The distribution of the number of women and men was “14 men and 16 women” for the group A “17 men and 13 women” for the group B and 15 men and 15 women” for the group C, and according to the Chi-square test, no significant difference was observed ( $p\text{-value} = 0/691$ ).

In the group A, no statistically or clinically significant difference was observed in systolic blood pressure values, before and at the end of the surgery. Diastolic blood pressure values statistically increased; however, this increase was not significant clinically. But, the mean number of heart rates decreased compared to the beginning of the surgery (Table 1). Significant clinical differences in blood pressure values were considered as at least 5 mmHg.

nose using sterile gauze (27). In the second group (group B), a selection of relaxing music were played by headphones. The third group (group C), received no intervention during treatment.

Before discharging the patients, blood pressure and heart rate were measured again and then the patients were asked to answer Spielberger's Test again, as soon as possible. Data were collected using the standardized questionnaire in order to assess anxiety scores and a separate form was considered to record blood pressure and heart rate of patients. After collecting data, they were analyzed using SPSS18 software; T-Test (was used to compare the mean scores of anxiety). Chi-square and ANOVA test.

## Results

In the group B, systolic blood pressure values and diastolic blood pressure values increased at the end of the surgery; however, their increases were not significant clinically. The mean number of heart rates significantly decreased (Table 1).

According to paired T-test, in the group C, no statistically or clinically significant difference was observed in systolic and diastolic blood pressure values and heart rates before surgery and at the end of the surgery. (Table 1).

According to participants' answers to the anxiety test, obtained values in the group C and the group B were not statistically different before and after the surgery. However, in the group A, the mean stress expressed by these patients had a significant decrease (Table 1). Interestingly, most of the patient expressed that listening to the music or smelling Lavender odor, caused pleasant feeling in them.

**Table 1.** Comparison of different parameters before and after dental surgery

Group	Variable	Heart Rate	Systolic Blood Pressure	Diastolic Blood Pressure	Anxiety
Group A	Before Treatment	$86.73 \pm 2.62$	$114.46 \pm 2.32$	$75.23 \pm 2.06$	$38.76 \pm 1.57$
	After Treatment	$80.46 \pm 2.08$	$118.36 \pm 3.05$	$79.70 \pm 2.04$	$36.80 \pm 1.61$
	P - Value	0/001	0/139	0/033	0/019
Group B	Before Treatment	$83.30 \pm 2.19$	$109.43 \pm 1.75$	$70.20 \pm 1.18$	$39.36 \pm 1.60$
	After Treatment	$78.96 \pm 2.05$	$115.10 \pm 2.32$	$74.70 \pm 1.33$	$39.70 \pm 1.96$
	P - Value	0/018	0/005	0/006	0/756
Group C	Before Treatment	$84.43 \pm 2.21$	$115.43 \pm 2.40$	$72.46 \pm 2.07$	$39.46 \pm 1.49$
	After Treatment	$83.60 \pm 2.26$	$117.10 \pm 3.03$	$74.43 \pm 2.31$	$39.73 \pm 1.49$
	P - Value	0/653	0/520	0/323	0/832

## Discussion

The aim of this study was to investigate the effect of relaxing music and lavender extract aroma on anxiety, blood pressure and heart rate of patients undergoing crown lengthening surgery. Lavender has long been used in traditional medicine and it has been used as an anti-anxiety, sedative, analgesic, mood-stabilizing medicine. It has also helped resolving sleep disorders (22-23). It can act as activator of parasympathetic system and as a muscle relaxant (25). It is worth mentioning that this plant does not cause allergic reactions; but rather its anti-allergic effects are reported following the blockade of mast cells (26); so, the essential oil of lavender was used in this study.

The mean score of anxiety of the patients in all three groups was mild according to Spielberger's test.

In the group C, no significant change was observed in the mean of evaluated parameters. In the group A, no significant difference was observed in systolic blood pressure values. Diastolic blood pressure values statistically increased; however, this increase was not significant clinically slight increase in systolic or diastolic blood pressure values can be attributed to vasoconstrictor in anesthetics. In this group, the mean number of heart rates and anxiety levels decreased. The results of this study were consistent with the study of Samadi et al. (27) in 2014 on the effect of lavender aroma in reducing anxiety of patients before routine dental treatments; although indicators used to calculate anxiety scores in two studies were different (Dental anxiety scale vs. STAI).

In a study by Rajaie et al. (28) in 2016 conducted on patients undergoing coronary artery bypass graft surgery, systolic and diastolic blood pressure decreased after performing aromatherapy with lavender; however, this decrease was not significant statistically. The mean values of heart rates significantly decreased and the results of this study, in this regard, are consistent with the results of our study. But anxiety levels had no change after aromatherapy, which is not consistent with our study. Different stressor conditions and different duration of aromatherapy in two studies (20 minutes before the surgery vs. the whole of surgery time) may be the reasons of this difference. In a study by Nategh et al. (23) in 2014 conducted on patients hospitalized in coronary care unit (CCU), the mixture of lavender essence and almond oil could not create a significant decrease in systolic and diastolic blood pressure values and heart rates. The difference between the results of this study and our study may be due to differences in clinical conditions and impurity of lavender's aroma used in the mentioned study but according to the patients, inhaling this odor brought them good feelings, which is consistent with present study. In a study by Seifi et al. in 2014, (24) according to Spielberger's test,

using some drops of 2% lavender essential oil (produced by Barij Essence Company) by using an oxygen mask, two and three days after the open heart surgery for twenty minutes could not make a significant difference in anxiety levels. The difference between the results of the two studies may be attributed to differences in intervening period, utilized dose, and differences in application methods of lavender extract. For example, in Trambert et al. study (29), the aroma of lavender plus sandalwood was effective on reducing anxiety in women undergoing image-guided breast biopsy and this result was consistent with our study, although we used lavender merely.

In the group B, systolic and diastolic blood pressure values increased at the end of the surgery; however, their increases were not significant clinically. On the other hand, listening to the relaxing music significantly decreased the mean number of heart rates. There was no difference in patients' anxiety levels; however, all the patients expressed their satisfaction of listening to music. In a study conducted by Maleki et al. (11) based on the Cattell Anxiety Scale, 100 patients who were referred to a dental office for root canal therapy (RCT), were evaluated. Music could reduce patient's mental anxiety and this is inconsistent with the present study. However, it had no effect on systolic and diastolic blood pressure values that is consistent with the results of the present study. The difference between the results of the two studies may be because of using different tests in two studies (Cattell test vs. Spielberger's test). Some studies used VAS (visual analog scale) to measure the anxiety on the basis of a self – report method (30) but in this study Spielberger's test was considered more accurate than self – reporting. In a study by Chafin et al. (31) classical music could reduce systolic blood pressure values; however, pop and jazz music were not effective. Therefore, in the present study we used a classical music. In the end, it should be mentioned that available studies in this field, specially in aromatherapy, were very scares and as far as the authors knew, there was no study done on patient's candidate for surgical dentistry procedures.

## Conclusion

Using lavender's aroma and relaxing music, regardless of whether or not it effects on anxiety, caused pleasant feeling in patients, during surgeries. Both aromatherapies by lavender and relaxing music can decrease patient's heart rate, but they had no efficiency on blood pressure decrease.

## Clinical Significance

Dental anxiety is one of the most common factors hindering people from visiting dentists. Therefore,

finding a solution for controlling stress can play a significant role in improvement of patients' oral health.

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### Conflict of interest

There are no conflicts of interest.

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