

Effect of Audio and Audiovisual Aids on Anxiety Level of Patients during First Appointment of Root Canal Treatment: An *In Vivo* Study

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Abstract

Aim: The aim of this study is to compare the effect of audio and audiovisual aids on anxiety reduction of patients during the first visit of root canal treatment and to compare anxiety level between male and female patients.

Materials and Methods: A total of 90 patients were randomly divided into three groups depending on anxiety reduction method and again divided into subgroups depending on gender. Before starting endodontic treatment, the interviewer administered the Corah's Dental Anxiety Scale to the participants to assess the level of anxiety. Music and videos were played according to patient's preference. Before, during, and after endodontic procedures, the vital parameters (diastolic and systolic blood pressure, heart rate, and respiratory rate) were recorded. There are three groups: Group I ($n = 30$): Control group, Group II ($n = 30$): Audio aid, and Group III ($n = 30$): Audiovisual aid.

Statistical Analysis Used: Statistical analysis was performed using one-way Analysis of variance

Results: All measured vital signs decreased considering the overall period (during and after canal therapy) in audiovisual group.

Conclusions: Audio and audiovisual distraction techniques provided effective reduction in dental anxiety. Female patients showed greater anxiety than male patients.

Key words: Anxiety, Blood pressure, Heart rate

INTRODUCTION

Medical procedures almost always elicit a sense of loss of control, fear, helplessness, and feelings of stress and anxiety.^[1] Anxiety and fear of the dentist are common phenomenon, and it is universally recognized. Many patients fear to visit the dental clinic because of dental anxiety. Fear and anxiety toward the dentist and dental

treatment are both significant characteristics that contribute to the avoidance of dental care.^[2] Depending on the population and the measurement technique, 2.5–20% of people suffer high dental anxiety.^[3] Dental anxiety has been cited as the fifth most common cause of anxiety by Agras.^[2]

Dental anxiety is defined as patient's specific reaction toward stress related to the dental treatment in which the stimulus is unknown, vague or not present at that moment.^[3] Dental anxiety is a significant determinant whether people will make regular dental visits.^[4]

Anxiety and fear are often used interchangeably. Fear is a reaction to known or perceived threat or danger. Odontophobia is overwhelming and irrational fear

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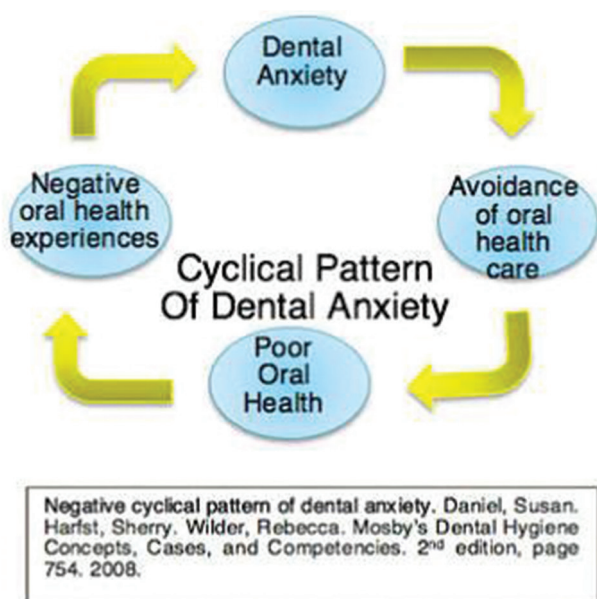
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of dentistry associated with devastating feelings of hypertension, terror, trepidation, and unease.^[2]

The first endodontic appointment, during which access will be gained and pulpal tissues removed, provides the greatest challenge to the endodontist. The primary obstacle to successful endodontic treatment is the presence of dual problems pain and fear.^[5] The effects of this anxiety associated with and exacerbated by the most frequent symptom in dentistry and dental pain are represented in the plane of the dental care, the hindering the cooperation with the dentist, extension of the duration, its medical benefits (on average about 20%), and subsequent trends postponing the presentation at the dental office.^[6] Peter Milgrom said “Deal with the fear first, then pain will be a minor problem.”^[5]

A study by Wong and Lytle showed that root canal therapy and oral surgery were found to be the most anxiety-provoking treatments.^[7] A woman tends to experience more root canal treatment (RCT)-associated anxiety and anticipates more pain than men.^[3]

Vicious Cycle of Dental Fear^[8]



Due to multifactorial etiology of dental anxiety, there is no monotherapy for management. Broadly, dental anxiety can be managed by psychotherapeutic interventions, pharmacological interventions, or a combination of both.^[2]

We should always try to reduce our patient anxiety by a non-pharmacologic manner. One option that has been shown to be a reliable alternative to pharmacologic methods is distraction.^[9]

Distraction, one of the psychobehavioral approaches used in medical and dental treatment situations, is defined as a non-aversive approach used to modify a patient's discomfort

by disrupting his/her attention away from the main task to accomplish successful treatment with a high quality.^[10]

Based on the theory by McCaul and Mallot, a patient's perception of pain is decreased when the patient is distracted from an unpleasant stimulus.^[9] Audiovisual aid is a new approach that has gained popularity to help relieve anxiety related to endodontics that incorporates a visual as well as an audio component.^[11]

In this study, we compared audio and audiovisual distraction techniques in managing anxiety during the first visit of endodontic appointment, and we also compared anxiety reduction between male and female patients.

This can be accomplished by having patients to listen music through JBL headphones in audio group and by having patients to watch an informative movie about the procedure or videos about dental and oral health by utilizing HP laptop and headphones to help better educate them.

SUBJECTS AND METHODS

Source of Data

A total of 90 patients requiring endodontic therapy were recruited for this study.

The selection of patients was made on the basis of the following criteria:

Inclusion Criteria

The following criteria were included in the study:

1. Age - 25 and 40 years.
2. Maxillary and mandibular molars with irreversible pulpitis or pulp necrosis

Exclusion Criteria

The following criteria were excluded from the study:

1. Uncooperative patients
2. Smokers and alcoholics
3. Individuals with any medical disorders and on anxiolytic and sedative medications
4. Patients who have undergone previous RCT
5. Pregnant women.

Patient's Preparation

All participants were informed about the aim of the present study. During the first visit, the ethical approval was requested and granted, and informed consent was obtained from each patient.

Randomization and Experimental Groups

The patients were randomly divided into three groups. Each group includes 15 males and 15 females.

- Group 1 ($n = 30$) control group
- Group 2 ($n = 30$) 432 Hz music
- Group 3 ($n = 30$) audiovisual aid.

Experimental Procedure

Patients were seated in dental chair, and the patient was asked to complete a Corah's Dental Anxiety Scale questionnaires. Upon completion of the questionnaires, vital parameters (diastolic blood pressure, Systolic blood pressure, heart rate, respiratory rate) were checked by Multipara monitor (Meditech MP 1200). Music or videos were played according to patient's preference. All treatments were performed under local anesthesia using lignocaine hydrochloride without adrenaline (LOX 2%, NEON). The teeth were isolated with rubber dam. After rubber dam isolation, again vital parameters were checked. Access opening was performed by Airotor handpiece (Kavo 506c Extra Torque Handpiece) followed by pulp extirpation (Dentsply Barbed Broaches), irrigation (Prime Dental Sodium Hypochlorite), and intracanal medicament placement (RC CAL prime dental) and temporary filling material (Cavit W, 3M ESPE). Again vital parameters checked and compared after the removal of rubber dam. Music and videos were allowed to play throughout the RCT procedure. The subjects in the control group went through the same procedure, but without the evaluation of music and video preference and no music was played during the procedure. All vital parameters were recorded before local anaesthetic injection, at the treatment midpoint and after the removal of rubber dam with the help of Multipara monitor. Figure 1, Figure 2 and Figure 3 shows Corah's Dental Anxiety Scale, Experimental procedure

and Armamentarium used in study (from left to right JBL Headphones, Multipara Monitor, HP Laptop respectively).

Selection of Audio and Audiovisual Aid

The music and videos selected for this study were according to the patient's preference. The compositions were tuned to 432 Hz. The selection of music consisted of classical, environmental, new age, country-western, and general easy listening music. Audiovisual aid consists of informative movie about the procedure or videos about dental and oral health.

RESULTS

Statistical analysis was performed by one-way analysis of variance. Diastolic blood pressure, systolic blood pressure, heart rate, and respiratory rate were measured, and all parameters were analyzed and tabulated [Table 1]. Based on data obtained, comparison of estimated means between groups was recorded [Table 1]. Table 2 shows comparison of estimated means for point of time. The effect of audiovisual and audio aid was statistically significant (< 0.001) [Table 2]. Female patients showed more anxiety as compared to males [Graph 1].

DISCUSSION

In the present-day dentistry, endodontic procedures are among the most common dental therapies. Only a few studies have evaluated the level of anxiety and the different approaches available for the treatment of dental anxiety in adults although the demands for sedation in endodontics are high.^[12]

Table 1: Comparison of estimated means between the groups (with control)

Variable	Group	Mean difference	Standard error	P	Significant
Systolic blood pressure	Music	-4.377*	2.056	0.034	No
	Video	-6.194*	1.983	0.002	Yes
Diastolic blood pressure	Music	3.45*	1.395	0.014	Yes
	Video	5.68*	1.353	0.000	Yes
Heart rate	Music	-3.50*	0.937	0.000	Yes
	Video	-3.88*	0.909	0.000	Yes
Respiratory rate	Music	2.02*	0.219	0.000	Yes
	Video	2.21*	0.213	0.000	Yes

Table 2: Comparison of estimated means for the point of time

Variable	Time	Mean difference	Standard error	P	Significant
Systolic blood pressure	During	2.974	1.989	0.136	No
	After	2.121	1.989	0.287	No
Diastolic blood pressure	During	2.57	1.354	0.050	Yes
	After	1.93	1.354	0.156	No
Heart rate	During	0.79	0.910	0.387	No
	After	2.51*	0.910	0.006	Yes
Respiratory rate	During	0.79*	0.213	0.000	Yes
	After	1.26*	0.213	0.000	Yes

Corah's Dental Anxiety Scale, Revised (DAS-R)

Name _____ Date _____

Norman Corah's Dental Questionnaire

1. If you had to go to the dentist tomorrow for a check-up, how would you feel about it?
 - a. I would look forward to it as a reasonably enjoyable experience.
 - b. I wouldn't care one way or the other.
 - c. I would be a little uneasy about it.
 - d. I would be afraid that it would be unpleasant and painful.
 - e. I would be very frightened of what the dentist would do.
2. When you are waiting in the dentist's office for your turn in the chair, how do you feel?
 - a. Relaxed.
 - b. A little uneasy.
 - c. Tense.
 - d. Anxious.
 - e. So anxious that I sometimes break out in a sweat or almost feel physically sick.
3. When you are in the dentist's chair waiting while the dentist gets the drill ready to begin working on your teeth, how do you feel?
 - a. Relaxed.
 - b. A little uneasy.
 - c. Tense.
 - d. Anxious.
 - e. So anxious that I sometimes break out in a sweat or almost feel physically sick.
4. Imagine you are in the dentist's chair to have your teeth cleaned. While you are waiting and the dentist or hygienist is getting out the instruments which will be used to scrape your teeth around the gums, how do you feel?
 - a. Relaxed.
 - b. A little uneasy.
 - c. Tense.
 - d. Anxious.
 - e. So anxious that I sometimes break out in a sweat or almost feel physically sick.

Scoring the Dental Anxiety Scale, Revised (DAS-R)

(this information is not printed on the form that patients see)

a = 1, b = 2, c = 3, d = 4, e = 5 Total possible = 20

Anxiety rating:

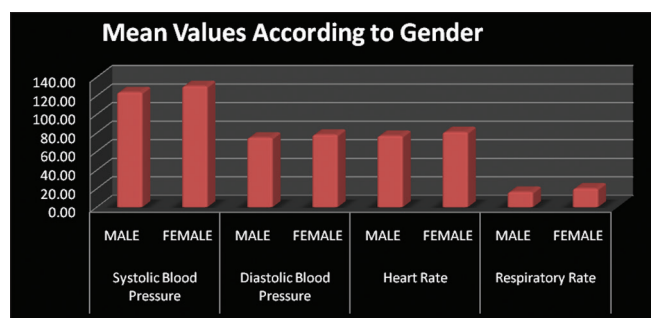
- 9 - 12 = moderate anxiety but have specific stressors that should be discussed and managed
- 13 - 14 = high anxiety
- 15 - 20 = severe anxiety (or phobia). May be manageable with the Dental Concerns Assessment but might require the help of a mental health therapist.

Figure 1: Corah's Dental Anxiety Scale

Patients who need endodontic treatment are often burdened by two main concerns, the length of the procedure and the pain.^[13] Pain causes an alarm reaction manifested by hypothalamic-oriented vasoconstriction and dilatation as well as the release of more epinephrine and norepinephrine. This results in increased heart rate and

cardiac output. In addition, pain may cause blood pressure to rise due to the release of endogenous catecholamine.^[14]

According to Georgelin, physiologic stress peaks early in a Root canal treatment appointment, around the time of local anesthesia delivery and initial instrumentation.^[15]



Graph 1: Mean values according to gender



Figure 2: Access opening procedure under experimental group

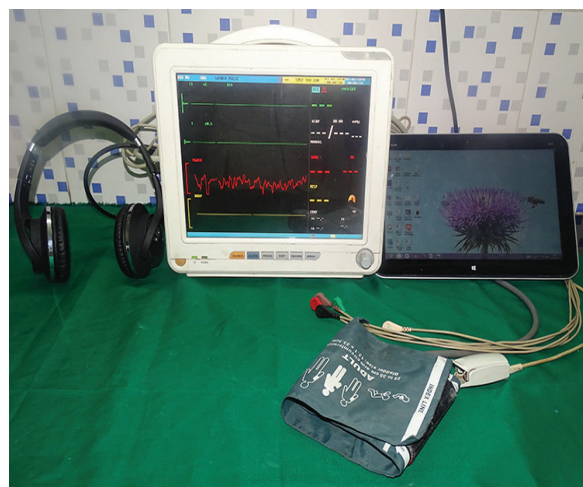


Figure 3: Armamentarium Used In Study

Etiology of dental anxiety is multifactorial such as previous negative experience, especially in childhood, vicarious learning from anxious family members or peers, individual personality characteristic such as neuroticism and self consciousness, lack of understanding, exposure to frightening portrayals of dentists in the media, the coping style of the person, perception of body image, and vulnerable position of lying back in the dental chair.^[2]

The initial interaction of the dentist with the patient can fairly reveal the presence of anxiety and fear, and in such situations, subjective evaluations using different multiple and single item self-reporting questionnaires and objective evaluations involving measurement of vital parameters can greatly enhance the diagnosis for successful management.^[2] The Corah's Dental Anxiety Scale (CDAS), modified DAS, and dental fear survey are the most commonly used questionnaires.^[2]

Various objective measures in measuring dental anxiety are an assessment of blood pressure, pulse rate, pulse oximetry, finger temperature, and galvanic skin response. An extremely accurate objective method used in various studies to measure dental anxiety is galvanic skin response.^[2]

This study evaluates the effect of audio and audiovisual aid on the anxiety level of patients during the first visit of endodontic treatment. The results obtained suggested that patients in audiovisual group showed more anxiety reduction because patients focus their attention on relaxation videos instead of anxiety-inducing dental equipment. It has been reported previously that such an audiovisual system is beneficial in the reduction of fear and pain for both adults and children undergoing dental prophylaxis and restorative procedures.^[16]

Measurement of Anxiety Level in this Study

We measured the anxiety level subjectively by CDAS and objectively by comparing their vital signs. In this study, the anxiety level of the subjects before treatment was measured by CDAS. It is considered reliable for its simplicity of application and the ease of translation into the patients' native languages.^[17] The scale consists of four questions about different dental situations. Hence, the range of possible score is from 4 to 20. The cutoff point of >15 indicates high anxiety level or possibly phobic.^[2]

Music and Anxiety

During dental treatments, music may elicit audio-analgesic responses due to different factors, including the masking of sound, distraction, and direct neurological suppression of pain.^[18] Music therapy can reduce anxiety and also have an analgesic effect by acting at psychological level. It acts by releasing intracerebral endorphins and distract the patient from painful and anxiogenic stimuli. It gives feeling of familiarity and comfort to patient in dental office.^[6] Music reduces activity in the neuroendocrine and sympathetic nervous systems, resulting in decreased anxiety, heart rate, respiratory rate, blood pressure, and better sleep.^[19]

The musical composition selected for this study tuned to 432 HZ instead of 440 Hz. Schumann resonance theory proposed that 432 Hz is the frequency at which earth beats. Hence, we should spent more time attuned to the natural electromagnetic

pulses of the earth at 432 Hz, and we would, in turn, feel more centered, balanced, conscious, and peaceful.^[20]

In this study, we also compared anxiety between male and female patients. Results showed greater anxiety in female patients as compared to male patients. One reason for this trend could be that males tend to hide their fears due to their orthodox gender role.^[3] In addition, it has been reported that, in general, females are more reactive to a specific stimulus than males, which could account for the higher anxiety levels reported by females.^[3]

Studies have shown that the average age at which reduction of fear begins is 40 years for both men and women.^[13] This may be explained by the increase of tolerance of frequent exposure to stressful situations over a prolonged period and life experience that shapes the behavioral characteristics of the individual.^[13]

Lai *et al.* studied the effect of music on state anxiety in patients undergoing root canal therapy. The subject's heart rate, blood pressure, and finger temperature were measured before treatment and during treatment. The results showed that subjects in the music group had a significant increase in finger temperature and a decrease in anxiety score over control group.^[19]

Prabhakar *et al.* compared audio and audiovisual device in reducing dental anxiety in pediatric patients. The results showed that audiovisual distraction technique is more effective in managing anxious patients than audio and normal dental setup.^[21]

Khotani *et al.* evaluated in their study effectiveness of viewing videotaped cartoons as an audiovisual distraction technique on behavior and anxiety of children receiving dental restorative treatment. Children using audiovisual distraction do not only report less distress during the procedure than control group but also show a more positive response after injection with local anesthesia.^[22]

CONCLUSIONS

Audio and audiovisual distraction techniques provided an effective reduction in dental anxiety. Female patients showed greater anxiety than male patients.

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