Original Article

Efficacy of Audio-visual Aids in Reduction of Anxiety during Dental Treatment

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Abstract

Background: During a dental visit, many patients will normally experience some type of tension or fear, with some patients experiencing moderate to severe anxiety. Anxiety in patients undergoing dental treatment, as in most patients undergoing invasive medical procedures, may be due to concerns about the physical discomfort caused by the procedure itself. **Aims:** The aims of this study were to determine if an audio-visual device worn during dental treatment can reduce the anxiety felt by a patient. **Materials and Methods:** A total of 60 patients requiring dental treatment were recruited for this study. Treatment was explained in simple terms. We randomly assigned 60 subjects into one of two groups, audio-visual or control. **Results:** The mean change from pre-operative to post-operative anxiety score for the audio-visual group was 4.07 and the control group was 1.73. This difference was significant ($P < 0.001$). The audio-visual group had a mean familial influence of 3.5 and friends/acquaintances 3.4. The least influential factor in patients' anxiety was the media. **Conclusion:** Both the groups showed a reduction in anxiety over 90 min with the audio-visual group showing a statistically greater reduction than the control group.

Keywords: Anxiety, Audio-visual distraction, Corah dental anxiety scale, Dental treatments.

Introduction

Anxiety is a common reason of many patients for not visiting a dentist. Anxiety can arise as a conditioned response to a previous painful or traumatic experience with a dentist or can result from negative beliefs and perceptions of dental situations rendering patients particularly sensitive to the reception and communication they receive from dental staff and to the outcome of dental treatment.[1] During a dental visit, many patients will normally experience some type of tension or fear, with some patients experiencing moderate-to-severe anxiety. In the United States alone, it has been estimated that approximately 80% of the population has some anxiety about dental treatment and that 5–14% have an extreme degree of dental treatment anxiety.[2] Several studies support the hypothesis that pain or fear of pain is a primary source of this anxiety, as well as being a major obstacle to seeking dental care.[3] Anxious patients feel more pain during injections of local anesthesia and of longer duration than less anxious patients.[4]

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However, it is estimated that many adults undergo one or more dental treatments during their lifetime.[5] Anxiety in patients undergoing dental treatment, as in most patients undergoing invasive medical procedures, may be due to concerns about the physical discomfort caused by the procedure itself. A 1991 study by Wong and Lytle showed that root canal therapy and oral surgery were found to be the most anxiety provoking treatments[6] than compared to other dental treatments.

About 35% of participants in the study stated that they had heard that root canal therapy was the most unpleasant dental procedure, whereas 29% stated oral surgery treatment had the

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worst reputation. However, 53% of patients experiencing oral surgery treatment stated that an oral surgery procedure was the most unpleasant treatment, whereas only 17% of patients experiencing root canal therapy stated the same.

Great advancements have been made in the treatment of dental anxiety, including the use of oral medications, nitrous oxide, and music distraction.[7] Unfortunately, not all therapies are fully effective and not all patients respond equally to all therapies. This study will test a new treatment modality for the reduction of dental treatment anxiety. The aim of the study is to determine if an audio-visual device worn during dental treatment can reduce the pre-treatment anxiety felt by a patient. If successful, this finding could alter the way that anxiety is managed and may allow more people with high anxiety to finally visit a dentist in peace.

Materials and Methods

A total of 60 patients requiring dental treatment were recruited for this study. All work was completed in the various Dental Clinic at Bhavnagar District, Gujarat. Patients should be above the age of 18 and no other systemic disease. Patients have self-reported anxiety about dental treatment. Exclusion criteria were as follows: Patients already taking anti-anxiety or psychotropic medications, patients with any visual or auditory deficits, and patients who could not communicate efficiently due to illiteracy or language barriers.

Patients informed about a research project ongoing in the clinic concerning patients who are anxious about dental treatment. Treatment was explained in simple terms. If after this dialogue the patient agreed to participate in the study, they were enrolled. Patients were scheduled for full half day blocks of time, to ensure adequate time to perform all required treatment and data collection.

All patients underwent a thorough review of their medical history as well as a dental examination. This consisted of any radiographs required, as well as intra- and extraoral examinations. Once the need for dental treatment was confirmed, consent forms to perform a dental treatment and consent to participate in the research project were explained and then signed by the patient. Up on signing the research consent form, the patient was asked to complete a questionnaire administered on a paper.

The administered questionnaire consisted of three parts. The first was the Corah Dental Anxiety Scale.[8] The scale contains four multiple choice items dealing with the patient's subjective reactions about going to the dentist, waiting in the dentist's office for the procedure, and anticipation of drilling and scaling. Points were assigned for the patients' choices, with points ranging from one to five points. Total scores ranged from 4 to 20 with 13 and above regarded as dentally anxious. The second portion of the questionnaire was the dental knowledge questionnaire.[9] This questionnaire consists of 15 questions regarding general dental knowledge, with subscales of teeth and gums, root canal procedures, and fear of dental pain. The last part of the questionnaire given to the patient. This portion of the questionnaire was created by the investigator to identify the influences of patients' anxiety. Patients were asked to consider various influences, such as family, friends/acquaintances, media and previous traumatic dental experiences, and score them independently on a scale from 0 to 10 (0 = no influence, 10 = highly influential).

On completion of the questionnaires, the video eyewear (irusu play VR Headset with Headphone) was placed on the patient during various dental procedures.

Before procedure began, the patient was assigned by a dental assistant, through the use of a randomization sheet, into either an intervention group, in which a patient's own choice of movie was watched and listened by the patient throughout the root canal procedure, or a control group, in which nothing was turned on and the video eyewear remained blank.

Immediately before the start of the procedure, the patient was asked to assign a number to the level of anxiety that they were feeling. The range of anxiety levels given was from 0 to 10, with 0 being no anxiety and 10 being maximum anxiety. The patient then underwent the procedure scheduled. Every 15 min, the patient was asked to reassess their anxiety level and again assign it to a score from 0 to 10. Data were collected for a total of 90 min.

On completion of the treatment, the video eyewear was removed. Modified Corah Dental Anxiety Scale was readministered. The patient was instructed to answer the questionnaire.

A paired *t*-test was used to assess the significance of changes over time in each treatment group, while a two sample *t*-test was used to directly compare differences between the audio-visual and the control groups. A Pearson's correlation was used to determine if there was any correlation between changes in anxiety and dental knowledge. $P < 0.05$ were considered significant.

Results

We randomly assigned 60 subjects into one of two groups, audio-visual or control. In the audio-visual group, 19 subjects were female and 11 were male, while, in the control group, 17 subjects were female and 13 were male.

Mean changes in anxiety between groups

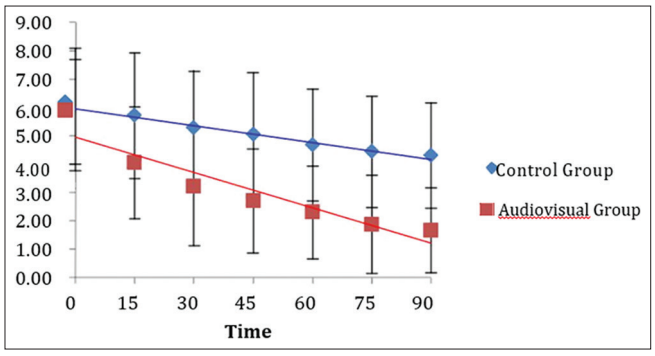
Graph 1 summarizes the mean changes in anxiety between the two treatment groups over 90 min. The mean reported pre-operative anxiety score for the audio-visual group was 5.73 and the control group was 6.03. The difference between these scores was not significant ($P > 0.05$). The mean reported post-operative anxiety score for the audio-visual group was 1.67, while the control group was 4.30. This difference was significant ($P < 0.001$). The mean change from pre-operative to post-operative anxiety score for the audio-visual group was 4.07 and the control group was 1.73. This difference was significant ($P < 0.001$).

Change in dental anxiety based on gender

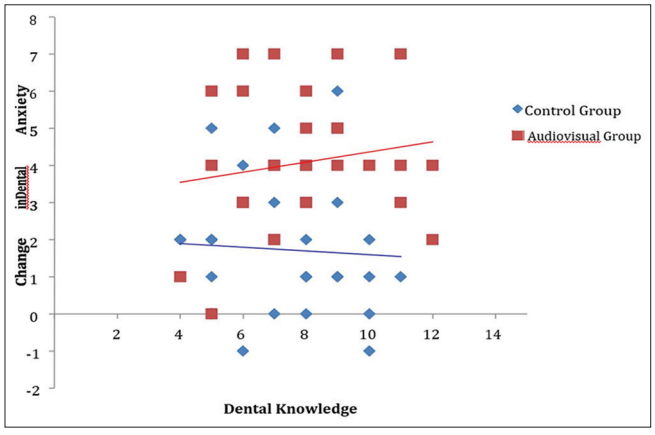
When mean change in dental anxiety was examined based on gender differences, female patents showed an apparent larger decrease in their dental anxiety than male patients. Female patients in the audio-visual group showed a 4.32 point decrease from pre-operative to post-operative dental anxiety score. Male patients in the same group showed a 3.64 point decrease in their dental anxiety. This difference was not significant ($P = 0.32$). Female patients in the control group showed a 2.24 point decrease in their dental anxiety from pre-operative to post-operative. Male patients in the same group showed only a 1.08 point decrease in their dental anxiety. This difference was also not significant ($P = 0.073$).

Correlation between change in anxiety and dental knowledge

When change in dental anxiety was correlated with dental knowledge, as scored from the dental knowledge questionnaire, it was shown that there was an apparent positive correlation for patients in the audio-visual group, while, for the control group, there was an apparent negative to almost no correlation. This meant that patients in the audio-visual group with a higher dental IQ tended to have a greater decrease in their anxiety. The Pearson Correlation Coefficient for the audio-visual group was 0.16 ($P = 0.39$); however, this value was not significant. The Pearson Correlation Coefficient for the control group was 0.06 ($P = 0.74$). This value is not significant. These results are summarized in Graph 2.



Graph 1: Mean change in anxiety over time (with standard deviations)



Graph 2: Correlation of change in anxiety with dental knowledge

Influences of dental anxiety

The largest influence on dental anxiety was patients' previous traumatic dental experiences. Subjects in the audio-visual group marked an average of 6.6 out of 10, while those in the control group marked an average of 6.4.

The patients' family and friends/acquaintances were equally influential in causing patients anxiety. The audio-visual group had a mean familial influence of 3.5 and friends/acquaintances 3.4. The control group had a mean familial influence of 3.9, with friends/acquaintances at 4.0. The least influential factor in patients' anxiety was the media. The audio-visual group marked an average of 2.4 and the control group A.

Discussion

A 1954 study by Shoben and Borland, sought to prove an etiology behind dental fear.[10] Some of the many subjective methods used for measuring dental anxiety include the Corah dental anxiety scale,[5] the visual analog scale.[11,12] Personal video eyewear is a portable video entertainment system that has the potential of providing a relaxed environment during dental treatment. In contrast to traditional audio-visual programs that use a large television monitor above the patient's chair, this system includes a lightweight eyeglass system that has a built in television monitor along with stereo earphones. Patients focus their attention on the relaxation video instead of anxiety inducing dental equipment (syringe, drill, endodontic files, and forceps) or noises. The music in the video coming through the earphones not only shields the drilling noise but also enhances the relaxation felt by the patient. It has been reported previously that such an audio-visual system is beneficial in the reduction of fear and pain for both adults and children undergoing dental prophylaxis and restorative procedures.[13,8]

Although similar studies have been performed, this is, to our knowledge, the first study that tests the use of video eyewear in the reduction dental anxiety on patients undergoing a root canal treatment. In 2008, Lai and colleagues[7] studied the effects of music on state anxiety in patients undergoing root canal therapy. Subjects in the music group listened to selected "sedative" music using headphones throughout the root canal treatment procedure, while patients in the control group wore headphones but without the music.

Prabhakar *et al*. conducted another similar study in 2007. In the study, an audio only device was compared to an audio-visual device in reducing dental anxiety in pediatric patients. Sixty children were divided into three groups of twenty children apiece, with the first group acting as a control. The second group listened to music through the use of headphones, while the third was shown an audio-visual presentation through a television throughout the entire visit. All children had their pulse and oxygen saturation measured throughout the procedure. The results showed that the audio-visual distraction technique was more effective in managing anxious pediatric dental patients as compared to the audio distraction technique and the normal dental setup (control). The results also indicated

that there was a decrease in the oxygen saturation as the pulse rate increased, although not statistically significant. Dental anxiety is a multidimensional complex phenomenon, and no one single.

Variable can exclusively account for its development. There are 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), and the influence of dentally anxious family members or peers which elicit fear in a person (vicarious learning).[14]

Study limitations

It is important to note that the participants in this study self-reported their dental anxiety, with actual scores ranging from mild to severe. All patients were asked to complete a pre-treatment Corah Dental Anxiety Questionnaire, even though there was no specific score that was required to participate in the study. Had we only included patients who scored a 13 or above (indicating moderate anxiety), the study would have been further standardized.

Another caution with respect to the interpretation of this study is that blinding of the subjects was not practicable, which might potentially result in bias. Since patients knew which treatment group that they were a part of, they may have rated their anxiety score with what they believed was correct (i.e., over scoring anxiety reduction for patients in the audio-visual group or under scoring anxiety reduction for patients in the control group) instead of what they actually felt.

Conclusion

- Both the audio-visual and control groups showed a reduction in anxiety over 90 min with the audio-visual group showing a statistically greater reduction than the control group
- Patients stated that previous traumatic dental experiences were the greatest influence in their dental anxiety. Familial influences, friends/acquaintances, and lastly the media followed this
- Additional research involving larger groups is needed to confirm the results of this preliminary study.

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