ORIGINAL ARTICLE

Role of audiovisual aid in reduction of dental anxiety during tooth extraction: a randomized clinical trial

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ABSTRACT

Background and Objective: Dental anxiety has been reported to be the fifth most prevalent reason for anxiety among adults. It is a negative psychological effect of the stress induced, precisely due to dental treatment. This study was conducted to assess the effect of audiovisual aids in reducing dental anxiety during tooth extraction.

Methods: A randomized control trial was conducted recruiting 162 participants requiring tooth extractions and were divided into two groups, each consisting of 81 individuals, through a simple randomization technique using the lottery method. Participants in Group A were given verbal information about the procedure preoperatively, while participants in Group B were shown an audiovisual clip. Preoperative and postoperative anxiety levels were self-reported by the patients on the Visual Analogue Scale from 0 to 10. Data were analyzed using SPSS version 25. Descriptive statistics were calculated for continuous and categorical variables. Nonparametric tests were applied for comparison of anxiety scores within and between the groups.

Results: The mean age of the study participants was 35.6 (SD ± 11.97). Among the 162 participants, 43.8% were females, and 56.2% were males. Higher levels of anxiety among females were observed preoperatively within the groups. The mean score for preoperative anxiety for groups A and B was 6.79 ± 1.3 and 7.02 ± 1.17, respectively. The postoperative anxiety score showed a reduction in both groups with a significant decrease (p-value < 0.05) in Group B (2.33 ± 1.13) as compared to A (4.37 ± 1.35).

Conclusion: Audiovisual aid containing detailed information about the procedure in the native language can serve as an effective tool for reducing dental anxiety among patients undergoing tooth extractions as compared to verbal instructions or counseling.

Keywords: Audiovisual aid, dental anxiety, dental fear, tooth extraction.

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Introduction

Dental anxiety is an emotional state of fear and worry associated with dental procedures.[1] It is a perceived stress associated with dental treatment whereby the stimulus is unknown, vague, or absent. It is known to affect both the child and adult populations. Dental anxiety has been reported to be the fifth most prevalent reason for anxiety among adults.[2] A recent study showed that as much as 31.5% of the studied population suffered from dental anxiety, while another 22.4% were found to have dental phobias.[3]

Anxiety is an emotion that precedes the actual encounter, so it can be experienced even in the absence of the stimulus. Various factors have been attributed to anxiety, including age, gender, traumatic dental treatment, and hearsay of someone else's bad experience.[1] Moreover, the site of blood/injection, the sound of drilling, or the vulnerability associated with resting on a dental chair can also aggravate a patient's anxiety.[4]

An expected ramification of dental anxiety is the avoidance of dental treatment by individuals. This is translated into poor oral health and progressive worsening of the oral health-related quality of life.[1] It has been cited as one of the major factors for missing dental appointments.[5] On the other end, dental anxiety also poses a serious challenge in the provision

of dental care to patients, as treating such patients is stressful on the part of the dentist. The pain threshold of the patients is decreased, and they have a heightened response to any painful stimulus. Confusing the discomfort with pain also adversely affects the treatment outcomes.[6] Therefore, it is imperative to identify such individuals so that the provision of dental treatment can be tailored accordingly.

Various pharmacologic and nonpharmacologic management techniques are employed to alleviate anxiety among dental patients. The nonpharmacologic or psychotherapeutic interventions include strong communication skills, various relaxation techniques, hypnosis, distraction, and so on.[7] Other techniques that are usually employed include breathing exercises, hypnosis, music, and audiovisual aids.[4]

The use of audiovisual aids has been tried as an indispensable tool for the distraction of pediatric patients during dental treatment.[8] It diverts the patients' attention from the fear-provoking instruments, so it can be employed effectively for response modulation in patients with high levels of anxiety and phobia of dental treatment. It has also emerged as an efficacious tool for the provision of anticipatory guidance to patients. It is logical to presume that patients who are well informed about the treatment have better outcomes than those without any prior knowledge. A recent review of the literature found it to be a thriving tool for convincing patients to dental procedures whereby a video containing evidence-based information regarding dental hygiene and care is shown to the patients, and it improved their outlook on dental treatment.[7] The effect of audiovisual resources on the effect of anxiety has been extensively studied for various dental procedures, including administration of local anesthesia, endodontic treatment, and implant surgery.[9-11]

Among the general dental treatments, tooth extraction is commonly associated with the greatest anxiety.[12] The anticipation of the local anesthesia needle, the sight of blood, and the pulling of the tooth out of the jaw pose significant anxiety among the patients. Although audiovisual aid has been extensively studied as a distraction tool among children and adults, the current study employs this as a means of providing the necessary information to the patients regarding this procedure to alleviate their anxiety about the treatment.

Methods

The present study is reported following the consolidated standards of reporting trails guidelines. A randomized clinical trial was conducted in the Oral and Maxillofacial Department of the University College of Dentistry, The University of Lahore, Pakistan, with a parallel group study design. The trial was registered in the Iranian Registry of Clinical Trial (IRCT ID: IRCT20221208056747N1). The study protocol was approved by the Institutional Ethical Review Board. The duration of the study was 4 months (from September to December 2022). Informed, voluntary consent was taken from the participants before recruiting them to the study. Patients aged 17-60 years requiring nonsurgical extractions irrespective of the tooth type and arch, with The American Society of Anesthesiology (ASA) Class 1 or 2 were considered valid and those who could easily comprehend and understand the instructions were included in the study. Exclusion criteria were: physically or mentally compromised patients, patients needing surgical extractions, grade 2 or 3 tooth mobility, and those with a language barrier who could not understand the native Urdu language. A sample size of 162 was computed, (81 in each group) taking the desired level of significance as 0.05, power of 0.8, and the difference in mean anxiety scores before and after intervention as 10.15.[13] The participants were divided into two equal groups of 81 subjects each, using a simple randomization method by employing lottery method ensuring an unbiased distribution and minimizing selection bias. The concealed chits, comprising 81 designated for Group A and 81 for Group B, were placed in a container. Participants were instructed to blindly select a chit from the container, determining their group assignment for the study. Participants in Group A were given verbal information about the procedure preoperatively, while participants in Group B were shown an audiovisual clip of a dental surgeon performing the procedure. A video was recorded in the oral and maxillofacial department of the University College of Dentistry, University of Lahore. The video showed a dentist skillfully performing the tooth extraction on a patient, showcasing the instruments used and providing a comprehensive explanation of the entire process The video was filmed in the native (Urdu) language so the participants could easily comprehend it.

The tooth extractions in the study were performed by two oral and maxillofacial residents who were trained by a consultant regarding all the standards of operating procedure and the study protocol. The anxiety levels were self-reported by the patients on the Visual Analogue Scale (VAS) from 0 to 10, where 0 represented no anxiety and 10 denoted severe anxiety as suggested by Couper et al.[14] To make sure that the patient did not confuse anxiety with pain, it was assessed at two pre-determined points, preoperatively before providing the information and thirty minutes post-operatively.

Statistical analysis

Data were analyzed using SPSS version 25. Means and standard deviations (SDs) were used to report descriptive statistics for continuous variables (age, pre-operative, and post-operative anxiety scores) and frequency with percentages for categorical variables (gender, tooth to be extracted, arch of extraction, extractions per patient). The Shapiro-Wilk test showed an uneven distribution of data for anxiety levels. The comparison

between pre-operative and post-operative mean anxiety scores was analyzed using the Mann-Whitney *U* test. The comparison between the mean anxiety scores of the two groups was carried out using the Wilcoxon Signed-rank test. *p*-value < 0.05 was taken as statistically significant.

Results

Among the 162 participants included in the study, 43.8% (71) were females, and 56.2% (91) were males. The mean age of the study participants was 35.69 ± 11.97. The baseline characteristics of the patients included in the study are given in Table 1. Higher anxiety among the female participants of the study was observed compared with the males with a statistically significant result (*p*-value 0.021).

The mean score for preoperative anxiety for groups A and B was 6.79 ± 1.3 and 7.02 ± 1.17, respectively. The postoperative anxiety score showed a reduction in both groups, with respective values of 4.37 ± 1.35 in group A and 2.33 ± 1.13 in group B. The mean anxiety scores of the study participants and their comparison within the groups are shown in Table 2. A greater reduction in the anxiety scores was observed for Group B compared to A, with a reduction of mean score of 2.42 in Group A and 4.69 in Group B. The Wilcoxon Signed-Rank test showed a statistically significant decrease in the reduction of anxiety scores among the two groups with a *p*-value of < 0.001.

Table 1. *Baseline characteristics of the patients included in the study.*

Characteristics of the participants		Verbal instructions (Group A) n (%)	Audio-visual aid (Group B) n (%)
Gender	Female	34 (42.0%)	37 (45.7%)
	Male	47 (58.0%)	44 (54.3%)
Number of extracted teeth for each patient	Single tooth	67 (82.7%)	72 (88.9%)
	Multiple teeth	14 (17.3%)	9 (11.1%)
Arch of extraction	Maxillary	35 (43.2%)	34 (42.0%)
	Mandibular	37 (45.7%)	42 (51.9%)
	Both	9 (11.1%)	5 (6.2%)
Tooth to be extracted	Central incisor	4 (4.9%)	4 (4.9%)
	Lateral incisor	7 (8.6%)	4 (4.9%)
	Canine	4 (4.9%)	4 (4.9%)
	Premolar	19 (23.5%)	19 (23.5%)
	Molar	39 (48.1%)	47 (58.0%)
	Retained	8 (9.9%)	3 (3%)

Discussion

Dental anxiety is a universally recognized phenomenon. The estimates of the reported prevalence vary considerably depending on the population studied and the parameters used to assess dental anxiety.

Among the common procedures performed by general dentists, extraction is frequently associated with fear and anxiety by the patients. It is presumed as an invasive procedure and provokes anxiety in the patients.[15] For some people, the site of blood triggers an anxious reaction. This could be particularly distressing in a patient with existing dental anxiety. A positive correlation between dental anxiety and postoperative pain and fear has also been reported.[16] Anxiety can significantly alter the pain response in an individual by lowering the pain threshold. This reduces patient compliance and makes it difficult for the dentist to perform the procedure.

It is important to identify and assess the anxiety before starting the procedure as it is a major factor that influences the planning and provision of dental treatment.

Various tools have been developed to assess dental anxiety among patients. The current study employs the VAS, whereby the patients self-reported their level of anxiety toward the procedure. Many studies affirm the validity and reliability of VAS in assessing dental anxiety.[12,17]

In the present study, a higher frequency of preoperative dental anxiety was observed among female patients. This is in agreement with the results of a study conducted by Dadalti et al.[18] who assessed the anxiety levels in 244 individuals divided into 2 groups of 122 males and 122 females seeking dental care at a Brazilian public dental health institution. They employed the Modified Dental Anxiety Scale to measure anxiety among individuals. Their results showed that females had a higher prevalence of dental anxiety, 18% as compared to males (13.1%). This gender difference can be explained based on various emotional and social factors as women are generally more eloquent in expressing their feelings, while men tend to hide their stress and anxiety.[19]

Various methods have been proposed to alleviate dental anxiety among patients. Strong communication with the

Table 2. *Effect of intervention on the pre and postoperative mean anxiety scores within the groups.*

Intervention	Preoperative anxiety score Mean ± SD	Post-operative anxiety score Mean ±SD	*p*-value*
Verbal instructions (Group A)	6.79 ± 1.3	4.37 ± 1.35	0.012
Audio-visual aid (Group B)	7.02 ± 1.17	2.33 ± 1.13	<0.001

*Mann-Whitney *U* test; *p*-value < 0.05 taken as significant.

patient remains the mainstay in addressing the issue. Communicating, instructing, and acknowledging patients' emotions preoperatively reduces anxiety significantly during the procedure.[20,21] It is important to be aware that the amount of information given to the patients and its medium can affect the dental anxiety in the patients, and audiovisual aid can serve as an effective tool for the provision of information to the patients.

In the present study, postoperative dental anxiety was remarkably reduced in the patients from the audiovisual group, which favors its use. A comparative study conducted by Midha et al.[9] in India compared various adjunctive aids to reduce anxiety among pediatric patients during local anesthesia. They found that distraction using the audiovisual aid was one of the most effective means of reducing anxiety and pain during the application of local anesthesia. The results are similar to our study as participants in the audiovisual aid group showed a statistically significant reduction in anxiety. However, unlike our study, this study was conducted on pediatric patients under local anesthesia.

Craveiro and Caldeira[10] employed similar means of anxiety reduction using the audiovisual method. They conducted a randomized clinical trial on 160 adult patients requiring endodontic treatment in which one group of 80 patients was shown a video about the procedure. The anxiety was measured using vital signs as well as self-reporting on the VAS. They obtained results similar to our study whereby a greater reduction in the anxiety scores was observed in the audiovisual group. The dependent variable was assessed using a methodology consistent with our study, specifically employing the VAS; however, they performed endodontic procedures on the patients. This underscores the distinctive nature of our study, as the evaluation of audiovisual aids for anxiety reduction has not been explored in the specific context of adult patients undergoing tooth extraction.

A randomized clinical trial by Choi et al.[22] in 2015 on 51 patients requiring surgical removal of impacted wisdom teeth divided the study participants into two groups, one received verbal information regarding the procedure and the other group received information via audiovisual aid. The authors concluded that the patients who were instructed via audiovisual aid had significantly lowerself-reported anxiety scores (p-value < 0.05) and retained the knowledge better than those who were given the information verbally. The results are in corroboration with our results as participants in the audiovisual aid group showed comparatively higher reduction in anxiety scores.

It is worth mentioning here that the results cannot be generalized for all dental procedures as a study conducted by Alonso et al.[11] found that patients who were informed via audiovisual aid 72.53% (n = 150) regarding implant placement had a heightened level of anxiety as compared to the group who were given verbal information [52.13% (n = 150)]. This is probably because of the patient's lack of knowledge regarding the procedure as they perceive it to be simple but showing the actual video augments their anxiety.

Information provided by audiovisual means is better absorbed and processed by the mind, and it enhances the information gained by the individual.[23] Many studies in the literature found that the use of customized audiovisual aids is more effective in the reduction of dental anxiety in comparison to the traditional verbal and written modes.[24-26]

The audio and the visual cues have a remarkable effect on the patient's perception.[27] Patients often have little or no knowledge about dental treatment and usually have some preconceived myths and misconceptions.[28] This can be effectively addressed before the procedure by offering an audiovisual-based explanation of the procedure to ensure the good quality of care provided to the patients. In addition, the audiovisual aid can help attenuate the possible language barrier between the doctors and the patients as it facilitates the understanding of the procedure. The audio component can be translated into different native languages to cater to the needs of the audience. This understanding is augmented by the use of the video clip. Future research could enhance the current findings by employing more rigorous methodologies, such as larger sample sizes, diverse demographic representations, and different types of audiovisual aids. Furthermore, incorporating objective physiological measures alongside self-reported anxiety assessments provides a comprehensive understanding of the efficacy of the interventions as well.

Conclusion

The use of customized audiovisual aids is a relatively simple and effective tool in reducing dental anxiety levels in patients undergoing tooth extraction as compared to verbal instructions or counseling by the treating dental surgeon.

Limitations of the Study

It is a single-center study with a limited sample size. The study enrolled participants with varying levels of preoperative anxiety. Subsequent research could consider specifically recruiting individuals with moderate to high anxiety levels to assess the relevance of the findings to patients experiencing elevated anxiety. The reliance on self-reported anxiety measures also introduces the potential for response bias. Incorporating objective measures or physiological biomarkers could enhance the validity of anxiety evaluations. Moreover, individual variances in the duration and complexity of the extractions, with certain cases requiring more time

and expertise than others, could potentially contribute to variations in post-operative anxiety levels.

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List of Abbreviations

VAS Visual Analogue Scale

Conflict of interest

None to declare

Grant support and financial disclosure

None to disclose.

Ethical approval

The study protocol was approved by the Institutional Ethical Review Board of the University College of Dentistry, Lahore, Pakistan, vide reference no: UCD/ERCA/12468, dated: June 10, 2022.

Authors' contributions

IJ: Concept and design of study, critical intellectual input.

PB, UQ: Analysis of data, drafting of manuscript.

SA, TS, TFT: Acquisition of data, revising the article with critical intellectual input.

ALL AUTHORS: Approval of the final version of the manuscript to be published.

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