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Dental Anxiety Levels and Implementing Anxiety-Reduction Techniques in Pre-and Post-Operative Dental Patients

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ABSTRACT

Background

Dental anxiety significantly impacts patient comfort and treatment outcomes in dental practice. Evaluating pre-operative anxiety-reduction interventions among adult dental patients undergoing routine procedures is crucial. This study aims to explore effective strategies to alleviate dental anxiety, potentially revolutionizing its management and enhancing patient comfort.

Methods

Seventy adult participants undergoing routine dental procedures were included. Demographics were recorded, and pre-operative dental anxiety levels were assessed using the Index of Dental Anxiety and Fear (IDAF-4C+). Participants received two anxiety-reduction techniques during procedures, and anxiety was reassessed post-operatively.

Results

Significant reductions in anxiety scores were observed post-intervention. Female participants' anxiety decreased from 2.5 ± 0.76 to 1.56 ± 0.46, and male participants' anxiety decreased from 1.70 ± 0.57 to 1.13 ± 0.17. Both low education (2.22 ± 0.77 to 1.40 ± 0.43) and high education groups (1.64 ± 0.70 to 1.14 ± 0.19) exhibited decreased anxiety. Both intervention techniques, rest and breaks (2.01 ± 0.78 to 1.31 ± 0.36) and distraction (2.27 ± 0.77 to 1.42 ± 0.46) were effective.

Conclusions

This study demonstrates that pre-operative anxiety-reduction interventions effectively reduce dental anxiety in routine procedures. Both rest and breaks and distraction techniques significantly lowered anxiety levels across participant demographics, suggesting potential benefits for patient comfort and dental care outcomes.

Keywords: anxiety management techniques; dental anxiety; IDAF 4C+.

INTRODUCTION

Dental anxiety, characterized by fear preceding dental procedures, encompasses physical and emotional reactions to perceived threats such as pain and lengthy treatments.[1,2] Influential factors include age, gender, prior dental experiences, and social support.[3] Studies suggest that a substantial percentage of adults experience dental anxiety, leading to avoidance of dental care.[4,5] Effective management strategies are crucial in routine dental practice to mitigate anxiety and improve patient attendance.[6] Chairside anxiety management techniques are useful in reducing anxiety among patients as reported in previous studies. Effectiveness of methods such as distraction techniques and relaxation methods, in managing dental anxiety among adult patients are simple and effective. 6 This study evaluates the effectiveness of anxiety-reducing interventions in adult dental patients, aiming to redefine dental anxiety management and enhance patient comfort.[7] It also seeks to investigate how age, gender,

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previous dental experiences, and education influence anxiety levels, with the overarching goal of developing simple management strategies to enhance patient comfort and improve overall dental care experience.

METHODS

An analytical cross sectional study was conducted in the Department of Community & Public Health Dentistry, Kathmandu University School of Medical Sciences, Dhulikhe, Nepal from June- July 2024. Ethical approval was obtained from the Institutional Review Committee, KUSMS (Ref No. 169/24). Sample size was calculated based on the formula of mean difference.

$n_{1=}(\sigma_1^2+\sigma_2^2/K)(Z_{1-\alpha/2}+Z_{1-\beta/2})^2/\Delta^2$

$n_2=(K \times \sigma_1^2+\sigma_2^2)(Z_{1-\alpha/2}+Z_{1-\beta/2})^2/\Delta^2$

The notation for the formulae are:

n_1 = sample size of Group 1

n_2 = sample size of Group 2

σ_1 = standard deviation of Group 1

σ_2= standard deviation of Group 2

Δ = difference in group means

κ = ratio = n_2/n_1

$Z_{1-\alpha/2}$ = two-sided Z value (eg. Z=1.96 for 95% confidence interval).

$Z_{1-\beta}$ = Power (0.84 at 80% power)

Mean ± SD, group 1-2.54 ± 1.16, Group 2: 1.79 ± 0.9. Mean difference of anxiety levels of patients undergoing different dental procedures as reported by Kandel et al.[7] Ratio of sample size set at 1:1. Minimum sample size obtained: 31 per group but this study was conducted among 35 per group.So, the final sample size was 70. Written consent was obtained from patients before starting the study. The study enrolled adult participants undergoing routine dental procedures at Dhulikhel Hospital. Adult patients who could read and understand English were included in the study. Patients with any psychiatric disorders, on anti-anxiety medications were excluded from the study. Patient demographics and history of previous dental history if present was recorded. Education till class 10 was considered low and above was considered high. Prior to treatment, participants completed a pre-operative questionnaire to assess baseline dental anxiety levels using the IDAF-4C+ scale. This scale consists of four components of anxiety (emotional, behavioural, physiological, cognitive). It consists of three modules, core module, phobia module and stimulus module. Item responses are on a 5 point Likert scale ranging from Disagree (1) to strongly agree (5). Higher scores indicate higher dental anxiety. Relaxed Dental phobia is defined as a mean score ≥3 in the anxiety module. Affirmative answers to items 2a and 2b in the phobia section and negative answers to items 2d and 2e. The stimulus module IDAF-S consists of ten items which explores the causes of dental anxiety. It is scored on a five point Likert scale.[8] Chair side reduction of dental anxiety will help increase productivity and also motivate patients to visit the dentist more often. Non pharmacological anxiety reduction strategies such as distraction, positive reinforcement, control, systematic desensitization, rests and breaks and shortening the length of the appointment have been routinely used in dental offices.[6] Rest and breaks and distraction were used in this study among participants. In rest and breaks technique patients were given uniform breaks mid appointment and procedure was restarted upon approval by the patients. In distraction there was music played in the background during dental procedure. During procedures, participants were randomly assigned to receive one of two anxiety-reduction interventions: rest and breaks or distraction techniques. Post-operatively, anxiety levels were reassessed using the same questionnaire to evaluate the effectiveness of the interventions. Data was entered and anslyzed by using SPSS-20. Descriptive statistics were used to depict frequency distributions, Paired t-test was used to compare pre and post anxiety scores and Pearson's correlation test was used to test relation and strength between anxiety scores. p-value <0.05 was considered as statistically significant.

RESULTS

The study enrolled 70 participants, evenly split into two groups: 35 (50%) for each anxiety reduction technique. Participants included 33 (47.1%) males and 37 (52.9%) females. A majority, 58 (82.9%), had a low education level, while 12 (17.1%) had high education levels. Regarding dental history, 53 (75.7%) participants had no prior dental visits,

and 17 (24.3%) had visited a dentist before. Dental procedures included restoration (18, 25.7%), scaling (33, 47.1%), and dental extractions (19, 27.1%). According to relaxed dental phobia criteria, 6 (8.6%) participants reported dental phobia (Table 1).

Table 1. Description of socio demographic variables.

Variable	Frequency (%)
Sex	
Male	33 (47.1%)
Female	37 (52.9%)
Education	
Low	58 (82.9%)
High	12 (17.1%)
Previous Dental Visit	
Present	17 (24.3%)
Absent	53 (75.7%)
Type of dental treatment	
Restoration	18 (25.7%)
Scaling	33 (47.1%)
Extraction	19 (27.1%)
Dental Phobia	
Present	64 (91.4%)
Absent	6 (8.6%)

Before applying anxiety reduction techniques, females exhibited higher pre-intervention anxiety scores (2.5 ± 0.76) compared to males (1.70 ± 0.57). Participants with low education levels showed higher anxiety scores (2.22 ± 0.77) compared to those with higher educational status (1.64 ± 0.70). Those without previous dental visits reported higher anxiety scores (2.37 ± 0.72) than those with previous visits (1.33 ± 0.25).

Two anxiety reduction techniques were evaluated: rest and breaks and distraction. The pre- and post-intervention anxiety scores were compared between different demographic parameters. For females, the initial anxiety score was 2.5 ± 0.76, which decreased to 1.56 ± 0.46 after intervention. In comparison, males started with an average score of 1.70 ± 0.57, which reduced to 1.13 ± 0.17 post-intervention, indicating a less pronounced decrease compared to females. Among participants with low education levels, the initial anxiety score was 2.22 ± 0.77, reducing to 1.40 ± 0.43 after intervention. Similarly, those with higher education began at 1.64 ± 0.70 and decreased to 1.14 ± 0.19. Notably, individuals without previous dental visits had higher initial anxiety scores of 2.37 ± 0.72, which significantly reduced to 1.45 ± 0.43 post-intervention (P<0.001). Conversely, those with previous dental visits started lower at 1.33 ± 0.25 and showed a decrease to 1.05 ± 0.11. Both rest and breaks (pre: 2.01 ± 0.78; post: 1.31 ± 0.36) and distraction (pre: 2.27 ± 0.77; post: 1.42 ± 0.46) techniques were effective in reducing anxiety levels, with statistically significant differences observed ($p < 0.05$) (Table 2).

Table 2. Pre- and post-intervention anxiety scores across different demographic groups.

Variables	Pre Mean ± SD	Post Mean ± SD	p-value
Anxiety Scores			
Overall Anxiety	2.12 ± 0.78	1.35 ± 0.41	<0.001*
Gender			
Male	1.70 ± 0.57	1.13 ± 0.17	<0.01*
Female	2.50 ± 0.76	1.56 ± 0.46	<0.001*
Previous Dental Visit			
Present	1.33 ± 0.25	1.05 ± 0.11	<0.001*
Absent	2.37 ± 0.72	1.45 ± 0.43	<0.001*
Education levels			
Low	2.22 ± 0.77	1.40 ± 0.43	<0.001*
High	1.64 ± 0.70	1.14 ± 0.19	<0.009*
Type of anxiety reduction technique			
Rest and Breaks	2.01 ± 0.78	1.31 ± 0.36	<0.001*
Distraction	2.27 ± 0.77	1.42 ± 0.46	<0.001*

Correlation analysis showed a strong positive correlation ($r = 0.785$, $p < 0.05$) between pre- and post-intervention anxiety scores, indicating that the application of anxiety reduction techniques led to consistent reductions in anxiety levels across participants (Table 3).

Table 3. Correlation Between Pre- and Post-Intervention Anxiety Scores.

Pearson's correlation	Anxiety Post Score
Anxiety Pre score	0.785
p-value	<0.001*

In the analysis of anxiety triggers using the stimulus module of IDAF-4C+ scale, several key triggers were identified among participants. The most significant sources of anxiety included painful or uncomfortable procedures, with a mean score of 3.39 ± 1.12, followed by needles or injections at 2.64 ± 0.66, and the cost of dental treatment at 2.70 ± 0.68. These triggers consistently elicited higher anxiety responses among the participants. Conversely, the triggers associated

with the least anxiety were feeling sick, queasy, or disgusted, with a mean score of 1.83 ± 0.70, and gagging or choking at 1.80 ± 0.75. These findings underscore the variability in anxiety responses to different aspects of dental care, highlighting the importance of targeted anxiety management strategies tailored to specific triggers (Table 4).

Table 4. Scores for anxiety triggers using the stimulus module of IDAF-4C+ scale.

To what extent are you anxious about the following things when you go to the dentist	Mean ± SD
Painful or uncomfortable Procedures	3.39 ± 1.12
Feeling embarrassed or ashamed	2.49 ± 0.89
Not being in control of what is happening	2.24 ± 0.75
Feeling sick, queasy or disgusted	1.83 ± 0.70
Numbness caused by anesthetic	1.99 ± 0.73
Not knowing what the dentist is going to do	2.27 ± 0.70
The cost of dental treatment	2.70 ± 0.68
Needles or Injections	2.64 ± 0.66
Gagging or choking	1.80 ± 0.75
Having an unsympathetic or unkind dentist	2.10 ± 0.80

DISCUSSION

Dental anxiety is a pervasive apprehension associated with dental treatment, affecting individuals across various demographics.[9] This issue impacts both dentists and patients alike, despite the introduction of numerous anxiety reduction methods. Our study investigated several demographic variables and their correlation with dental anxiety. We found that females (2.5 ± 0.76) exhibited higher dental anxiety compared to males (1.70 ± 0.57), consistent with findings by Ibrahim et al.,[10] Bashiru et al.,[11] and Gatchel et al.[12] This disparity may be influenced by gender roles that lead females to acknowledge anxiety more readily and exhibit lower pain tolerance.[13] Additionally, research indicates that females tend to vividly recall painful experiences, which could contribute to these findings.[14] Participants who had not previously visited a dentist reported higher dental anxiety scores. Similar observations were made by Klepac et al.,[15] Armfield et al.,[16] Svensson et al.,[10] and Berggren et al.[17] Infrequent dental visits often result in deteriorating oral health, prompting patients to seek treatment only during emergencies-a cycle exacerbated by dental fear.[18] Education level also played a significant role, with lower education levels (2.22 ± 0.77) experiencing higher dental anxiety compared to those with higher education (1.64 ± 0.70). This phenomenon, linked to fear of the unknown,[19] suggests that education can act as a protective factor against anxiety.[20] Conversely, several studies have reported higher dental anxiety among individuals with higher education levels,[21-23] possibly due to heightened awareness of treatment modalities that increase fear rather than alleviate concerns. This trend can be attributed to greater awareness of the treatment modalities that end up instilling more fear in the respondents, rather than alleviating their concerns. This result may be due to other reasons, such as fear of cross infection.[24] Before implementing anxiety management techniques, the study assessed the prevalence of dental phobia, reporting a prevalence of 8.6%. This aligns with findings by Bashiru et al. (8.7%),[11] Arigbede et al. (7%),[25] and Udoye et al. (7.5%).[26] Higher prevalence rates reported in Australia (15%), Norway, and Ireland (17%) may be attributed to racial differences, as suggested by Weisenberg et al.[27]

Anxiety management techniques were employed, focusing on both pharmacological and non-pharmacological methods.[23] Chairside techniques such as rest and breaks, and distraction techniques showed significant reduction in anxiety post-treatment, underscoring their practicality and effectiveness in routine dental practice. These findings highlight the importance of non-pharmacological strategies in anxiety reduction, urging dental practitioners to incorporate and refine these techniques. Lengthy appointments without breaks have been shown to negatively impact masticatory muscles and the temporomandibular joint,[28] supporting the use of structured anxiety-reduction approaches for enhanced patient comfort and compliance. The study explored potential anxiety triggers through stimulus evaluation, identifying pain, needles, lack of control, and cost as primary concerns, consistent with findings by Svenson et al.[10] and Tolvanen et al.[29] The behavior of the dentist, including perceived kindness, also emerged as a significant trigger, as also reported by Carrillo Diaz et al.[30] While our study provides

valuable insights, it is not without limitations. Potential information bias among participants and the study's restriction to a tertiary healthcare center may limit generalizability to the broader population of Nepal.

CONCLUSIONS

This study underscores the effectiveness of pre-operative anxiety reduction techniques in alleviating dental anxiety among patients undergoing routine dental procedures. The findings reveal significant reductions in anxiety levels post-intervention, with both rest and breaks and distraction techniques proving effective across diverse demographic groups. Females and individuals with lower educational backgrounds initially exhibited higher anxiety levels, highlighting the importance of tailored interventions. Importantly, participants with previous dental visits showed lower anxiety levels, suggesting potential benefits of prior exposure to dental settings. The strong positive correlation between pre- and post-intervention anxiety scores underscores the robustness of the anxiety reduction techniques employed. These results contribute valuable insights into optimizing patient comfort and satisfaction during dental care, emphasizing the role of personalized anxiety management strategies in enhancing overall dental experiences.

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REFERENCES

1. Stenebrand A, Wide Boman U, Hakeberg M. Dental anxiety and symptoms of general anxiety and depression in 15-year-olds. Int J Dent Hyg. 2013;11(2):99-104. [PubMed]
2. White AM, Giblin L, Boyd LD. The Prevalence of Dental Anxiety in Dental Practice Settings. J Dent Hyg. 2017 Feb;91(1):30-34. [PubMed]
3. Muglali M, Komerik N. Factors related to patients' anxiety before and after oral surgery. J Oral Maxillofac Surg. 2008 May;66(5):870-7. [PubMed]
4. Kamin V. Fear, stress, and the well dental office. Northwest Dent. 2006;85(2):10-1,13,15-8. [PubMed]
5. Nascimento M, Murielly T, Assis P, Maciel C, Colares V. How to evaluate adolescents' dental anxiety? A review of instruments. Arch Health Invest (2019) 8(9):522-528. [DOI][Link]
6. Sivaramakrishnan G, Makki H, AlDallal S, Alaswad Z, Sultan E, Ahmed S, AlBanna H, Alsobaiei M, AlSalihi L. The variables associated with dental anxiety and their management in primary care dental clinics in Bahrain: a cross-sectional study. BMC Oral Health. 2022 Apr 21;22(1):137. [PubMed]
7. Kandel S, Shrestha R, Shrestha R. Evaluation of anxiety levels in patients undergoing oral surgical procedures. J Nepal Dent Assoc. 2021 Jan-Jun;21(32):14-8. [Link]
8. Armfield JM. Development and psychometric evaluation of the Index of Dental Anxiety and Fear (IDAF-4C+). Psychol Assess. 2010; 22:279–287. [PubMed]
9. Appukuttan DP. Strategies to manage patients with dental anxiety and dental phobia: Literature review. Clin Cosmet Investig Dent. 2016; 8:35. [PubMed]
10. Svensson L, Hakeberg M, Wide U. Evaluating the validity of the Index of Dental Anxiety and Fear (IDAF-4C+) in adults with severe dental anxiety. Eur J Oral Sci. 2020; 128:423–428. [PubMed]
11. Bashiru BO, Omotola OE. Prevalence and determinants of dental anxiety among adult population in Benin City, Nigeria. Eur J Gen Dent. 2016; 5:99-103. [Link]
12. Gatchel RJ, Ingersoll BD, Bowman L, Robertson MC, Walker C. The prevalence of dental fear and avoidance: A recent survey study. J Am Dent Assoc. 1983; 107:609-10. [PubMed]
13. Pierce KA, Kirkpatrick DR. Do men lie on fear surveys? Behav Res Ther. 1992; 30:415–8. [PubMed]
14. Settineri S, Tati F, Fanara G. Gender differences in dental anxiety: Is the chair position important? J Contemp Dent Pract. 2005; 6:115–22. [PubMed]
15. Klepac RK, Dowling J, Hauge G. Characteristics of clients seeking therapy for the reduction of

dental avoidance: reactions to pain. J Behav Ther Exp Psychiatry. 1982; 13:293–300. [PubMed]

16. Armfield JM, Stewart JF, Spencer AJ. The vicious cycle of dental fear: exploring the interplay between oral health, service utilization and dental fear. BMC Oral Health. 2007; 7:1. [PubMed]
17. Berggren U, Meynert G. Dental fear and avoidance: causes, symptoms, and consequences. J Am Dent Assoc. 1984; 109:247–251. [PubMed]
18. Locker D. Psychosocial consequences of dental fear and anxiety. Community Dent Oral Epidemiol. 2003; 31:144–151. [PubMed]
19. Appukuttan DP, Subramanian S, Tadepalli A, Damodaran LK. Dental anxiety among adults: An epidemiological study in South India. N Am J Med Sci. 2015; 7:13–18. [PubMed]
20. López-Jornet P, Camacho-Alonso F, Sanchez-Siles M. Assessment of general pre and postoperative anxiety in patients undergoing tooth extraction: A prospective study. Br J Oral Maxillofac Surg. 2014; 52:18–23. [PubMed]
21. De Jongh A, Olff M, Hoolwerff HV, Aartman IH, Broekman B, Lindauer R, Boer F. Anxiety and post-traumatic stress symptoms following wisdom tooth removal. Behav Res Ther. 2008; 46:1305–1310. [PubMed]
22. Vassend O. Anxiety, pain, and discomfort associated with dental treatment. Behav Res Ther. 1993; 31:659–666. [PubMed]
23. De Stefano R, Bruno A, Muscatello MR, Cedro C, Cervino G, Fiorillo L. Fear and anxiety managing methods during dental treatments: a systematic review of recent data. Minerva Stomatol. 2019; 68:317–31. [PubMed]
24. Nair AM, Shankarapillai R, Chouhan V. The dental anxiety levels associated with surgical extraction of tooth. Int J Dent Clin. 2009; 1:20–23. [Link]
25. Arigbede AO, Ajayi DM, Adeyemo BF, Kolude B. Dental anxiety among patients visiting University Dental Center. Niger Dent J. 2011; 19:20-4. [Link]
26. Udoye CI, Oginni AO, Oginni FO. Dental anxiety among patients undergoing various dental treatments in a Nigerian teaching hospital. J Contemp Dent Pract. 2005; 6:91-8. [PubMed]
27. Weisenberg M, Kreindler ML, Schachat R, Werboff J. Pain: Anxiety and attitudes in Black, white and Puerto Rican patients. Psychosom Med. 1975; 37:123-35. [PubMed]
28. Sahebi S, Moazami F, Afsa M, Nabavi Zade MR. Effect of lengthy root canal therapy sessions on temporomandibular joint and masticatory muscles. J Dent Res Dent Clin Dent Prospects. 2010; 4:95. [PubMed]
29. Tolvanen M, Puijola K, Armfield JM, Lahti S. Translation and validation of the Finnish version of index of dental anxiety and fear (IDAF-4C(+)) among dental students. BMC Oral Health. 2017; 17:85. [PMC]
30. Carrillo-Diaz M, Crego A, Armfield JM, Romero M. Adaptation and psychometric properties of the Spanish version of the Index of Dental Anxiety and Fear (IDAF-4C+). Oral Health Prev Dent. 2012; 10:327–337. [PubMed]

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