

A Survey to assess the Fear and Anxiety of Patients prior to Prosthodontic Treatment

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ABSTRACT

Aim: The aim of this study was to assess the degree of dental fear and anxiety experienced by a patient prior to prosthodontic treatment, to establish a comfortable patient–dentist relationship, which would help in framing a better treatment plan, evaluate the major cause of avoidance of dental treatment, and assist the dentist in management of anxious patient.

Materials and methods: This cross-sectional questionnaire-based study was conducted among 379 patients to determine the dental fear and anxiety experienced by a patient prior to prosthodontics treatment. Dental fear was assessed with the help of visual analog scale (VAS). Dental anxiety was assessed with the help of modified dental anxiety scale (MDAS). A questionnaire was handed over to the patient to get their personal details and to assess the degree of dental fear and anxiety experienced by patient and the purpose of study was explained to each and every participant.

Results: According to chi-square test, Kruskal–Wallis analysis of variance (ANOVA) test, and Mann–Whitney U test, females are more fearful than males. According to statistical analysis, mean fear among the study participants was 24.27 and anxiety was 10.02. Among the different age groups, mean anxiety was highest in age group 18 to 27, which was 10.36 and lowest in 58+ age group, which was 7.44. According to Mann–Whitney U test, females are more afraid to visit the dental clinic where mean value is 2.18.

Conclusion: Based on the results, it can be concluded that anxiety is higher in females compared with males and according to age, the most anxious age group is young age, i.e., 18 to 27. Females were more prone to cancel their appointment, and also get more fearful and anxious by seeing the instruments.

Clinical significance: It helps in the management of fearful and anxious patient.

Keywords: Anxiety, Assess, Fear, Visual analog scale.

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INTRODUCTION

Fear and anxiety experienced by patients for dental treatment are worldwide.¹ Dental fear and dental anxiety are a barrier toward dental treatment because of which there is negligence toward dental treatment. Fear is defined as a feeling of alarm or disquiet caused by expectation of danger, pain, disaster, or the like. Fear and anxiety toward the dentist are ranked as 4th among common fears.² Dental anxious patients take longer time for treatment and often fail to keep their appointment. Anxiety is an unpleasant emotion and may cause the patient to avoid a planned treatment plan, it may adversely influence anesthetic induction, and decrease patient satisfaction, preoperative and posttreatment experience.³ Dental fear and anxiety have been repeatedly identified as important factors in delay and avoidance of dental care.⁴ Shrivastava et al⁵ have done a study on dental anxiety and its correlation with denture satisfaction in edentulous patients and they concluded that in their anxiety score, females were more as compared with males. El Faki et al¹ have done a study on dental anxiety prevalence and associated factors among patients attending the academy dental teaching hospital Khartoum, Sudan, and they concluded that females were more likely to develop dental anxiety. No such study relating to the fear and anxiety of patients prior to prosthodontic treatment has been conducted in this population; hence, this survey was conducted to find out fear and anxiety of patients prior to prosthodontic treatment. Having a look at patient's dental anxiety and dental fear prior to prosthodontics treatment may help the prosthodontist to manage patient before treatment and reduce the chair-side time. A questionnaire-based study was designed and carried out in the prosthodontics set-up at the Department of Prosthodontics, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed University (KIMSUDU), Karad, Maharashtra, India. The content, ease of use, and measurement properties of the questionnaire are presented and compared in order to assist both clinicians and researchers.⁶

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MATERIALS AND METHODS

A cross-sectional survey on dental fear and anxiety experienced by patients prior to prosthodontic treatment was conducted among the patients visiting the outpatient department (OPD) of Department of Prosthodontics for a period of 3 months from January 2017 to March 2017 at KIMSUDU, Karad, Maharashtra, India. Ethical approval for carrying out the present study was obtained from the Research Ethics Committee of Krishna Institute of Medical and Dental Sciences, Karad, Maharashtra, India. A convenient sampling technique was applied and the sample size for the study was drawn as 379. Mentally disabled and individuals below the age of 18 were excluded from the study and consenting participants intending to undergo prosthodontics treatment were included for the study. The purpose of the study was explained to each and every participant in their mother tongue. Eight experts from the field of prosthodontics and psychology were approached to review this questionnaire for its face validity and content validity. The questionnaires were translated into the local language and back-translated to English by a bilingual expert and validated. There are various scales for fear and anxiety like Corah's Dental Anxiety Scale,⁵ Dental Fear Scale,⁷ Dental Anxiety Scale,⁸ MDAS,⁵ and VAS.⁹ The questionnaire consists of three sections in which the first section is composed of demographic details of participants. Section 2 questionnaire is based on dental fear (Appendix 1) which is recorded with the help of VAS for fear. Visual analog scales have been provided to be satisfactory in measurement of pain.⁹ Section 3 consists of questionnaire which is based on dental anxiety (Appendix 2), which is recorded with the help of MDAS. Modified dental anxiety scale is the most acceptable among the other scales and thus, high reliability and validity of the MDAS support its cross-cultural validity and indicate that it may be a valuable tool in quantifying fear of dentistry (Fig. 1).¹⁰

RESULTS

Anxiety plays a major role as a barrier toward dental treatment. There are distinct factors including age, gender, type of dental/prosthodontics treatment, the psychological impact, and specific patient characteristics which may modulate the prosthodontic treatment and/or treatment outcome.¹¹ Hence, this survey was conducted to know the degree of dental anxiety and fear experienced by patient prior to prosthodontics treatment.

The total study population was 379. The number of male participants was 192 (N), 50.66%, and the number of female participants was 187 (N), 49.34%, as shown in Table 1 and Graph 1.

Appendix 1

Title:

Name: Age:

Gender:

OPD no:

ID no:

Socioeconomic status:

Questionnaire

Appendix 1

Anxiety

- (1) How do you feel before coming to a dental clinic?
 - (i) Not at all anxious
 - (ii) Little anxious
 - (iii) Fair amount
 - (iv) Very much
 - (v) Extreme
- (2) Before your turn to a dental chair how do you feel?
 - (i) Relaxed
 - (ii) Little uneasy
 - (iii) Tensed
 - (iv) Anxious
 - (v) So anxious that sometimes I break into sweat
- (3) Before starting the treatment and seeing an instrument or drill, how do you feel?
 - (i) Relaxed
 - (ii) Little uneasy
 - (iii) Tensed
 - (iv) Anxious
 - (v) So anxious that sometimes I break into sweat
- (4) Do you feel anxious to talk to a dental receptionist?
 - (i) Not at all anxious
 - (ii) Little anxious
 - (iii) Fair amount
 - (iv) Very much
 - (v) Extreme
- (5) Do you feel anxious by seeing a needle or anesthesia?
 - (i) Not at all anxious
 - (ii) Little anxious
 - (iii) Fair amount
 - (iv) Very much
 - (v) Extreme

Appendix 2

Fear:

- (1) Do you feel fear to turn to a dental office?
- (2) Thinking about prosthodontics treatment, muscle become tense.
- (3) Thinking of prosthodontics treatment, breathing rate increases.
- (4) Do you feel nausea or sick before coming to a dental clinic?
- (5) Do you feel fear before making a dental appointment?
- (6) Do you feel fear while sitting in waiting area?
- (7) Do you feel fear by the smell of dental office?
- (8) Do you feel fear by seeing mouth mirror and probe?
- (9) How fearful you feel of thinking about having a dental treatment?

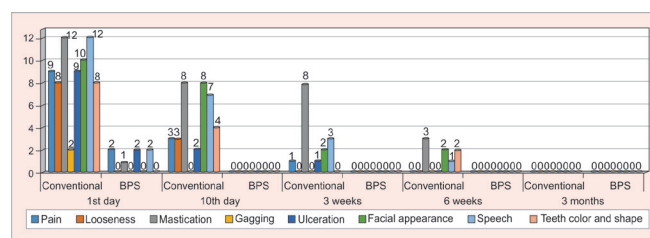
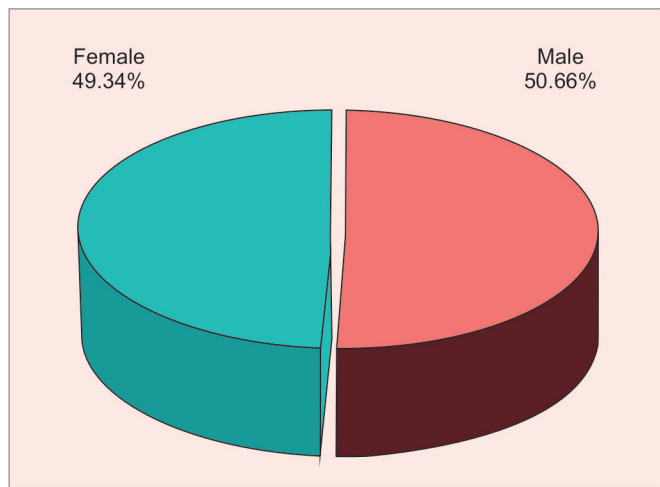


Fig. 1: Visual analog scale

Table 1: Gender-wise distribution

Gender	No	Percent
Male	192	50.66
Female	187	49.34
Total	379	100.00



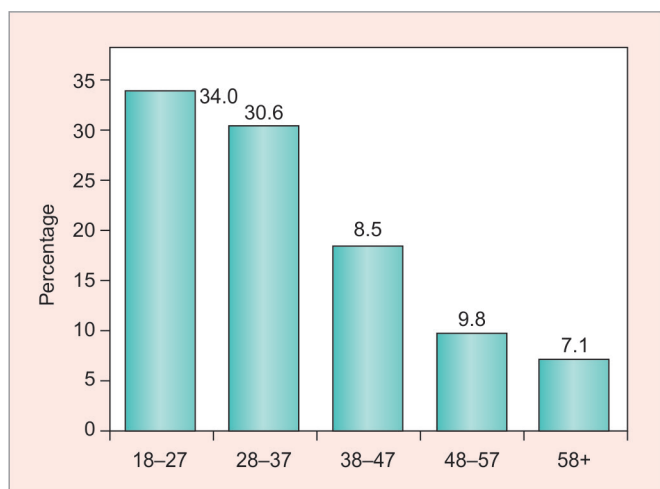
Graph 1: Gender-wise distribution

The total study participants were divided into five groups according to age. Group I consisted of participants aged between 18 and 27 years (129N) (34%) and group II

Table 2: Age group-wise distribution

Age groups	No	Percent
18–27	129	34.00
28–37	116	30.60
38–47	70	18.50
48–57	37	9.80
58+	27	7.10
Total	379	100.00
Mean	34.83	
SD	12.21	

SD: Standard deviation



Graph 2: Graphical representation of age-wise distribution of patients

consisted of participants aged between 28 and 37 years (116N) (30.60%). In group III, participants belonged to the age group between 38 and 47 years in which there were 70 participants (18.50%). Group IV consisted of participants between 48 and 57 years age group, and there were 37 participants (9.80%). Group V consisted of age group 58+ years and there were 27 participants (7.10%), which is shown in Table 2 and Graph 2. The mean age of the participants was 34.83 years.

Gender comparison of male and female with mean fear and mean anxiety scores by t-test describes that there was statistically significant difference between fear and anxiety for males and females ($p < 0.05$) with p-value for fear 0.0112, and p-value for anxiety was 0.0013, as shown in Table 3 and Graph 3.

One-way ANOVA showed that there was a statistically significant ($p = 0.0001$) difference between age groups and mean anxiety scores as described in Table 4.

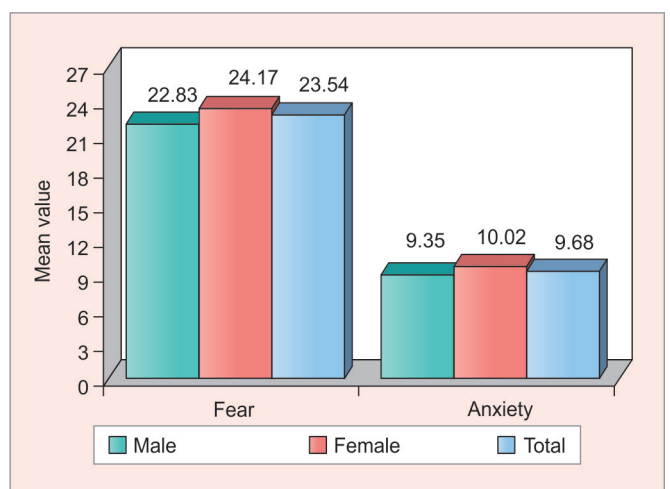
There was statistically significant ($p = 0.0001$) correlation between fear and anxiety scores by Karl Pearson’s coefficient method where r value is 0.2973, which is described in Table 5 and Graph 4.

Mann–Whitney U test was done to compare the response of males and females for each question of fear

Table 3: Comparison of male and female with mean fear and anxiety scores by t-test

Gender	Fear		Anxiety	
	Mean	SD	Mean	SD
Male	22.83	5.16	9.35	1.95
Female	24.27	5.83	10.02	2.08
Total	23.54	5.54	9.68	2.04
t-value	-2.5475		-3.2451	
p-value	0.0112*		0.0013*	

SD: Standard deviation; *Statistically significant



Graph 3: Comparison of male and female with mean fear and anxiety score

Table 4: Comparison of age groups with mean fear and anxiety scores by one-way ANOVA

Age groups	Fear		Anxiety	
	Mean	SD	Mean	SD
18–27	24.14	5.98	10.36	1.93
28–37	23.32	4.89	9.72	1.71
38–47	24.09	4.68	9.63	1.80
48–57	22.19	6.05	8.89	2.12
58+	22.11	6.91	7.44	2.50
Total	23.54	5.54	9.68	2.04
F-value	1.6032		15.0649	
p-value	0.1728		0.0001*	

SD: Standard deviation

Table 5: Correlation between fear and anxiety scores by Karl Pearson's correlation coefficient method

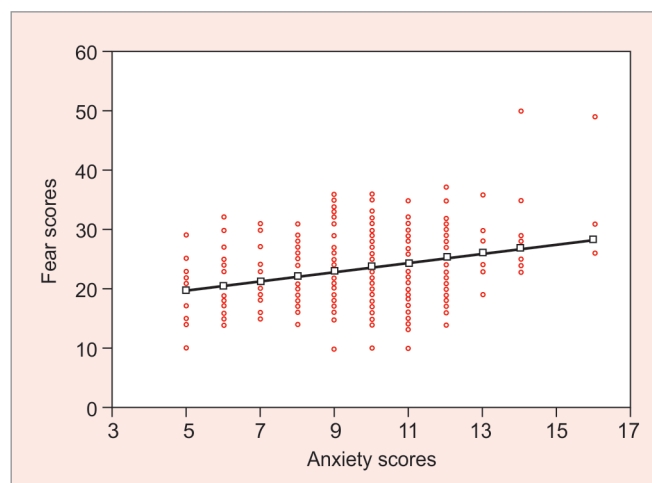
Variables	Correlation between fear scores		
	r-value	t-value	p-value
Anxiety scores	0.2873	5.8462	0.0001*

(Appendix 1) and anxiety (Appendix 2). According to this, there was a significant result for the following:

- Question 1 (Appendix 2) showed that females (2.18) are more fearful to visit the dental office than males (1.86) where the p-value is 0.0010.
- Question 8 (Appendix 2): Females' (3.09) fear scores go higher by seeing mouth mirror and probe than males (2.86) where the p-value is 0.0170.
- Question 1 (Appendix 1): Females (1.92) get more anxious before coming to dental clinic than males (1.72) where the p-value is 0.0001.
- Question 2 (Appendix 1): Females (1.92) get more anxious than males before turning or heading to be seated on a dental chair (1.74) with a p-value of 0.0050.
- Question 3 (Appendix 1): Females (2.08) get more anxious by seeing instrument or drill than males (1.95) with a p-value of 0.0350.
- Question 5 (Appendix 1): Females (2.60) feel more anxious by seeing a needle or anesthesia than males (2.40) with a p-value of 0.0050.

Kruskal–Wallis ANOVA test was done for the comparison of age groups with mean response in each question of fear and anxiety. Statistically significant results were found for the following:

- Response to Question 1 (Appendix 1) is statistically significant where $p = 0.020$. Mean fear in patients who turn to dental office is more in the age group 18 to 27 years whose mean score is 2.21, followed by age group 38 to 47 years whose mean score is 2.09, age group 58+ years whose mean score is 2.07, age group 28 to 37 years whose mean score is 1.87, and age group 48 to 57 years whose mean score is 1.68.
- Response to Question 5 (Appendix 2) is statistically significant, $p = 0.0500$. Mean fear in patients who are

**Graph 4:** Fear and anxiety score correlation by Pearson's correlation coefficient methods

- fearful before making a dental appointment is more in the age group 28 to 37 years whose mean score is 2.24, followed by age group 18 to 27 years whose mean score is 2.20, age group 38 to 47 years whose mean score is 2.04, age group 48 to 57 years whose mean score is 1.81, age group 58+ years whose mean score is 1.78.
- Question 1 (Appendix 2) is statistically significant, $p = 0.0001$. Mean anxiety in patients who feel anxious before coming to dental clinic is more in age group 18 to 27 years whose mean score is 1.94, followed by age group 28 to 37 years whose mean score is 1.87, age group 38 to 47 years whose mean score is 1.74, age group 48 to 57 years whose mean score is 1.65, and age group 58+ years whose mean score is 1.44.
 - Question 2 (Appendix 2) is statistically significant, $p = 0.0001$. Mean anxiety in patients who feel anxious before turning to dental chair is more in the age group 18 to 27 years whose mean score is 2.03, followed by age group 38 to 47 years whose mean score is 1.79, age group 28 to 37 years whose mean score is 1.78, age group 48 to 57 years whose mean score is 1.68, and age group 58+ years whose mean score is 1.41.
 - Question 3 (Appendix 2) is statistically significant, $p = 0.0001$. Mean anxiety in patients who feel anxious by seeing instrument or drill is more in the age group 18 to 27 years whose mean score is 2.18, followed by age group 38 to 47 years whose mean score is 2.07, age group 28 to 37 years whose mean score is 2.02, age group 48 to 57 years whose mean score is 1.73, and age group 58+ years whose mean score is 1.44.
 - Question 5 (Appendix 2) is statistically significant, $p = 0.0001$. Mean anxiety in patients who feel anxious by seeing needle or local anesthesia is more in the age group 18 to 27 years whose mean score is 2.63 followed by age group 28 to 37 years whose mean score is 2.56, age group 38 to 47 years whose mean score is 2.44, age

group 48 to 57 years whose mean score is 2.41, and age group 58+ years whose mean score is 1.85.

Chi-square test of association was done to compare between gender (males and females) and each question in Appendix 1 and question in Appendix 2.

In Appendix 1, it was found that for question 1, females were more fearful to visit a dental clinic than males where the p-value is 0.02, which is statistically significant. In question 8, females get more scared by seeing mouth mirror and probe where the p-value is 0.03, which is clinically significant.

In Appendix 2, it was found that females were more anxious before coming to dental clinic $p = 0.0001$, which is statistically significant. Before turning to dental chair, females were more anxious, $p = 0.0190$, which is statistically significant. As compared with males, female were more anxious by seeing needle or local anesthesia, $p = 0.005$, which is statistically significant.

Chi-square test of association was done to compare age groups in each of fear question (Appendix 1) and anxiety questionnaire (Appendix 2). The following are the observations:

In Appendix 1, statistically significant results were found for questions 1, 2, 8, and 9 in which $p = 0.004, 0.016, 0.007, 0.008$ respectively.

In Appendix 2, statistically significant results were found for questions 1, 2, 3, and 5 in which $p = 0.001, 0.0001, 0.0001, 0.0001$ respectively.

DISCUSSION

Anxiety plays a major hindrance in dental treatment. El Faki et al¹ in their study on dental anxiety prevalence and associated factors among patients attending the academy dental teaching hospital Khartoum, Sudan, concluded that females were more likely to develop dental anxiety than males (dental anxiety prevalence before treatment was 26.1% and after treatment was 26.8%). Shrivastava et al⁵ did a study on dental anxiety and its correlation with denture satisfaction in edentulous patients. They concluded that anxiety score was higher for females than for males. Natarajan et al¹² have done a study on dental fear and anxiety in both genders of Chennai population, and concluded that overall fear for females is higher than for males toward dental treatment. Moore et al⁷ have done a study of prevalence and characteristics of dental anxiety in Danish adults and concluded that women were more likely to report dental anxiety than men by a ratio of 2:1. Results of all these studies are directly in correlation with the results of the present study, quoting females are more anxious compared with males when it comes to dental treatment. In the present study for scoring of fear, when the score is 0 to 1, it is "no fear," when the score is 2 to 6,

it is "anxiety," when the score is 7 to 8, it is "fear," and when the score is 9 to 10, it is "extreme fear" (according to VAS for fear), Appendix 1. When the fear level in males and females was compared in question 1, the percentage for "no fear" in females was 6.86%, and in males, 12.92%; for "anxiety," the percentage for females was 31.66%, and in males, 27.96%; for "fear" in females, it is 1.31%, and in males, 0.26%. In question 2, the percentage for "no fear" in females was 9.23%, and in males, 11.33%; for "anxiety," the percentage for females was 30.34%, and in males, 31.92%; for "fear" in females, it is 0.26%, and in males, 0.52%. In question 3, the percentage for "no fear" in females was 10.81%, and in males, 13.45%; for "anxiety," the percentage for females was 28.49%, and in males, 30.34%. In question 4, the percentage for "no fear" in females was 13.72%, and in males, 19.52%; for "anxiety," the percentage for females was 26.12%, and in males, 24.27%. In question 5, the percentage for "no fear" in females was 10.55%, and in males, 14.77%; for anxiety, the percentage for females was 29.02%, and in males, 28.49%; for "fear," in females, it is 0.52% and in males, 0.26%. In question 6, the percentage for "no fear" in females was 9.30%, and in males, 13.72%; for "anxiety," the percentage for females was 30.60%, and in males, 30.07%. In question 7, the percentage for "no fear" in females was 9.49%, and in males, 14.77%; for "anxiety," the percentage for females was 30.07%, and in males, 28.75%; for "extreme fear," the percentage for females was 0.52%, and males, 0%. In question 8, the percentage for "no fear" in females was 1.84%, and in males, 3.16%; for "anxiety," the percentage for females was 37.20%, and in males, 37.73%; for "fear" in females, it was 0.52%, and in males, 0%. In question 9, the percentage for "no fear" in females was 2.63%, and in males, 2.11%; for "anxiety," the percentage for females was 36.67%, and in males, 39.31%; for "fear" in females, it is 0.79%, and in males, 0%. In question 10, the percentage for "no fear" in females was 2.63%, and in males, 2.11%; for "anxiety," the percentage for females was 40.63%, and in males, 41.16%; for "fear" in females, it is 1.05%, and in males, 0.26%. When the anxiety rate in males and females was compared, none of the male participants had "severe anxiety" rate in comparison with females who had about 2.13%; 1.56% of male participants had "moderate anxiety" rate in comparison with females who had 6.95%; 98.43% of the males had "mild anxiety" rate in comparison with female participants who had 90.90%. This shows that severe and moderate anxiety rates were more in females as compared with males. This could be because females tend to be more sensitive to noxious stimuli like needle, drill, and instruments. Holtzman et al⁴ conducted a study on relationship of age and gender to fear and anxiety in response to dental care. The result of their study was that fear and anxiety are more prevalent

among young patients than older patients and male patients are less prone to postpone their appointments. Liddell and Locker¹³ have done a study on gender and age differences in attitude to dental pain and dental control, and they concluded that females had a higher fear score when compared with males. This result is in direct agreement with the results of the present study. Locker et al¹⁴ have done a study of psychological disorder conditioning experience and onset of dental anxiety in early adulthood, and they concluded that both psychological and conditioning variables contribute to development of dental anxiety in this population of young adults. Berggren¹⁵ have done a study on the role of age, gender, education, and experiences on dental anxiety, and they concluded that females tend to be more anxious than males but the difference did not reach statistical significance. Reddy et al² have done a study on dental anxiety and neglect of dental care, and they concluded that as the age group of subjects increased from 10 to 20 years to 51 to 60 years, the anxiety scores gradually increased from 11.4 to 12.4. Subjects who were above 60 years have shown a gradual decline in anxiety, with a least anxiety level of 10.84 in patients above 70 years of age. Dobroś et al¹⁶ have done a study on the level of dental anxiety and dental status in adult patients, and they concluded that the number of decayed teeth tended to increase with higher dental anxiety and higher dental anxiety was correlated to lesser frequency of appointments. The above study states that patients who are young in age are much more anxious as compared with old patients just because young patients are less frequent to visit dental clinic as compared with old patients.

There is no doubt that fear and anxiety exist in patients regarding dental treatment. Hence, as professionals, it becomes our duty to reduce their fear and anxiety, using various adjunct methods so that the patient gets the utmost benefit and also the professional has a better working atmosphere. These could be achieved by the help of eco-friendly dental clinic, soothing music,¹⁷ aroma,¹⁷ friendly dental attendants, and a proper explanation of the procedure before the treatment.¹⁸

Limitation of the Present Study

The sample size taken/drawn is small to generalize the findings of the study to a bigger population.

Future Prospects of the Study

This study can help in understanding the perspective of the patient from the fear and anxiety point of view, and help treat the patients in a better and positive manner. More of such study should be conducted to understand

the patients and help them get over their fear and anxiety toward dental treatment.

CONCLUSION

The present study reveals that the dentally fearful and anxious patients can be identified through the use of questionnaires. There are various scales to measure the fear and anxiety of patients quoted in the literature. Literature also supports various methods to alleviate these problems, which in turn will better the dental treatment and also enhance the dentist–patient relationship. Therefore, before starting with the dental treatment, patients' anxiety and fear levels should be assessed and a proper counseling should be given in the initial visit itself. The result of this study is that females are more anxious as compared with males and females are more prone to cancel the appointments due to anxiety and fear toward the dental treatment. The findings of this study can assist in understanding the extent of the problem and subsequently appropriate measures can be undertaken to overcome this obstacle in future. However, this study did not focus on the major possible causes for the anxiety or the variety of different treatments and other factors that may influence anxiety. Evidence in the form of behavioral, physiological, or cognitive characteristics should be considered to manage these dentally anxious individuals effectively in the dental office.

REFERENCES

1. El Faki AK, Awooda EM. Dental anxiety prevalence and associated factors among patients attending the academy dental teaching hospital—Khartoum, Sudan. *Am J Med Sci* 2016;4(4):82-86.
2. Reddy RS, Ramya K, Pavani K, Subbarayudu G, Rajesh N, Sruthi R. Dental anxiety—neglect of dental care. *Int J Health* 2015;3(1):20-23.
3. Kindler CH, Harms C, Amsler F, Ihde-Scholl T, Scheidegger D. The visual analog scale allows effective measurement of preoperative anxiety and detection of patients. *Anesth Analg* 2000 Mar;90(3):706-712.
4. Holtzman JM, Berg RG, Mann J, Berkey DB. The relationship of age and gender to fear and anxiety in response to dental care. *Spec Care Dentist* 1997 May-Jun;17(3):82-87.
5. Shrivastava R, Srivastava R, Shigli K, Prasanth MB, Kumaraswamy BN, Nethravathi TD. Assessment of dental anxiety and its correlation with denture satisfaction in edentulous patients. *J Contemp Dent Pract* 2012 May 1;13(3):257-260.
6. Hawker GA, Samra M, Kendzerska T, French M. Measures of adult pain. *Arthritis Care Res* 2011; 63(11):240-252.
7. Moore R, Birn H, Kirkegaard E, Brodsgaard I, Scheutz F. Prevalence and characteristics of dental anxiety in Danish adults. *Community Dent Oral Epidemiol* 1993 Oct;21(5):292-296.
8. Dailey Y, Humphris G, Lennon M. The use of dental anxiety questionnaires: a survey of a group of UK dental practitioners. *Br Dent J* 2001 Apr 28;190(8):450-453.

9. Couper M, Tourangeau R, Conrad F. Evaluating the effectiveness of visual analog scale. *Soc Sci Comput Rev* 2006;24(2): 227-245.
10. Tunc EP, Firat D, Onur OD, Sar V. Reliability and validity of the Modified Dental Anxiety Scale (MDAS) in a Turkish population. *Community Dent Oral Epidemiol* 2005 Oct;33(5): 357-362.
11. Listl S, Behr M, Eichhammer P, Tschernig R. The psychological impact of prosthodontic treatment—a discrete response modelling approach. *Clin Oral Invest* 2012 Jun;16(3):997-1006.
12. Natarajan S, Seenivasan M, Paturu R, Arul Q, Padmanabhan T. Dental fear and anxiety in different gender of Chennai population. *Internet J Epidemiol* 2009;9(1):1-5.
13. Liddell A, Locker D. Gender and age differences in attitudes to dental pain and dental control. *Community Dent Oral Epidemiol* 1997 Aug;25(4):314-318.
14. Locker D, Thomson WM, Poulton R. Psychological disorder, conditioning experiences, and the onset of dental anxiety in early adulthood. *J Dent Res* 2001 Jun;80(6):1588-1592.
15. Berggren U. Long term management of the fearful adult patient using behavior modification and other modalities. *J Health Educ* 2001 Dec;65(12):1357-1368.
16. Dobroś K, Hajto-Bryk J, Wn k A, Zarzecka J, Rzepka D. The level of dental anxiety and status in adult patients. *J Int Oral Health* 2014 Jun;6(3):11-14.
17. Lehrner J, Marwinski G, Lehr S, Johren P, Deecke L. Ambient odors of orange and lavender reduce anxiety and improve mood in a dental office. *Physiol Behav* 2000 Oct 1-15;71(1-2): 83-86.
18. Neacsu V, Sfeatcu I, Maru N, Dumitrache M. Relaxation and systematic desensitization in reducing dental anxiety. *Proc Soc Behav Sci* 2014;127:474-478.