Research Article

Factors Influencing Level of Anxiety and Pain in Patients' Receiving Endodontic Treatment

Zehra Abdul Karim[1], Mehwish Feroz Ali[2,*], Gulrukh Askary[2], Hussain Askary[3], Umer Nisar Siddiqui[1]

[1]*Department Of Operative Dentistry, Fatima Jinnah Dental College & Hospital, Karachi, Pakistan.*
[2]*Department of Oral Pathology, Fatima Jinnah Dental College & Hospital, Karachi, Pakistan.*
[3]*Department of Community Dentistry, Fatima Jinnah Dental College & Hospital, Karachi, Pakistan.*

Abstract: Background: Dental anxiety is a vicious cycle in which avoidance of dental care, poor oral health, and psychosocial consequences are prevalent. It might be a significant impediment to receiving prompt dental care until absolutely required.

Objectives: To evaluate the level of dental anxiety and pain in patients receiving root canal treatment and to identify factors that might increase anxiety levels.

Materials and Methods: This was a cross-sectional study conducted at Fatima Jinnah Dental College Hospital, Karachi, Pakistan from the period of August-December 2022. The study included participants who scheduled their first appointment for endodontic treatment during this period. Participants were included between the ages of 18 and 60, those who provided verbal consent. The sample size of 100 cases were calculated through power analysis at a 95% confidence interval. Data was analyzed by using SPSS version 20 software. P-value <0.05 was considered significant.

Result: According to the Modified dental anxiety scale, the average score was 12.7±4.53, which is considered to be a moderate anxiety. The Pearson correlation of mean anxiety score showed statistically significantly results such as gender ($p<0.001$), age ($p<0.001$), level of education ($p=0.015$), employment ($p=0.029$), ethnicity ($p=0.009$) and level of pain ($p=0.008$). The study showed a lower pain threshold among female patients than males with a statistically significant result ($p=0.008$).

Conclusion: The incidence of dental anxiety among study participants ranged from mild to moderate. Women, young patients, and those with less education were more concerned than their male counterparts. Patients who need urgent root canal therapy more commonly experience dental pain and anxiety.

Keywords: Dental anxiety, Toothache, Dental pulp diseases, Root canal therapy, Visual analog pain scale, Septicemia.

INTRODUCTION

Dental anxiety is a vicious cycle in which avoidance of dental care, poor oral health, and psychosocial consequences are prevalent [1]. Dental anxiety might be a significant impediment to receiving prompt dental care until absolutely required [2]. Avoiding prompt dental care not only worsens the patient's present situation, but it also puts at risk the patient's overall well-being [3]. If the cause is not treated promptly, these patients may suffer from a number of serious dental and medical problems, including septicemia, sinusitis, cellulitis, and osteomyelitis of the face [4]. Despite advances in less invasive and time-saving dental treatments, dental phobia persists in our culture [5].

According to Quteish Taani *et al.* 2.5-20% of young adult Saudian population reported severe dental anxiety [6]. Moreover, a study reported that anxious individuals have poorer oral health than non-anxious ones and they reported association of dental anxiety with a previous traumatic experience [7]. Other than traumatic experience different factors could also stimulate dental anxiety such as gender, age, education, and type of dental procedure [5]. According to the literature, one of the major contributing factors may be gender; females report higher levels of dental anxiety than males [7]. Another important factor that may influence dental anxiety is the patient's age. A study conducted by Sukumaran, *et al.* reported dental anxiety decreases with the increasing age [8]. However, a study reported that elderly patients showed more anxiety [9]. Before beginning treatment, dental surgeons should be able to assess a patient's level of anxiety so that they can use the best techniques to control it and assure a satisfactory treatment outcome.

The intensity of dental anxiety in a specified population has been measured using a variety of anxiety measuring scales. In this study, the Modified Dental Anxiety Scale (MDAS) was selected which range from "not anxious" to "very anxious" on a five-category rating scale [10]. Compared to Corah's Dental Scale, a primitive four-question test of dental anxiety, this scoring system is more simplified [11,12]. The respondent's fear over receiving a local anesthetic injection is a separate question in the MDAS [10,13]. Therefore, a cross-sectional study was conducted to evaluate the level of dental anxiety and pain

*Address correspondence to this author at the Department of Oral Pathology, Fatima Jinnah Dental College & Hospital, Karachi, Pakistan.
Email: mgalmani@live.com

in patients receiving root canal treatment at the Fatima Jinnah Dental College Hospital in Karachi, Pakistan and to identify factors that might contribute to increase anxiety levels.

MATERIALS AND METHODS

This was a cross-sectional study conducted at the Fatima Jinnah Dental College Hospital (FJDCH) during the course of five months (Aug-Dec 2022). The study included participants who received endodontic treatment at the FJDCH, Department of Endodontics during this period. Consecutive sampling method was used. Participants were included between the ages of 18 and 60, those who provided verbal consent, and scheduled their first appointment for endodontic treatment. Females who were pregnant, patients who had undergone endodontic treatment previously, and patients on follow-up visits were excluded from the study. The patients' confidentiality was respected, and the data collected was only used for the purposes of the study. Ethical approval was taken from the Institute's ethical review board (JULY-2022-ORP01).

According to the power analysis, 100 cases were needed to identify a group difference between at least 26 and 54 percent with a 95% confidence range [3]. The pain levels were assessed on the basis of visual analog scale (VAS) [5]. A VAS is a 10-centimeter-long line with descriptive labels at either end (for example, "no pain" on the far left and "the most extreme pain" on the far right). The scale represents 1-3 (Mild pain), 4-6 (moderate pain), 7-8 (severe pain) and 9-10 (Horrible pain). The Modified dental anxiety scale (MDAS) was used to assess levels of anxiety among the patients [10]. The MDAS consist of five items which have been coded from 1 to 5 (not anxious to extremely anxious respectively). The questions that were composed in MDAS are; **Question 1:** If you went to your dentist for treatment tomorrow, how would you feel? **Question 2:** If you were sitting in the waiting room (waiting for treatment), how would you feel? **Question 3:** If you were about to have your teeth scaled and polished, how would you feel? **Question 4:** If you were about to have a tooth drilled, how would you feel? **Question 5:** If you were about to have a local anesthetic injection in your gum, above an upper back tooth, how would you feel?" The researcher completed the survey on the spot.

The highest and lowest scores obtained were 25 and 5, respectively, and it also has a cut-off value of 19 [10]. Therefore, MDAS score range, 0-5 (not anxious), 6-10 (low anxiety), 11-14 (moderate anxiety), 15-18 (high anxiety) and 19-25 (extreme dental phobia) [14]. Face-to-face interviews were held with study participants in the dental OPD waiting room. The dependent variables were pain and anxiety and independent variables were gender, age, level of education, job status, cost of treatment and ethnicity.

STATISTICAL ANALYSIS

Data was analyzed by using SPSS version 20 software. All qualitative variables were presented as percentages and frequencies and quantitative variables as mean and standard deviation. Pearson correlation test was applied to identify the correlation of mean anxiety score with different study variables such as gender, age, level of education, employment, level of pain, cost of treatment and ethnicity. Chi-square was used to find the responses of the modified dental anxiety scale's questions according to gender. P-value ≤ 0.05 was considered significant.

RESULT

The questionnaire was filled out by 54 males and 46 females in the study. The mean age of females was 35.3±14.4 and males was 41.8±14.25. The majority of patients were between the ages of 31 and 40 (36%), followed by 41-50 (24%), 18-30 (22%), and above 51 (18%). In 60% of the study population, the level of education was less than matriculation. In the current study, 71% of patients were employed and 29% were unemployed. The ethnic backgrounds of the patients varied, including Sindhi (13%), Punjabi (19%), Pathan (25%), Urdu-speaking (30%), Hazara (6%), Saraiki (5%), and Hindu (2%) Table **1**.

Table 1. Represents the Demographic Data of the Study Participants.

Variables	Frequency %
Gender	
Male	54 (54%)
Female	46 (46%)
Age group	
18-30	22 (22%)
31-40	36 (36%)
41-50	24 (24%)
51-60	18 (18%)
Level of Education	
Matric or below	60 (60%)
Intermediate	28 (28%)
Graduation	8 (8%)
Post-graduation	4 (4%)
Employment	
Yes	71 (71%)
No	29 (29%)
Ethnicity	
Sindhi	13 (13%)
Punjabi	19 (19%)
Pathan	25 (25%)
Urdu Speaking	30 (30%)
Hazara	6 (6%)
Hindku	2 (2%)
Saraiki	5 (5%)

On the Modified dental anxiety scale (MDAS), the average total score for dental anxiety was 12.7±4.53. According to the MDAS score, mild anxiety was found in 31% of patients, moderate anxiety in 38%, high anxiety in 18%, and extreme dental phobia in 6% of patients (Fig.**1**).

Study participants who had any prior negative dental experiences were more anxious than those who had positive dental experiences (p=0.001). The relationship between MDAS responses and gender is seen in Table **2**. Females seemed to be moderately to severely nervous about local anesthesia injections and high speed handpiece (drills) as compared to males.

Table **3** showed correlation of mean MDAS score with different study variables. The Pearson correlation of mean anxiety score with different study variables showed statistically significantly results such as gender (p<0.001), age (p<0.001), level of education (p=0.015), employment (p=0.029), ethnicity (p=0.009) and level of pain (p=0.008). There was no correlation found between mean anxiety score and cost of treatment.

Table 2. Shows the Responses of the Modified Dental Anxiety Scale's Questions.

Modified Dental Anxiety Scale (MDAS)		Gender		Total N (%)
		Male N (%)	Female N (%)	
Question 1: If you went to your dentist for treatment tomorrow, how would you feel?	Not anxious	9 (9)	1 (1)	10 (10)
	Slightly anxious	33 (33)	19 (19)	52 (52)
	Fairly anxious	9 (9)	16 (16)	25 (25)
	Very anxious	3 (3)	10 (10)	13 (13)
	Extremely anxious	0 (0)	0 (0)	0 (0)
Total		54 (54%)	46 (46)	100 (100)
p-value	**0.002**			
Question 2: If you were sitting in the waiting room, how would you feel?	Not anxious	9 (9)	1 (1)	10 (10)
	Slightly anxious	38 (38)	14 (14)	52 (52)
	Fairly anxious	5 (5)	21 (21)	26 (26)
	very anxious	2 (2)	10 (10)	12 (12)
	Extremely anxious	0 (0)	0 (0)	0 (0)
Total		54 (54%)	46 (46)	100 (100)
p-value	**<0.001**			
Question 3: If you were about to have your teeth scaled and polished, how would you feel?	Not anxious	16 (16)	6 (6)	22 (22)
	Slightly anxious	35 (35)	28 (28)	63 (63)
	Fairly anxious	3 (3)	8 (8)	11 (11)
	very anxious	0 (0)	4 (4)	4 (4)
	Extremely anxious	0 (0)	0 (0)	0 (0)
Total		54 (54)	46 (46)	100 (100)
p-value	**0.012**			
Question 4: If you were about to have a tooth drilled, how would you feel?	Not anxious	1 (1)	1 (1)	2 (2)
	Slightly anxious	31 (31)	1 (1)	32 (32)
	Fairly anxious	18 (18)	21 (21)	39 (39)
	very anxious	3 (3)	18 (18)	21 (21)
	Extremely anxious	1 (1)	5 (5)	6 (6)
Total		54 (54)	46 (46)	100 (100)
p-value	**<0.001**			
Question 5: If you were about to have a local anesthetic injection in your gum, above an upper back tooth, how would you feel?	Not anxious	1 (1)	0 (0)	1 (1)
	Slightly anxious	30 (30)	2 (2)	32 (32)
	Fairly anxious	19 (19)	21 (21)	40 (40)
	very anxious	3 (3)	18 (18)	21 (21)
	Extremely anxious	1 (1)	5 (5)	6 (6)
Total		54 (54)	46 (46)	100 (100)
p-value	**<0.001**			

Table 3. Demonstrate Pearson Correlation of Mean Anxiety Score with Different Variables such as Gender, Age, Level of Education, Employment, Level of pain, Cost of treatment and Ethnicity.

Variables		Anxiety Score
Gender	Pearson Correlation	.555**
	Sig. (2-tailed)	.000
	N	100
Age	Pearson Correlation	-.437**
	Sig. (2-tailed)	.000
	N	100
Education	Pearson Correlation	.242*
	Sig. (2-tailed)	.015
	N	100
Employment	Pearson Correlation	.218*
	Sig. (2-tailed)	.029
	N	100
Ethnicity	Pearson Correlation	.261**
	Sig. (2-tailed)	.009
	N	100
Cost	Pearson Correlation	-.025
	Sig. (2-tailed)	.807
	N	100
Level of pain	Pearson Correlation	.263**
	Sig. (2-tailed)	.008
	N	100
*Correlation is significant at the 0.05 level (2-tailed) **Correlation is significant at the 0.01 level (2-tailed)		

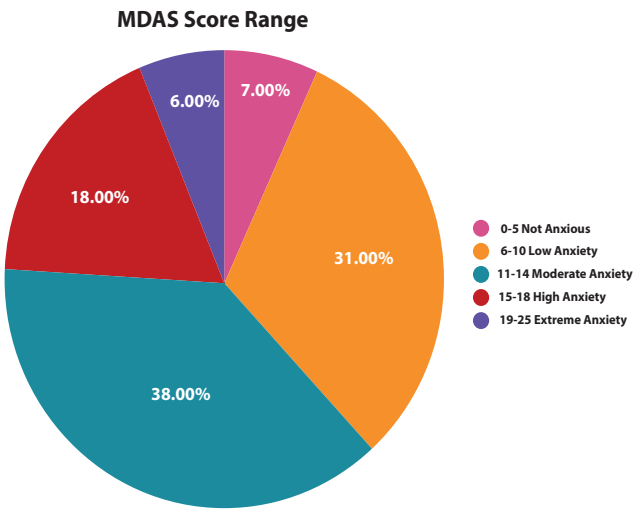

Fig. (1). Display the Distribution of Modified Dental Anxiety Scale Score Range.

DISCUSSION

This study proposed that patients who need urgent root canal therapy more frequently experience dental pain and anxiety. In the study, the majority of patients experienced mild to moderate dental anxiety before their initial appointment for endodontic therapy. Merely 18% of research participants expressed significant levels of dental phobia, with 6% reporting extreme dental phobia. Previous research at multiple public and private hospitals in Karachi, Pakistan, found that only 3% of patients receiving endodontic treatment had extreme dental anxiety [15].

In the current study, the majority of the high dental phobic individuals had less than 10 or 12 years of education. Several studies have found that meagre education levels correlate with increased dental anxiety, which could be due to a fear of the unknown [16, 17]. This could support the hypothesis that patients' dental phobia develops as a result of their lack of awareness about dental procedures. However, a study conducted by Anzar, *et al.* individuals with 16 years of education, although having substantial knowledge about their dental treatment, showed elevated levels of anxiety when compared to individuals with 10 or less years of education [18]. Moreover, another study reported that professionals and well-educated people were more likely to be dental phobic (55%) which was followed by students (21%) [19].

In the study, low threshold for pain was observed in females as compared to males with a statistically significant result (p=0.008). Similarly other studies also reported that women have lower pain thresholds than men, which contributes to a high occurrence of dental anxiety [18-20]. However, no significant relationship between gender and dental phobia was reported in a few research [15, 18]. Likewise, there is a wide range of dental phobia among different age groups. In this study, high dental anxiety was reported in young adults, while mature adults showed low or no dental anxiety. Other studies also reported that dental anxiety was found less in older patients as compared to young adults [20, 21]. Normally, mature adults usually undergo several dental treatments such as tooth extractions, restorative procedures and so on, which makes them more aware and less fearful of subsequent dental procedures.

The fear of experiencing discomfort prior to any dental procedure may be a factor contributing to patients' elevated levels of anxiety. The majority of individuals involved in the current study had clinical and radiographic evidence of irreversible pulpitis or pulp necrosis and presented to the endodontics department for emergency chamber opening. According to Tellez, *et al.* emergency patients exhibited a greater prevalence of dental phobia than routine patients (35.7% versus 14.1%) [22]. Participants in the study were given antibiotics and painkillers to manage the emergency condition in order to alleviate pain before their initial visit. Those who had pain treated before starting therapy were less anxious than those who had pain during treatment. We discovered a strong relationship between dental pain and anxiety levels with Pearson correlation of .263 (P=0.015), indicating that

it could be an important factor to address prior to endodontic treatment.

The root canal treatment comprises several invasive processes including local anesthetic injection, tooth drilling, and dental pulp extraction [20]. Preexisting fear of pain, may result in severe anxiety in patients. In our study, 20% of patients were extremely anxious about local anesthetic injections and tooth drills, with a mean anxiety score of more than 15. Some patients have fear of injections or other painful experiences even after receiving local anesthetic injections. This may result in an unpleasant experience and increased anxiety before and during the procedure. Several researchers reported that those who were afraid of the aforementioned parameters perceived their experience as unpleasant [21, 22]. Similarly, endodontic therapy is a stressful process that is associated with discomfort, especially in the absence of an adequate pain-management strategy [20].

Individuals who had previously unpleasant dental experiences reported higher levels of dental anxiety (p=0.041) in the study. Similarly, apprehensive patients experienced greater discomfort during dental procedures than non-anxious ones. The adverse perceptions of those in the family, friends, or relatives toward root canal treatment may also contribute to the development of dental phobia [23]. As a result, dentists ought to make more efforts to ensure that patients feel less apprehensive and to provide them with a positive dental experience. In addition, a conducive environment for oral wellness must be created so that patients can learn enough about the dental procedure they are receiving. This should improve patients' attitudes about dental care and the necessity for endodontic or other dental procedures [24-27].

LIMITATION

The study's main weaknesses include its small sample size and the fact that data was only gathered from one center, which prevents us from generalizing the findings.

CONCLUSION

The incidence of dental anxiety among study participants ranged from moderate to high. Women, young patients, and those with less education were more concerned than their male counterparts. Patients undergoing dental procedures may experience anxiety due to a lack of understanding, pain phobia, traumatic procedures, and unfriendly practitioners.

AUTHORS' CONTRIBUTION

- **Zehra Abdul Karim and Mehwish Feroz Ali**: Designed, Literature review, Questionnaire design, data collection, data analysis and manuscript writing.
- **Gulrukh Askary and Hussain Askary**: Literature review and Proof-reading.
- **Umer Nisar Siddiqui**: Literature review, Data collection and Data entry.

CONFLICT OF INTEREST

Declared none.

ACKNOWLEDGEMENTS

Declared none.

REFERENCES

[1] Kassem El Hajj H, Fares Y, Abou-Abbas L. Assessment of dental anxiety and dental phobia among adults in Lebanon. BMC Oral Health 2021; 21(1): 1-10. https://doi.org/10.1186/s12903-021-01409-2

[2] Farooq I, Ali S. A cross sectional study of gender differences in dental anxiety prevailing in the students of a Pakistani dental college. Saudi J Dent Res 2015; 6(1): 21-5. https://doi.org/10.1016/j.sjdr.2014.06.002

[3] Alroomy R, Kim D, Hochberg R, Chubak J, Rosenberg P, Malek M. Factors influencing pain and anxiety before endodontic treatment: A cross-sectional study amongst American individuals. Eur Endod J 2020; 5(3):199-204. https://doi.org/10.14744/eej.2020.17363

[4] Mehrstedt M, John TM, Sven T, Micheelis W. Oral health related quality of life in patients with dental anxiety. Comm Dent Oral Epidemiol 2007; 35(5): 357-63. https://doi.org/10.3390%2Fijerph19137643

[5] Wali A, Siddiqui TM, Gul A, Khan A. Analysis of level of anxiety and fear before and after endodontic treatment. J Dent Oral Health 2016; 2(3): 19-21. https://scientonline.org/open-access/analysis-of-level-of-anxiety-and-fear-before-and-after-endodontic-treatment.pdf

[6] Quteish Taani DS. Dental fear among a young adult Saudian population. Int Dent J 2001; 51(2): 62-6. https://doi.org/10.1002/j.1875-595x.2001.tb00823.x

[7] Høyvik AC, Lie B, Willumsen T. Dental anxiety in relation to torture experiences and symptoms of post-traumatic stress disorder. Eur J Oral Sci 2019; 127(1): 65-71. https://doi.org/10.1111/eos.12592

[8] Sukumaran I, Taylor S, Thomson WM. The prevalence and impact of dental anxiety among adult New Zealanders. Int Dent J 2021; 71(2): 122-6. https://doi.org/10.1111/idj.12613

[9] Khan A, Nasir U, Masood A, Sadiq Z, Babar Z, Ahmad I. Frequency of dental anxiety among children aged 5–12 years visiting a dental teaching hospitals in Kohat, Pakistan. Pak J Physiol 2021; 17(4): 39-41. https://pjp.pps.org.pk/index.php/PJP/article/view/1306

[10] Humphris GM, Freeman R, Campbell J, Tuutti H, D'souza V. Further evidence for the reliability and validity of the modified

dental anxiety scale. Int Dent J 2000; 50(6): 367-70. https://doi.org/10.1111/j.1875-595x.2000.tb00570.x

[11] Fatima Z, Rashid A, Abdullah F, Rasheed B. Dental fear: The prevalence of dental fear and anxiety in patients coming to department of dentistry at Lahore general hospital, Pakistan. Professional Med J 2018; 25(06): 959-65. https://doi.org/10.29309/TPMJ/2018.25.06.288

[12] Grisolia BM, Dos Santos AP, Dhyppolito IM, Buchanan H, Hill K, Oliveira BH. Prevalence of dental anxiety in children and adolescents globally: A systematic review with meta-analyses. Int J Paediatr Dent 2021; 31(2): 168-83. https://doi.org/10.1111/ipd.12712

[13] Makri C, Alexias G, Togas C, Chasiotis V. Evaluation of dental anxiety and of its determinants in a Greek sample. Int J Caring Sci 2020; 13(2): 791-803. http://www.internationaljournalofcaringsciences.org/docs/3_togas_original_11_2.pdf

[14] Giri J, Pokharel PR, Gyawali R, Bhattarai B.Translation and validation of modified dental anxiety scale: The Nepali version. Int Scholar Res Notices 2017; 2017: 5495643. https://doi.org/10.1155/2017/5495643

[15] Faisal S, Zehra, N, Hussain M, Jaliawala HA, Faisal A. Dental Anxiety among patients attending public and private dental hospitals of Karachi. J Pak Dent Assoc 2015; 24(1): 46-51. https://www.jpda.com.pk/dental-anxiety-among-patients-attending-public-and-private-dental-hospitals-of-karachi/

[16] Khan S, Ahmad I, Ghulam R, Arshad GK. Dental anxiety among Sudanese dental patients attending Pakistani field hospital, Nyala, Sudan. Sudan Med J 2016; 52: 126-30.

[17] Deogade S, Suresan V. Psychometric assessment of anxiety with the modified dental anxiety scale among central Indian adults seeking oral health care to a dental school. Ind Psychiatr J 2016; 25: 202-9.

[18] Anzar W, Afaq A, Baig QA. Assessment of dental anxiety in adults undergoing dental procedures in Dow International Dental College. J Dow Univ Health Sci 2017; 11(1): 2-5.

[19] Shaikth MA, Kawal A. Over dental anxiety problem among university students: Perspective from Pakistan. J Coll Physicians Surg Pak 2011; 21: 237- 8. https://pubmed.ncbi.nlm.nih.gov/21453623/

[20] Farooq I, Ali S. A cross sectional study of gender differences in dental anxiety prevailing in the students of a Pakistani dental college. Saudi J Dent Res 2015; 6(1): 21-5. https://doi.org/10.1016/j.sjdr.2014.06.002

[21] Musalam K, Sohal KS, Owibingire SS, Kileo B. Magnitude and determinants of dental anxiety among adult patients attending public dental clinics in Dar-Es-Salaam, Tanzania. Int J Dent 2021; 2021, Article ID 9965204. https://doi.org/10.1155/2021/9965204

[22] Tellez M, Kinner DG, Heimberg RG, Lim S, Ismail AI. Prevalence and correlates of dental anxiety in patients seeking dental care. Commun Dent Oral Epidemiol 2015; 43: 135-42. https://doi.org/10.1111/cdoe.12132

[23] Neelakantan P, Liu P, Dummer PM, McGrath C. Oral health–related quality of life (OHRQoL) before and after endodontic treatment: A systematic review. Clin Oral Investig 2020; 24: 25-36. https://doi.org/10.1007/s00784-019-03076-8

[24] Dou L, Vanschaayk MM, Zhang Y, *et al.* The prevalence of dental anxiety and its association with pain and other variables among adult patients with irreversible pulpitis. BMC Oral Health 2018; 18: 101. https://doi.org/10.1186/s12903-018-0563-x

[25] Rechenberg DK, Held U, Burgstaller JM, Bosch G, Attin T. Pain levels and typical symptoms of acute endodontic infections: A prospective, observational study. BMC Oral Health 2016; 16: 61. https://bmcoralhealth.biomedcentral.com/articles/10.1186/s12903-016-0222-z

[26] Appukuttan D, Subramanian S, Tadepalli A, Damodaran LK. Dental anxiety among adults: An epidemiological study in South India. N Am J Med Sci 2015; 7: 13-8. https://doi.org/10.4103/1947-2714.150082

[27] Murad M, Ingle N, Assery M. Evaluating factors associated with fear and anxiety to dental treatment-A systematic review. Fam Med Prim Care Rev 2020; 9(9): 4530. https://doi.org/10.4103/jfmpc.jfmpc_607_20

Received: April 19, 2023 Revised: September 19, 2023 Accepted: September 25, 2023