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Dental Treatment Anxiety and Oral Health Status among University Students and Its Correlation with Their Field of Study: A Cross-Sectional Study

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Abstract

Aim: To assess the dental treatment anxiety levels & oral health status among university students of different health occupations in Pune city, & to correlate it with their fields of study & between the genders. ***Materials and Methods***: A cross-sectional study was conducted among 293 university students from Physiotherapy, Pharmacy, and Unani medicine colleges in Pune city. Data was collected using the Modified Dental Anxiety Scale (MDAS) given by Humphries *et al.*, the modified WHO 's Oral Health Assessment form (2013) and Oral Hygiene Index-Simplified given by Greene and Vermillion (1964). Descriptive statistics was used to analyze the relationship between anxiety levels, oral health and Field of Study. ***Results***: Pharmacy students had the highest anxiety (mean MDAS score of 15 ± 4.3), followed by Physiotherapy students (14 ± 4.4) and Unani medicine students (13 ± 3.4). Most of the participants had fair oral hygiene($p<0.0001$) & majority of them required prompt dental treatment ($p<0.001$). A statistically significant correlation was found between higher dental treatment anxiety scores and poorer oral hygiene ($p < 0.001$). Females reported higher anxiety levels than males ($p<0.01$). ***Conclusion***: Dental treatment anxiety is prevalent among students, with higher levels of dental treatment anxiety correlating to poorer oral health. Interventions targeting dental treatment anxiety reduction and dental health education are needed, particularly for students outside of healthcare fields to provide good dental care.
Keywords: Dental anxiety; Oral health; Students, health occupations; Dental care; Health education, dental.

INTRODUCTION

Dental treatment anxiety is a prevalent issue that significantly impacts oral health and the utilization of dental services across various populations [1]. It is characterized by an excessive fear or stress associated with dental visits, often leading to the avoidance of necessary dental care. This avoidance can result in the deterioration of oral health, thereby exacerbating existing dental issues and contributing to the onset of new ones.

Dental treatment anxiety is the psychological fear that a person feels about a possible outcome or dental intervention that may occur that is dangerous for him/her.

Dental treatment anxiety is multifactorial; the main reasons include illiteracy, lack of dental knowledge, infrequent dental visits, parental stress, socioeconomic status, psychological causes, previous negative dental experiences and the dentist's attitude [2]. Research conducted by Gaigalaitė S *et al.*, (2021) [3] and Cohen SM *et al.*, (2000) [4] has shown that the prevalence of dental treatment anxiety varies across different populations, cultures and ethnicities in terms of content, pattern and level of fear & can range from 3% to 43%.

Avoidance of dental care is one of the reason associated with dental fear and anxiety in many patients

[5]. Patients with high dental treatment anxiety develop negative attitudes towards the dentist and dental care, making it difficult to complete dental treatment and causing their oral health to worsen. Anxious patients are considered some of the most stressful patients a dentist can encounter which is again seen more in young adults. Particularly in undergraduate students, as the transition to university life is a period marked by increased autonomy and responsibility, often accompanied by changes in lifestyle and stress levels. Undergraduate students, navigating this new phase, may experience heightened levels of anxiety, which can manifest in various forms, including dental treatment anxiety. Moreover, the demands of academic life, combined with other stressors, can further contribute to the neglect of oral health, as students may prioritize academic responsibilities over personal health care. Hence, dental treatment anxiety can be a critical factor influencing their oral health behaviors and outcomes [6].

Moreover, understanding the correlation between dental treatment anxiety and oral health status is crucial in identifying vulnerable groups within the undergraduate population of different fields of study. For example, students enrolled in health-related programs, may have more awareness and knowledge regarding the importance of oral health, potentially resulting in lower levels of dental treatment anxiety and better oral health status. Conversely, students in other fields might lack this knowledge or place less emphasis on maintaining good oral health, leading to higher anxiety levels and poorer oral health outcomes [7].

Therefore, dental treatment anxiety assessment in such patients is important for effective treatment. Various scales have been developed to measure dental treatment anxiety such as Gale's Ranking Questionnaire (RQ), Dental Fear Survey (DFS), Modified Dental Fear Survey (MDFS), Dental State Anxiety Scale (DSAS), Getz's Dental Belief Survey (DBS) [8-13]. Among these the Modified Dental Anxiety Scale (MDAS), developed by Humphris, Morrison & Lindsay *et al*., (1995), based on the original Corah Dental Anxiety Scale is very effective and convenient to use [14].

Keeping all these factors in mind, this study was planned with the aim to explore the relationship between dental treatment anxiety and oral health status among different undergraduate students and examine how this relationship varies across different fields of study. By identifying potential disparities, this research seeks to provide insights that could inform targeted interventions to reduce dental anxiety and promote better oral health practices among different university students of Physiotherapy, Unani medicine & Pharmacy colleges in Pune city. The findings of this study may also contribute to the broader understanding of how educational background influences health behaviors and outcomes, with implications for health education and policy. This study also revealed the influence of gender and various fields of study on the perceived dental treatment anxiety.

MATERIALS & METHODS

This observational, cross sectional study was conducted among 293 students with the age range of 19 to 25 years of Physiotherapy, Unani medicine and Pharmacy colleges in the city of Pune, over a period of 1 month using convenience sampling technique and reported in accordance with the STROBE guidelines [15].

Prior permissions were taken by explaining the goal and the purpose of the study to the college administrators along with providing them with all the necessary documents. The institutional ethical clearance (EC/MCES/973/2024) was obtained before conducting the study.

In this study, all students were verbally given an explanation about the nature and purpose of the study and an informed written consent of willing participants was obtained and all the personal information of the students was kept confidential (as per the Helsinki declaration) [16] (Refer Annexure 1 & 2).

The sample size was determined using the following formula after conducting a pilot study.

$$n = \frac{z \ 1-\alpha/2 \ 2 \ p(1-p)}{d^2}$$

Where, p = previous expected values = 0.30, d = desired Margin of error = 0.5

Z1-α/22 confidence interval of 95%, z = 1.96
Sample size: 289

Out of the 293 students selected for the study, 93 were Physiotherapy students, 90 were Unani medicine students & 110 were Pharmacy students. Students who were suffering from any type of pre existing diagnosed systemic disease & those who were unwilling to participate in the study, were excluded from the study.

For data collection, Dental Treatment Anxiety assessment and clinical examination was done.

For Dental Treatment Anxiety assessment, the Modified Dental Anxiety Scale (MDAS) developed by Humphris, Morrison & Lindsay *et al*., (1995) was used which is a comprehensive, simple, highly valid and reliable scale [14]. The Scale contains 5 questions, each question has five options with scores for each option ranging from 1 (not anxious) to 5 (extremely anxious). The scores for each of the 5 questions were summed up to give a total value of dental treatment anxiety score. The scores are interpreted as follows, a score of 5 to 8 is considered to be no anxiety, 9 to 12 is moderate anxiety, 13 to 14 is high anxiety, and 15 to 20 is extreme anxiety bordering on phobia (Refer Annexure 3).

The WHO's Modified Oral Health Assessment form of 2013 was used to clinically examine the students' caries status, previous dental experience, history of trauma & Intervention Urgency, and the Oral Hygiene Index-Simplified scale (OHI-S scale given by John C. Greene & Jack R. Vermillion in 1964), was used to assess the students' oral health status [17, 18] (Refer Annexure 4).

The data collected through the questionnaires was entered in MS Excel and was statistically analyzed. Descriptive statistics including means, standard deviations, and percentages were calculated. The Results are presented in the form of tables and graphs.

RESULTS

Out of the 327 questionnaires distributed only 293 were completely filled. 34 questionnaires were incomplete & thus excluded from the study. Therefore the result includes the data of 293 students.

Demographic Information

The study fields of the participants included Physiotherapy (32% of total participants), Pharmacy (30% of total participants), and Unani undergraduate students (38% of total participants) (Refer graph 1) aged 19-25 years with more female students as compared to male students. In this study it was found that female students had greater Dental Treatment Anxiety than male students **(p<0.01)**. The students were mostly from hostels (47%), however some students were localites (38%) and some resided as PG's (15%). Majority of the students brush their teeth only once a day (60%). Out of 293 students 65% of the students had no prior history of dental treatment, while 1.3% students reported having a negative experience from previous dental visits.

Table 1: Comparison of mean Oral Health and Dental Treatment Anxiety status amongst the study population

| VARIABLES	PHYSIOTHERAPY STUDENTS (N=93)	UNANI MEDICINE STUDENTS (N=90)	PHARMACY STUDENTS (N=110)	p value
	MEAN+/- STANDARD DEVIATION			
OHI-S Score	1.4 ± 0.6	1.4 ± 0.6	1.3 ± 0.6	**0.001***
Intervention urgency	1.8 ± 0.6	1.6 ± 0.6	1.6 ± 0.6	**0.001***
Q1 from MDAS	2 ± 0.9	2 ± 0.78	2 ± 0.9	
Q2 from MDAS	2 ± 1.0	2 ± 1.1	2 ± 0.9	
Q3 from MDAS	3 ± 1.1	3 ± 1.1	3 ± 1.2	
Q4 from MDAS	3 ± 1.2	3 ± 0.8	3 ± 1.2	
Q5 from MDAS	4 ± 1.1	3 ± 1.2	5 ± 1.1	
MDAS Score	14 ± 4.4	13 ± 3.4	15 ± 4.3	**0.001***

*(p value <0.001, highly significant)

Table 1 shows that the students have varying degrees of oral hygiene with most participants having fair oral hygiene which is highly significant **(p < 0.001)**. Majority of students require prompt dental treatment **(p<0.001)**. The mean MDAS value for Physiotherapy students is 14+/-4.4, Unani medicine students is 13+/-3.4 and Pharmacy students is 15+/-4.3. This indicates an extreme level of dental treatment anxiety in the Pharmacy college students and high level of anxiety in the Physiotherapy and Unani medicine college students.
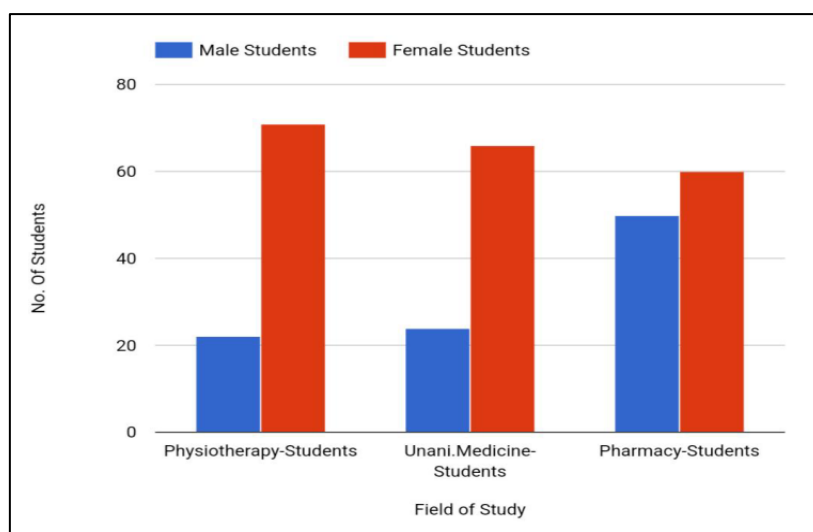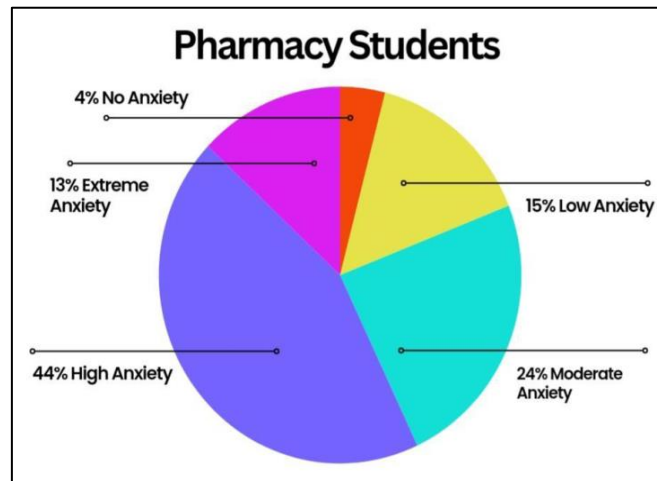

Graph 1: Distribution of students among Physiotherapy, Unani medicine and Pharmacy colleges
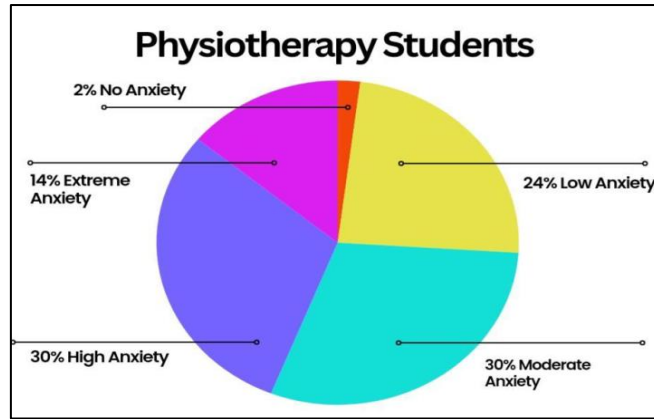
Pie chart 1: Different levels of Dental Treatment Anxiety among Physiotherapy Students
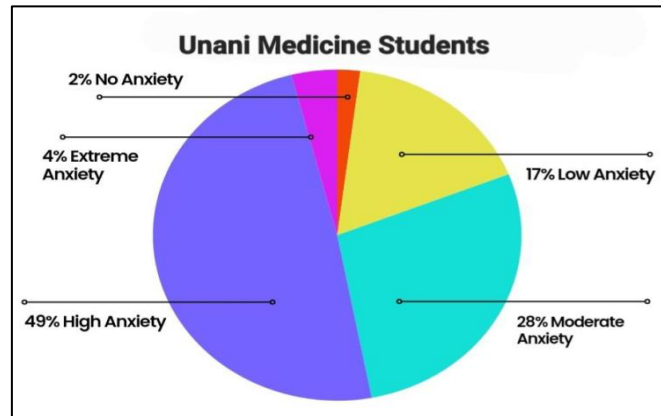
Pie chart 2: Different levels of Dental Treatment Anxiety among Unani medicine Students

Pie chart 3: Different levels of Dental Treatment Anxiety among Pharmacy Students

Table 2: Correlation of Dental Treatment Anxiety and Oral Health Status amongst study population

OHI-S GRADE		Branch 1 - Physiotherapy		Branch 2 – Unani		Branch 3 – Pharmacy		p value
		MDAS	Intervention urgency	MDAS	Intervention urgency	MDAS	Intervention urgency	
1	Mean ± Standard Deviation	12.17 ± 3.8	1.68 ± 0.62	12.84 ± 3.83	1.37 ± 0.54	13.75 ± 6.2	1.48 ± 0.66	**<0.001***
2	Mean ± Standard Deviation	14.19 ± 4.5	2.06 ± 0.35	13.38 ± 3.7	2.03 ± 0.18	14.84 ± 4.17	2 ± 0	
3	Mean ± Standard Deviation	17.67 ± 1.53	2.33 ± 0.47	14 ± 5	2 ± 0	16.65 ± 4.05	2 ± 0	

*(p value <0.001, highly significant)

From Table 2 it is evident that the students have moderate to high levels of Dental Treatment Anxiety. It was also noted that Pharmacy students had extreme levels of dental treatment anxiety (Mean 15 ± 4.3) followed by Physiotherapy students (Mean 14 ± 4.4) and Unani medicine students (Mean 13 ± 3.4). Moreover as the Dental Treatment Anxiety (MDAS) increases, OHI-S grades worsens and students require greater dental treatment interventions **(p<0.001)**. This concludes that high levels of dental treatment anxiety can lead to avoidance of dental visits, which in turn increases oral health issues over time.

DISCUSSION

The present study explored the relationship between dental treatment anxiety and oral health status among undergraduate students in three different fields—Physiotherapy, Pharmacy, and Unani medicine— by analyzing their dental treatment anxiety levels and oral hygiene practices. The findings indicate significant trends in dental treatment anxiety that are influenced by demographic characteristics, field of study, and oral health behavior. The following discussion will provide an interpretation of the results, compare them with previous studies, and highlight the implications of these findings for dental health awareness and future research.

1. Influence of Gender on Dental Treatment Anxiety

The significant difference in dental treatment anxiety levels between male and female students is consistent with studies conducted by Armfield JM *et al*., (2013) [19] & Kumar S *et al*., (2015) [20] that have shown females generally report higher levels of dental treatment anxiety compared to males possibly due to a combination of sociocultural factors and innate emotional responses **(p < 0.001)**. Therefore targeted interventions, such as anxiety-reducing dental education programs, should consider gender differences.

2. Influence of Field of Study on Dental Treatment Anxiety

The differences in dental treatment anxiety across the three fields, as evidenced by their MDAS scores, are noteworthy (p < 0.001). Pharmacy students had extreme dental treatment anxiety, while both Physiotherapy and Unani medicine students had high dental treatment anxiety. The reason being that being part of the medical field, Unani medicine students are more accustomed to clinical settings, patient care, and medical procedures. This familiarity may reduce their anxiety when it comes to their own treatment. On the contrary, Physiotherapy and Pharmacy students may experience higher dental treatment anxiety due to their limited exposure to dental care, heightened awareness of risks and fear of pain.

This finding is consistent with the research done by Humphris GM *et al*., (2011) [2] among Undergraduate and postgraduate University students of UK, Al-Omari WM *et al*., (2009) [14] among Jordanian students from Medical, Engineering and Dental colleges and Newton JT *et al*., (2007) [21] among Medical and Dental students which has also indicated that healthcare students tend to have heightened awareness of medical procedures, which can either increase or decrease anxiety depending on the level of exposure and education they have received about oral health.

The implications of this finding suggest that curricula for healthcare students, apart from dental and medical students, should also include comprehensive dental health education to reduce the levels of anxiety related to dental treatments. This can be accomplished through workshops, interactive learning modules, or hands-on experience in dental clinics.

3. Correlation of Dental Treatment Anxiety and Intervention Urgency

Previous studies conducted by Armfield JM *et al*., (2013) [19] & de Jongh A *et al*., (2006) [22] also shows that individuals with high dental treatment anxiety often delay seeking treatment, leading to more severe oral health issues that require urgent intervention and this vicious cycle of anxiety and worsening oral health can result in poorer long-term outcomes. The present study adds to this body of evidence by showing that the participants with higher dental treatment anxiety not only have poor oral health (as indicated by OHI-S scores) but also require more immediate dental intervention. For instance, participants with higher MDAS scores typically required more immediate dental attention (p<0.001).

4. Correlation between Dental Treatment Anxiety and Oral Health Status

One of the most striking findings of this study is the direct correlation between dental treatment anxiety and oral health status. The relationship between poor oral health and dental treatment anxiety has been explored in numerous studies by Locker D *et al*., (1991) [23], Porritt S *et al*., (2012) [24] & Carson P *et al*., (2015) [25] conclude that anxiety not only affects a person's willingness to seek dental care but also contributes to the deterioration of oral health. This study shows that poor oral health contributes to heightened dental treatment anxiety **(p<0.001)**, by demonstrating a clear relationship between worsening OHI-S scores and increasing MDAS scores, this in turn, may lead to further neglect of oral hygiene and avoidance of dental care.

5. Implications for Dental Health Awareness

The findings of this study have important implications for improving dental health awareness and reducing dental treatment anxiety among young adults. Firstly, educational interventions should be implemented early in university curricula to help students, particularly those in healthcare-related fields, for better understanding of the importance of maintaining oral health and overcoming dental treatment anxiety.

Secondly, dental health campaigns at universities should address the common misconceptions and fears surrounding dental treatments, particularly for female students and those with past negative dental experiences. By normalizing dental visits and providing stress-relieving techniques, universities can play a pivotal role in reducing the overall prevalence of dental treatment anxiety.

Limitations and Future Research

While this study provides valuable insights, several limitations must be acknowledged. The sample population was limited to three fields of study, which may not be representative of all undergraduate students. Future research should aim to include a more diverse sample from different academic disciplines.

In addition, longitudinal studies are needed to explore how dental anxiety evolves over time and how early interventions can influence long-term oral health outcomes.

CONCLUSION

In conclusion, the study reveals that dental treatment anxiety levels significantly vary among students of different fields of study—Physiotherapy, Pharmacy, and Unani medicine. The majority of participants, particularly females, exhibit high to extreme levels of dental treatment anxiety, with the MDAS scores averaging between 13 and 14. This high anxiety level correlates with poorer oral hygiene (OHI-S scores) and a greater need for dental intervention, As dental treatment anxiety increases, the Oral health of the students deteriorates due to avoidance of dental visits and the urgency for dental treatment also rises, indicating the importance of addressing dental treatment anxiety to improve oral health outcomes among students.

Annexure 1- *Information sheet*

Annexure -1 INFORMATION SHEET

We, Shamita Mhaske and Anam Mirza, the students of M. A. Rangoonwala Dental College and Research Centre, are conducting a Study on Dental Treatment Anxiety and Oral Health Status among University Students and its Correlation with their field of study.

Only oral examination will be done to find your oral health conditions. Some questions regarding dental anxiety will also be asked.

No invasive procedures will be done.

The study would be beneficial at an individual level as well as for future researches.

Your participation would be highly encouraged and appreciated.

Annexure 2- *Consent form*

Annexure-2 CONSENT FORM

TITLE: Dental Treatment Anxiety & Oral Health Status among University Students and its

Correlation with their field of study- A cross sectional study

I confirm that Shamita Mhaske and Anam Mirza (investigators) have explained and ensured me

that there will be no Intervention done on me and there will be no risk that I may experience. All

my queries regarding the study are made clear.

I give my consent to participate.

NAME

AGE

GENDER

DATE

SIGNATURE

Annexure 3- *Modified Dental Anxiety Scale (refer https://www.researchgate.net/figure/Modified-dental-anxiety-scale_fig1_325971424)*

Annexure-3 MODIFIED DENTAL ANXIETY SCALE DEVELOPED BY HUMPHRIS, MORRISON & LINDSAY ET AL (1995)

Can You Tell Us How Anxious You Get, If At All, With Your Dental Visit?

Please Indicate By Inserting In The Appropriate Box

1. If you went to your Dentist for TREATMENT TOMORROW, how would you feel?

☐ Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious

2. If you were sitting in the WAITING ROOM (waiting for treatment), how would you feel?

☐ Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious

3. If you were about to have a TOOTH DRILLED, how would you feel?

☐ Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious

4. If you were about to have your TEETH SCALED AND POLISHED, how would you feel?

☐ Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious

5. If you were about to have a LOCALANAESTHETIC INJECTION in your gum, above an upper

back tooth, how would you feel?

☐ Not Anxious ☐ Slightly Anxious ☐ Fairly Anxious ☐ Very Anxious ☐ Extremely Anxious

Annexure 4- *Oral health assessment form (refer* World Health Organization. Oral health surveys: basic methods - 5th edition. 2013; & Greene JC, Vermillion JR. The Oral Hygiene Index: A Plaque-Index for the Assessment of Oral Hygiene. J Am Dent Assoc. 1964;68:7-13).

Annexure-4

World Health Organization - Modified Oral Health Assessment form (2013) and Oral Health Index-Simplified (OHI-S, 1964)

Name : _____ Age : _____ Gender : _____

College : _____ Branch : _____ Year : _____

Education : _____ Monthly Family Income : _____

Residence : Hostel / PG / Localite   Any lesions : _____

Oral hygiene practices : 1) Frequency of brushing: Once / Twice / Thrice / None

2) Time of brushing : Morning / Afternoon / Evening

3) Materials used : _____

4) Any other aids used : _____

Past Dental History : _____

- **Previous Dental Experience :** _____

Dentition Status :

18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38

Oral Health Status- Simplified:

Debris Index: 16 11 26

46 31 36

Calculus Index: 16 11 26

46 31 36

OHI-S Index: _____

Dental Trauma :

Status : [ ]   Intervention urgency : [ ]

No. Of teeth affected : [ ]

REFERENCES

1. Armfield, J. M. (2010). How do we measure dental fear and what are we measuring anyway? *Oral Health Prev Dent, 8*(2), 107-115.

2. Humphris, G. M., & King, K. (2011). The prevalence of dental anxiety across previous distressing experiences. *J Anxiety Disord, 25*(2), 232-236.

3. Gaigalaitė, S., & Daugėlienė, R. (2021). The impact of socioeconomic status on dental anxiety in children and adolescents: a systematic review. *BMC Oral Health, 21*(1), 165.

4. Cohen, S. M., Fiske, J., & Newton, J. T. (2000). The impact of dental anxiety on daily living. *Br Dent J, 189*(7), 385-390.

5. Lachhab, A., & Abouda, N. (2020). The role of dental anxiety in treatment avoidance: A review. Saudi Dent J, 32(5), 207-214.

6. Acharya, S. (2008). Factors affecting dental anxiety and beliefs in an Indian population. *J Oral Rehabil, 35*(4), 259-267.

7. Friedman, M., & Keener, N. (2010). Dental anxiety levels in students enrolled in health-related programs versus other fields. *Health Educ Res, 25*(4), 628-634.

8. Chi, S. I. (2023). What is the gold standard of the dental anxiety scale? *J Dent Anesth Pain Med, 23*(4), 193-212.

9. Gale, N. (1998). A ranking questionnaire for the assessment of dental anxiety. *Br Dent J, 184*(3), 121-125.

10. Getz, T. (1991). An empirical assessment of the Dental Belief Survey. *Dent Hyg (Chic), 65*(3), 138-143.

11. Corah, N. L. (1969). An assessment of a dental anxiety scale. *J Am Dent Assoc, 78*(4), 589-592.

12. Kleinknecht, R. A., & Demby, A. (1986). Development of the Dental Fear Survey. *Psychol Rep, 58*(3), 883-890.

13. Klingberg, G., & Broberg, A. G. (2007). Dental fear/anxiety and dental behavior in children: a review of the literature. *Eur Arch Paediatr Dent, 8*(2), 66-72.

14. Al-Omari, W. M., & Al-Omiri, M. K. (2009). Dental anxiety among university students and its correlation with their field of study. *Journal of Applied Oral Science, 17*(3), 199-203.

15. von Elm, E., Altman, D. G., & Egger, M. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Ann Intern Med, 147*(8), 573-577.

16. World Medical Association. (2001). World Medical Association Declaration of Helsinki. Ethical principles for medical research involving human subjects. *Bulletin of the World Health Organization, 79*(4), 373–374.

17. World Health Organization. Oral health surveys: basic methods - 5th edition. 2013.

18. Greene, J. C., & Vermillion, J. R. (1964). The Oral Hygiene Index: A Plaque-Index for the Assessment of Oral Hygiene. *J Am Dent Assoc, 68,* 7-13.

19. Armfield, J. M., & Heaton, L. J. (2013). Management of fear and anxiety in the dental clinic: a review. *Aust Dent J, 58*(4), 390-407.

20. Kumar, S., & Usha, M. (2015). The influence of gender on dental anxiety among patients attending dental clinics in India. *J Clin Diagn Res, 9*(6), 32-35.

21. Newton, J. T., Khan, F., & Richmond, S. (2007). Factors influencing dental anxiety in medical and dental students. *Eur J Dent Educ, 11*(3), 143-148.

22. De Jongh, A., Fransen, J., Oosterink-Wubbe, F., & Aartman, I. (2006). Psychological trauma exposure and trauma symptoms among individuals with high and low levels of dental anxiety. *European journal of oral sciences*, *114*(4), 286-292.

23. Locker, D., & Liddell, A. M. (1991). Correlates of dental anxiety among older adults. *Journal of Dental Research*, *70*(3), 198-203.

24. Porritt, J. (2012). Dental anxiety and its relationship to oral health outcomes. *Community Dent Health, 29*(2), 143-147.

25. Carson, P. (2015). The relationship between dental anxiety, dental attendance and oral health. *Br Dent J, 218*(9), 555-559.