

Stress assessment awareness among practitioners during dental procedures: a cross-sectional study

Smrithi Vishakha Varma^{1*} , Sheeja Varghese¹ ,
Srinivasan Narasimhan² , Sajan Velayudhan Nair³ 

¹ Department of Periodontology,
Saveetha Dental College, Chennai,
Tamil Nadu, India.

² Department of Endodontics,
Hamad Dental Center, Hamad
Medical Corporation, Doha, Qatar.

³ Department of Orthodontics, Sri
Sankara Dental college, Kerala, India.

Corresponding author:

Dr. Smrithi Vishakha Varma
Sangeeth, C8, Elankom Gardens
Vellayambalam, Trivandrum-695010
Phone Number: +919995982747
Email Id: smrithivishakhavarma@
gmail.com

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Aim: Patient anxiety during dental procedures impacts oral health and well-being. Dental practitioners are vital in managing this stress. Our study aims to explore, analyze, and draw comparisons regarding the understanding and awareness levels of stress and anxiety assessment during routine dental procedures among general dental practitioners and specialists.

Method: A self-administered questionnaire was sent to 503 Indian dental practitioners, encompassing both general dentists and specialists. Comprising 13 sections, the questionnaire covered demographic information and delved into topics such as dental anxiety assessment tools, familiarity with stress-reducing techniques, and awareness of the impact of anxiety on treatment outcomes. Following this, data analysis was performed using SPSS software, employing a range of descriptive and inferential statistics, including the Chi-square test. **Results:** Significant knowledge disparities were observed. While 78.3% of specialists assessed patient stress, only 75% of general dentists did, with no statistical difference ($p=0.386$). Both groups recognized the impact of gender dynamics and environmental factors on stress, but these findings lacked significant differences ($p=0.314$, $p=0.40$, $p=0.86$). However, specialists showed significantly more awareness of the link between stress and periodontal disease ($p=0.043$), genetics' role in stress ($p=0.008$), and the implications of epigenetics for stress and oral health ($p=0.000$). **Conclusion:** This study highlights a noticeable knowledge gap between general dentists and specialists in assessing patient stress during dental procedures. While both groups share similar views on gender dynamics and environmental factors, significant differences exist in their awareness of connections between stress, periodontal disease, genetics, and epigenetics. Targeted educational efforts are necessary to bridge this knowledge gap, improve patient care, and advance dental medicine.

Keywords: Stress, psychological. Genetics. Epigenomics. Anxiety. Dentistry.

Introduction

Dental anxiety, a prevalent condition affecting a significant portion of individuals spanning various age groups and socioeconomic backgrounds, often deters people from seeking dental care. The presence of stress and anxiety in patients can undermine the effectiveness of dental treatments, increase the risk of complications, and significantly impact overall patient satisfaction¹. Dental professionals must possess the requisite knowledge and awareness to skillfully recognize and address stress and anxiety to deliver effective care.

Historically, according to Spielberger et al.², the term 'stress' has been used in two primary contexts: firstly, to describe adverse situations or circumstances that trigger anxiety responses, and secondly, to refer to the anxiety reactions themselves that are elicited by these stressors. In the framework defined by Lazarus³, anxiety is categorized as a distinct form of emotional stress, setting it apart from positive emotions like love, happiness, and excitement. Following Lazarus' model, stress emotions involve three core components: the emotional experience (affect), a compulsion to act, and physiological changes.

This remains a significant concern, generating concerns for dental practitioners and patients as they engage in routine dental services during regular interactions⁴. Anxiety is an emotional state that arises before encountering potentially threatening stimuli, which may sometimes be imperceptible. This sensation is commonly experienced in everyday situations, such as before exams, when making important decisions, in the workplace, and in numerous other scenarios.

Managing these apprehensive patients stresses dentists more, necessitating extra time and resources due to reduced patient cooperation. Consequently, this results in an unsatisfactory experience for the patient and the dentist^{5,6}.

Individuals who experience fear and anxiety associated with dental procedures often anticipate unfavorable outcomes, which, in turn, leads them to avoid dental appointments. This avoidance behavior contributes to a decline in oral health, resulting in increased occurrences of tooth decay, tooth loss, and worsening periodontal conditions⁷.

According to Cohen et al.¹, dental anxiety exerts a profound impact on various aspects of an individual's life. Physiologically, this is manifested by signs and symptoms of the fight or flight response and feelings of fatigue following a dental visit. Cognitively, it gives rise to a spectrum of negative thoughts, beliefs, and fears. Behaviorally, it extends beyond mere avoidance to encompass behaviors related to eating, oral hygiene, self-medication, crying, and even aggression. These repercussions extend to general health, causing sleep disturbances that affect both existing and new personal relationships. Additionally, social interactions and workplace performance suffer due to diminished self-esteem and self-confidence.

The literature presents a wide range of reported prevalence rates for dental fear in adults, ranging from as low as 4.2%⁸ to well over 50%⁹. Psychological factors

related to dentistry, including individuals' beliefs, thoughts, and emotions concerning dentists and the dental environment, can influence their dental attendance. Research from Western countries suggests that negative perceptions of dentists' behavior and unfavorable attitudes toward dentists are associated with lower rates of dental appointments¹⁰.

This study aimed to assess the current knowledge and awareness levels among dental practitioners regarding the evaluation of stress and anxiety during routine dental procedures.

Materials and methods

In this cross-sectional observational study, a questionnaire-based approach was used to engage 503 dental practitioners from various dental clinics across India, seeking to gain insights into the assessment of stress. The study plan received approval from the institutional review board (IHEC Ref No: SDC/Ph.D.-01/19/10). A self-structured and non-incentivized questionnaire was specifically designed to focus on the assessment of stress and anxiety during routine dental procedures. The questionnaire encompassed 12 sections, which included demographic information, questions related to dental anxiety assessment tools, familiarity with stress-reducing techniques, and awareness of the impact of anxiety on treatment outcomes.

The questionnaire was electronically distributed to a diverse group of participants, encompassing both general dentists and specialist practitioners. General dentist practitioners were defined as individuals holding a bachelor's degree in dental surgery, while specialist dental practitioners possessed a minimum of 3 years of post-graduate specialization in various dental specialties (Periodontology, Prosthodontics, Orthodontics, Oral surgery, Endodontics). Those general dental practitioners and specialists who were not actively engaged in clinical practice, as well as participants who did not respond despite five reminders, were excluded from the study.

The sample size was determined using convenient sampling methods, and the design of the structured questionnaire was based on existing literature. To enhance its validity and clarity, a pilot study involving 30 participants was conducted.

To maintain the integrity of the results, incomplete questionnaires were omitted from the analysis. The collected data were organized into tables and subjected to comprehensive statistical analysis. This approach allowed us to gain valuable insights into the awareness levels of dental practitioners regarding the assessment of stress and anxiety during routine dental procedures.

Data Collection

A total of 700 dentists were contacted by email to participate in the survey, resulting in 503 responses received. Follow-up reminders were sent to the dentists after 2 to 4 weeks. The questionnaire remained available for a duration of 60 days. The collected data were subject to analysis using suitable statistical methods. The assess-

ment of knowledge and awareness levels pertaining to stress and anxiety evaluation was based on the questionnaire responses.

Statistical Analysis

Data entry and analysis were performed with the assistance of statistical software (SPSS version 27). Descriptive statistics, including cross tabulations, were employed to summarize the demographic attributes of the participants. The data was presented through frequency counts and percentages to provide a clear overview. Furthermore, inferential statistics, specifically the Chi-square test, were applied to determine whether any significant associations existed among the categorical variables.

Results

In the present study, we have addressed three key objectives. The first objective was to assess the awareness and knowledge levels among dental practitioners regarding the evaluation of stress and anxiety in patients when they visit dental clinics. Our results as shown in Table1, indicated that 97.2% of the participating dental practitioners acknowledged the connection between stress and oral health, while only 76.9% of practitioners actually incorporate stress assessment into their clinical practice.

Table 1. Categorical Analysis of Response Frequencies and Percentages Among Dental Practitioners

1. Are you practicing as a general dentist or a specialist?		General dental practitioner	Specialist	General dental practitioner + Specialist (Relative frequency)	Pearson Chi-Square Test
		Count (N%)	Count(N%)	N%	P-Value
2. Are you aware that Stress has a direct relationship on oral health	No	8(3.8%)	6(2.0%)	2.8%	0.224
	Yes	200(96.2%)	289(98.0%)	97.2%	
3. Do you assess stress among your patients in clinical practice?	No	52(25.0%)	64(21.7%)	23.1%	0.386
	Yes	156(75.0%)	231(78.3%)	76.9%	
4. Do you think gender plays a crucial role in stress or stressful life events?	No	65(31.3%)	80(27.1%)	28.8%	0.314
	Yes	143(68.8%)	215(72.9%)	71.2%	
5. Do you think environmental factors contribute to an individual's stress?	No	11(5.3%)	11(3.7%)	4.4%	0.400
	Yes	197(94.7%)	284(96.3%)	95.6%	
6. Do you think oral conditions such as periodontal disease contribute to stress?	No	77(37.0%)	107(36.3%)	36.6%	0.864
	Yes	131(63.0%)	188(63.7%)	63.4%	
7. Could stress be linked to periodontal disease?	No	74(35.6%)	80(27.1%)	30.6%	0.043*
	Yes	134(64.4%)	215(72.9%)	69.4%	

Continue

Continuation					
8. Do you think stress can modify the treatment outcomes?	No	11(5.3%)	6(2.0%)	3.4%	0.047*
	Yes	197(94.7%)	289(98.0%)	96.6%	
9. Do you think there is a knowledge gap concerning the ability of dental clinicians to identify patients with Stress?	No	20(9.6%)	23(7.8%)	8.5%	0.472
	Yes	188(90.4%)	272(92.2%)	91.5%	
10. Do you think genetics plays a crucial role in stressful life events?	No	64(30.8%)	60(20.3%)	24.7%	0.008*
	Yes	144(69.2%)	235(79.7%)	75.3%	
11. Are you aware of epigenetics and its impact on stress and oral health?	No	102(49.0%)	78(26.4%)	35.8%	0.000*
	Yes	106(51.0%)	217(73.6%)	64.2%	
12.If yes, do you think potential implication of epigenetic research can change the face of dental and oral regeneration	No	78(37.5%)	70(23.7%)	29.4%	0.001*
	Yes	130(62.5%)	225(76.3%)	70.6%	

A total of 71.2% of practitioners believed that gender plays a significant role in stress and the experience of stressful life events. Of these, 55.7% believed that stress affects females the most. Additionally, 95.6% of the practitioners recognized the influence of environmental factors on an individual's stress levels. However, only 63.4% of practitioners believed that oral conditions, such as periodontal disease, contribute to stress, while 69.4% believed stress is connected to periodontal disease. A substantial 96.6% of the practitioners agreed that stress can influence the outcomes of dental treatments. A majority, 91.5%, also felt a knowledge gap concerning dental clinicians' ability to identify patients experiencing stress. Furthermore, 75.3% of practitioners believed that genetics plays a crucial role in the experience of stressful life events. Notably, only 64.2% of the practitioners were aware of epigenetics and its impact on stress and oral health. Finally, 70.6% of dental practitioners believed that the potential implications of epigenetic research have the potential to transform the landscape of dental and oral regenerative medicine.

The second objective was to compare the knowledge of stress assessment between general dental practitioners and specialists. Our analysis showed that both groups had similar approaches, with 78.3% of specialists and 75% of general dentists reporting routine stress assessments. Notably, there was no statistically significant difference in their stress assessment practices ($p=0.386$).

The third objective aimed to pinpoint knowledge gaps among dental practitioners and recommend improvement strategies. While 95.6% of participants believed that environmental factors played a role in stress, and 63.4% linked stress to oral conditions, such as periodontal disease, these associations did not exhibit statistical significance ($p=0.40$ and $p=0.86$, respectively). In contrast, a significant difference emerged when 69.4% of participants suggested a connection between stress and periodontal disease ($p=0.043$), revealing a distinction between specialists and

general dentists. Furthermore, our study found that dental practitioners acknowledged the transformative impact of stress on treatment outcomes (96.6%) and the presence of a knowledge gap (91.5%) without reaching statistical significance. Notably, genetics' role in stress garnered recognition by 75.3%, with statistical significance ($p=0.008$), highlighting another difference between the two groups. Additionally, we observed that 64.2% of participants demonstrated awareness of epigenetics' implications for stress and oral health, with a remarkably high level of statistical significance ($p=0.000$). Furthermore, there was a consensus among the respondents (70.6%) that epigenetic research holds the potential to revolutionize dental and oral regenerative medicine, with significant statistical significance ($p=0.001$), indicating the promise of substantial advancements in the field. These results collectively emphasize the need for targeted educational initiatives and enhanced interdisciplinary collaboration to bridge the knowledge gap between general dental practitioners and specialists in the field of stress assessment during routine dental procedures.

Discussion

Our study reveals substantial disparities between general dental practitioners and specialists in their knowledge and practices related to stress assessment during routine dental procedures.

In terms of stress assessment practices, we observed differences in the approaches employed by specialists and general dentists. Notably, 78.3% of specialists reported routinely assessing stress in their patients, compared to 75% of general dentists, though this variation was not statistically significant ($p=0.386$). This suggests a shared recognition of the importance of stress assessment but underscores the need for consistency in practices across the two groups.

Perceptions regarding gender dynamics in stress also differed, with 71.6% of practitioners collectively recognizing the significance of gender in stress responses¹¹. Of these, 51.6% specifically noted that females tend to be more affected by stress¹². Both men and women exhibit distinct responses to stress, encompassing both psychological and biological aspects¹³. The biological understanding of stress has deep historical roots, emerging from the interconnection of two pre-existing notions: psychological distress and physiological homeostasis¹⁴. Consequently, the stress response was conceptualized as a unified reaction to various environmental situations that posed a risk of disrupting an organism's typical physiological equilibrium.

In our study, it's noteworthy that an impressive 97.2% of both general dental practitioners and specialists recognized the clear association between stress and oral health. However, it's important to highlight that the statistical significance remained elusive ($p=0.224$), aligning with previous research findings^{5,15-18}. While this finding aligns with research by Marcenes and Sheiham¹⁵ (1992), who established a positive correlation between occupational demands and periodontal health issues, evident through bleeding or pockets observed during clinical examinations. Similarly, a study by Finlayson et al.¹⁶ (2010) identified a connection between chronic stress and higher levels of self-reported oral health problems. Armfield et al.¹⁷ (2013) revealed

a noteworthy positive correlation between chronic stress and untreated decayed teeth. These findings resonate with our study and corroborate the dentists' recognition of the association between dental anxiety and compromised oral health, while also emphasizing the necessity for a deeper understanding of effectively addressing and managing dental anxiety, as indicated by research conducted by Moore and Brødsgaard⁵. The American Dental Association has also noted an increased occurrence of oral health issues associated with stress¹⁸.

In our research, it's essential to note that 51.1% of practitioners utilized a history-taking method to assess stress¹⁹. Dentists encounter a growing number of patients with complex medical conditions in their daily practice, and there exists a disparity of perspectives on the best approach to gather comprehensive medical and social histories. Combining history-taking techniques with verbal confirmation has been demonstrated as the most effective and reliable strategy for identifying issues among dental patients.

The role of environmental factors in contributing to stress found recognition among 95.6% of participants, yet both general dentists and specialists shared similar perspectives, and the lack of statistical significance ($p=0.40$) suggests room for more in-depth understanding. Human studies exploring the detrimental health impacts of prolonged stress within the context of socioeconomic disparities reveal the significant influence of the environmental backdrop. Individuals positioned at the lower levels of the socioeconomic gradient frequently exhibit more pronounced health damage triggered by stress²⁰.

Moreover, when we compare the two groups, 64.4% of general dental practitioners and 72.9% of specialists in our study believed in the connection between stress and periodontal disease. This observation aligns with previous studies conducted by Lu et al.²¹ and Refulio et al.²², which have also highlighted the role of psychological stress as a contributing factor in the onset of periodontal disease. Furthermore, it emphasizes that stress can potentially exacerbate the severity of periodontal disease and impede the effectiveness of available treatments. The statistical significance of this association was 0.04. The observed difference could have been due to differences in training and expertise such as specialists typically undergo additional training in their specific field of dentistry, which may include more exposure to psychology and patient assessment techniques.

This perspective was corroborated by 96.6% of dental practitioners, underscoring that stress can significantly influence treatment outcomes, as evidenced by our study's statistical significance of 0.047. Notably, when comparing the two groups, 94.7% of general dental practitioners and 98% of specialists firmly believed in the impact of stress on treatment outcomes. This conviction aligns with the findings of Catherine Petit et al.²³, whose research revealed that patients with elevated stress, anxiety, and depression scores, as well as those exhibiting negative coping strategies, tend to experience worsened outcomes in the context of Scaling and Root Planing procedures. Furthermore, studies conducted by Issam Bakri et al.²⁴ support this notion, as they demonstrated that patients under psychosocial stress had poorer outcomes following non-surgical periodontal therapy.

A notable 91.5% of the survey participants highlighted the existence of a knowledge gap within the dental community, particularly concerning the recognition of patients experiencing stress. This sentiment was shared by 90.4% of general dental practitioners and 92.2% of specialists, although the statistical significance was relatively low at 0.472. This observation finds support in the research of Markus Hoglund et al.^{25,26}, which underscores an inverse correlation between clinicians' confidence and their ability to assess patients with dental anxiety. Notably, the clinical acumen, a vital tool for clinicians in identifying signs of dental anxiety, necessitates a combination of intuition and experience. This is due to the substantial variability in behaviors associated with dental anxiety. The clinical acumen relies on attentiveness, awareness, and experience, all of which are crucial for identifying the diverse signs indicative of dental anxiety.

A noticeable contrast in recognizing the role of genetics in stress exists between general dental practitioners and specialists. Specifically, 69.2% of general dental practitioners acknowledge this role, whereas a higher percentage of specialists (79.7%) align with this perspective. This variance underlines the potential knowledge gap between these two groups and is supported by the statistical significance of 0.008. These findings are consistent with previous research by Smoller²⁷ and Caroline Park et al.²⁸.

Furthermore, there is a substantial difference in the awareness of epigenetics with stress and oral health between general dental practitioners and specialists. While 51% of general dentists are aware of this role, a significantly larger proportion of specialists (73.6%) recognize the significance of epigenetics in this context. This distinction is statistically significant, with a p-value of 0.000, and resonates with research conducted by Caroline Park et al.²⁸ and Asa'ad et al.²⁹.

These discrepancies in percentages between general dental practitioners and specialists can be attributed to several factors, including variations in training and specialization, differences in clinical exposure, varying levels of awareness, and the potential impact of interdisciplinary collaboration.

A significant proportion of dental practitioners (70.6%) believed in epigenetic research's transformative potential in dental and oral regeneration. Notably, a difference in opinion between the two groups, general dental practitioners, and specialists, is evident. While 76.3% of specialists believed that epigenetics can change the landscape of dental and oral regeneration, the percentage was slightly lower among general dental practitioners, with 62.5% sharing this belief. It's worth highlighting that the statistical significance we obtained for this insight was highly significant at 0.001. This variance in perspective could be attributed to a potential disparity in awareness levels, with specialists possibly being more informed on this subject.

This study bears several limitations that warrant consideration. First, the use of convenient sampling, while practical, may introduce sampling bias, potentially limiting the generalizability of the findings to the entire population of dental practitioners in India. Another noteworthy limitation is the reliance on self-reported data, which is susceptible to recall bias and the influence of social desirability. Furthermore, excluding non-responders and dental practitioners not actively engaged

in clinical practice introduces the possibility of selection bias. Additionally, the design and wording of questions in the questionnaire can influence responses. The study's limited geographical scope also needs to be considered, as findings may not directly apply to dental practitioners in other countries. In this study, more specialists participated in the survey than general dentists. This could have impacted the result of our study. These limitations collectively underline the need for a cautious interpretation of the study's results and emphasize areas for future research and refinement.

In conclusion, our cross-sectional observational study reveals a significant knowledge gap between general dental practitioners and specialists in assessing patient stress during routine dental procedures. General dental practitioners, in particular, require comprehensive training to effectively bridge this gap. While both groups share similar views on gender dynamics and environmental factors, substantial disparities exist in their awareness of the connections between stress, periodontal disease, genetics, and epigenetics. These findings underscore the immediate need for targeted educational initiatives, especially for general dental practitioners, and enhanced interdisciplinary collaboration to address patient anxiety effectively.

Our study aimed to evaluate dental practitioners' knowledge and awareness regarding stress assessment during routine dental procedures. The insights gained provide valuable information on current practices in identifying patient anxiety, offering clear guidance on areas needing improvement. By strengthening the knowledge and awareness of dental practitioners, especially general dental practitioners, we can enhance the overall patient experience, improve treatment compliance, and ultimately elevate oral health outcomes. Continuous research and education in this field are imperative for further advancing the capabilities of both general dental practitioners and specialists in effectively addressing patient anxiety.

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Conflict of Interest

The authors have no conflict of interests to disclose.

Data availability

Datasets related to this article will be available upon request to the corresponding author.

Author Contribution

Smrithi Vishakha Varma: Conception and design of the study, Writing the manuscript

Sheeja Varghese: Conception and design of the study, Review and editing

Srinivasan Narasimhan: Data Analysis, Interpretation and statistics

Sajan Velayudhan Nair: Data Collection, Review and editing

We declare that all authors actively participated in two distinct criteria related to authorship. Firstly, each author contributed substantially to the acquisition, analysis, or interpretation of the manuscript's findings. Secondly, all authors were actively involved in the revision process and collectively approved the final version of the manuscript.

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