



Dental Environmental Stress among Pre-Clinical and Clinical undergraduate students- a cross-sectional study.

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(Received: 16 February 2026

Revised: 14 March 2026

Accepted: 25 April 2026)

KEYWORDS

Stress,
Dental
Education,
Undergraduate Dental
Students,
Dental
Environment Stress
(DES)
Questionnaire.

ABSTRACT:

Background: The concept of stress encompasses external demands, both physical and psychological, that influence an individual's physical and mental health. Dental education is known to be an exceptionally stressful environment, with dental students reporting higher stress levels than medical students and the general population due to academic pressure and clinical demands.

Aim: The aim of the study is to assess the level of Dental Environment Stress among non-clinical and clinical undergraduate dental students using the Dental Environment Stress (DES) questionnaire.

Methods: This institution-based, descriptive cross-sectional study was conducted among undergraduate dental students in Andhra Pradesh and Northern Tamil Nadu. Data were collected using the DES questionnaire from 491 participants across second to fourth year. The questionnaire included 42 items divided into six domains: academic efficiency, patient treatment, internal beliefs, academic factors, clinical education, and other items. Statistical analysis was performed using SPSS version 21.

Results: Second-year students recorded the highest mean stress score (99.3 ± 26.1), followed by third-year students (92.6 ± 28.5) and fourth-year students (90.9 ± 29.4). Gender comparisons revealed no significant differences in stress levels, with males having a mean stress score of 95.4 ± 26.8 and females 94.3 ± 30.2 . Component-wise analysis showed no statistically significant differences among academic years or genders.

Conclusions: Dental students across all academic years experience considerable levels of stress, with the highest levels observed in the second year. The uniformity of stress across demographic groups suggests that curricular factors, rather than personal attributes, largely drive stress perception. The findings emphasize the need for comprehensive, institution-wide interventions to foster supportive learning environments and enhance student well-being.

1. Introduction

The concept of stress encompasses external demands, both physical and psychological, that influence an individual's physical and mental health. Stress is not merely a stimulus or a response; rather, it is a process involving the perception and management of environmental events. Students frequently experience perceived and potential stress, making them susceptible to psychological issues and negatively affecting their physical well-being. Research has consistently shown that dental education is an exceptionally stressful

environment, with dental students reporting higher stress levels than medical students and the general population due to academic pressure and clinical demands [1,2].

The need for dental students to excel academically while simultaneously mastering precise clinical skills contributes significantly to elevated stress levels. Primary stressors among dental students include living conditions, curriculum structure, academic workload, and clinical responsibilities [3]. Stress levels tend to increase as students progress through their dental



education, with students in clinical years experiencing greater stress than those in preclinical years [4].

Clinical dental students, who begin treating patients, encounter stressors similar to those faced by practicing dentists, in addition to academic pressures. The dental environment is particularly challenging and exposes students and practitioners to occupational health issues such as stress, musculoskeletal disorders, and percutaneous injuries. Stress within the dental setting has been identified as a contributing factor to needle-stick injuries, which may result in disease transmission and professional harm [5].

Numerous researchers have assessed stress in dental students using standardized instruments. The most commonly used tools include the Dental Environment Stress Questionnaire (DES), developed by Garbee et al. in 1981 to evaluate stressors related to predoctoral dental training, and the Perceived Stress Scale (PSS), which measures general perceived stress over a short period [6,7]. Individuals from different social, cultural, and educational backgrounds may perceive identical stressors differently, and coping strategies along with examination-related self-efficacy have been shown to influence stress perception [8].

As students transition from preclinical to clinical years, stress levels increase markedly. This rise is commonly associated with initial patient interactions, fear of making mistakes, higher faculty expectations, increased workload related to clinical competence, case requirements, and examinations. Academic stressors such as extensive coursework, frequent evaluations, long working hours, and limited relaxation time significantly contribute to psychological strain. Clinical stressors—including patient management, treatment planning, inadequate clinical time, lack of materials, and difficulty mastering new skills—further intensify stress.

Institutional and environmental factors such as faculty interactions, administrative issues, peer competition, and uncertainty regarding future employment also contribute to stress. These stressors are commonly categorized into domains including workload, self-efficacy, faculty and administration, patient care, performance pressure, and personal and social factors, emphasizing the need to understand stress patterns across different clinical years [2,3,8]. The aim of the study is to assess the level of Dental Environment Stress among non-clinical and

clinical undergraduate dental students using the Dental Environment Stress (DES) questionnaire.

2. Objectives

1. To evaluate and compare the levels of stress among non-clinical and clinical dental undergraduate students using a validated stress scale.
2. To identify specific stressors and patterns of stress across different years of study within dental institutions.
3. To understand the psychological well-being of dental students and how stress affects their academic performance, clinical skills, interpersonal relationships, and overall mental health.

Methods

This study adopts an institution-based, descriptive cross-sectional design to assess perceived stress among undergraduate dental students. Data are collected at a single point in time using the Dental Environment Stress (DES) questionnaire from both non-clinical (pre-clinical) and clinical year students, allowing comparison of stress levels and stressors between the two groups and evaluation of their association with selected demographic and academic variables.

The study was conducted as a multicentric and data was collected from undergraduate dental students of Andhra Pradesh and Northern Tamil Nadu, who are enrolled in Clinical and non-clinical postings (Second Year to Final Year) of Bachelor of Dental Surgery (BDS) program during the study period. The study was conducted for the period of 1 month of November 2025.

Ethical Clearance: Ethical clearance to conduct the research was obtained from the Institution Review Board of Narayana Dental College and Hospital, Nellore with a reference ID number (IEC/NDCH/2025/JUNE/P-63). The study was done in accordance with the Declaration of Helsinki.

Study Tool: A pre-validated Dental Environment Stress (DES) questionnaire for assessing stress among non-clinical and clinical dental undergraduates, which includes 42 items divided into six domains: academic efficiency, patient treatment, internal beliefs, academic factors, clinical education, and other items. Each item is



rated on a 4-point scale from "not stressful" to "very stressful," and the mean score is calculated for each item.

Sample Size: Based on the academic year admissions and those who respond on the day to the Google form.

Target Population/Study Population: The study was conducted at multicentric level among students of second year to final year who are admitted in the academic years of 2023-2025 in the states of Andhra Pradesh and Tamilnadu. The list of dental colleges was obtained from the Dental Council of India. .

Inclusion Criteria: Those students who were posted in non-clinical and clinical postings which includes second, third and final year. Students who gave informed consent. Those who were willing to participate in the study.

Study Procedure: A pre-validated Dental Environment Stress (DES)⁶ questionnaire for assessing stress among non-clinical and clinical dental undergraduates, which includes 42 items divided into six domains: academic efficiency, patient treatment, internal beliefs, academic factors, clinical education, and other items. Each item is rated on a 4-point scale from "not stressful" to "very stressful," and the mean score is calculated for each item.

Demographic data such as age, gender, academic year, and marital status are also collected. This study has used tools such as the Dental Environment Stress Questionnaire (DES)⁶ to evaluate stress in dental students, revealing that cultural backgrounds, learning experiences, and gender may influence how students perceive stressors. Given the competitive nature of dental training and its importance for future academic and career success, understanding the sources and levels of stress among dental undergraduates.

Data Collection: The data was collected using an online method of sending a google form which consists of demographic data like Gmail ID, gender, age, sex. The next step in the google form involves a consent question. The questionnaire include self-efficacy beliefs (1 to 9 Table 2 presents the comparison of overall stress scores across the three academic years. Second-year students recorded the highest mean stress score (Mean = 99.3 ± 26.1), followed by third-year students (Mean = 92.6 ±

questions), faculty and administration (10 to 19 questions), workload (20 to 25 questions), patient treatment (26 to 31 questions), clinical training (32,33 questions), performance pressure (34,35 questions) and others (36 to 42 questions).

Statistical Analysis:

Data was collected and compiled and entered micro soft excel 2016 Statistical analysis was done using spss version 21 Kruskal wallis test was done for the year wise comparison of stress scores and its components and Mann Whitney u test was used to compare the gender wise comparison of stress scores and its components.

3. Results

A total of 491 dental students participated in the study. The results are presented in accordance with the study objectives and statistical analyses performed.

Table 1. Demographic Characteristics of the Study Participants: The demographic distribution of the participants is summarized in Table 1. Of the total sample, 27.7% (n = 136) were males and 72.3% (n = 355) were females. Regarding academic year, 33.0% (n = 162) were second-year students, 35.0% (n = 172) were third-year students, and 32.0% (n = 157) were fourth-year students.

Table 1 : Distribution of sample based on year of study

| Demographics | | Frequency | Percentage |
|---------------|----------|-----------|------------|
| Gender | Males | 136 | 27.7% |
| | Females | 355 | 72.3% |
| Year of study | II Year | 162 | 33% |
| | III Year | 172 | 35% |
| | IV Year | 157 | 32% |

2. Comparison of Stress Scores Based on Year of Study

28.5) and fourth-year students (Mean = 90.9 ± 29.4). The Kruskal–Wallis test revealed no statistically significant difference among the groups (p = 0.236).



Table 2 : Comparison of stress scores based on year of study

| Year of study | Mean | Std.dev | p-value |
|---------------|------|---------|-----------|
| II year | 99.3 | 26.1 | 0.236(NS) |
| III year | 92.6 | 28.5 | |
| IV year | 90.9 | 29.4 | |

Kruskal-Wallis test $p < 0.05$ * significant.

3. Comparison of Components of the Dental Environmental Stress (DES) Questionnaire

Component-wise comparison of stressors among the three academic years is shown in Table 3. Across self-efficacy, faculty relations, workload, clinical treatment, training, performance pressure, and other stress domains, second-year students consistently showed higher mean scores compared to third- and fourth-year students. However, none of the differences were statistically significant with the Self-efficacy ($p = 0.502$), Faculty-related stress ($p = 0.067$), Workload ($p = 0.353$), Treatment-related stress ($p = 0.294$), Training ($p = 0.062$), Performance ($p = 0.319$), Others ($p = 0.170$). Although the mean values showed variations, the Kruskal–Wallis analysis confirmed no significant association between year of study and any individual DES component.

Table 3 : Comparison of components in dental environmental stress questionnaire

| Year of study | Self efficacy | Faculty | Work | Treatment | Training | Perform | Others |
|---------------|---------------|------------|------------|------------|------------|------------|------------|
| II year | 21.3(6.01) | 23.1(7.02) | 15.2(4.56) | 14.1(4.46) | 4.64(1.78) | 4.89(1.81) | 16.0(5.00) |
| III year | 20.7(6.47) | 20.6(7.84) | 14.9(5.5) | 12.9(4.44) | 4.21(1.59) | 4.76(1.92) | 14.6(5.05) |
| IV year | 19.6(6.94) | 21.2(7.17) | 13.7(4.83) | 13.6(4.95) | 3.79(1.86) | 4.28(1.79) | 14.8(5.09) |
| p-value | 0.502(NS) | 0.067(NS) | 0.353(NS) | 0.294(NS) | 0.062(NS) | 0.319(NS) | 0.17(NS) |

Kruskal-Wallis test $p < 0.05$ * significant

4. Gender-wise Comparison of Overall Stress Scores The distribution of stress scores between male and female students is presented in Table 4. Males had a

mean stress score of 95.4 ± 26.8 , while females had a mean score of 94.3 ± 30.2 . The Mann–Whitney U test indicated no significant gender difference ($p = 0.879$).

Table 4 : Gender wise comparison of stress scores

| Gender | Mean | Std.dev | pvalue |
|---------|------|---------|-----------|
| Males | 95.4 | 26.8 | 0.879(NS) |
| Females | 94.3 | 30.2 | |

Mann-whitney u test $P < 0.05$ * significant

5. Gender-wise Comparison of DES Components

Table 5 shows the gender-wise comparison of DES components. Across all domains—self-efficacy, faculty, workload, treatment-related stress, training, performance, and other stressors—no statistically significant gender differences were observed: Self-efficacy ($p = 0.857$), Faculty ($p = 0.959$), Workload ($p = 0.460$), Treatment ($p = 0.285$), Training ($p = 0.684$), Performance ($p = 0.994$), Others ($p = 0.538$). Mean



values between males and females were comparable in each domain, indicating no gender-based variation in perceived stress levels among the participants.

Table 5 : Gender wise comparison of DES components

| Components | Gender | Mean | Std.dev | p-value |
|---------------|---------|-------|---------|-----------|
| Self efficacy | Males | 20.84 | 5.98 | 0.857(NS) |
| | Females | 20.64 | 7.28 | |
| Faculty | Males | 21.72 | 7.33 | 0.959(NS) |
| | Females | 21.62 | 7.88 | |
| Work | Males | 15.06 | 4.83 | 0.46(NS) |
| | Females | 14.38 | 5.55 | |
| Treatment | Males | 13.64 | 4.51 | 0.285(NS) |
| | Females | 13.07 | 4.63 | |
| Training | Males | 4.35 | 1.67 | 0.684(NS) |
| | Females | 4.27 | 1.89 | |
| Perform | Males | 4.74 | 1.88 | 0.994(NS) |
| | Females | 4.73 | 1.81 | |
| Others | Males | 15.09 | 4.89 | 0.538(NS) |
| | Females | 15.64 | 5.50 | |

Discussion

The present study assessed stress levels and associated components among undergraduate dental students across second, third, and fourth years, along with gender-wise comparisons. The findings indicate that although variations in stress scores were observed between academic years and genders, none of these differences were statistically significant. This suggests that dental education-related stress is a pervasive experience across student groups, rather than being concentrated within a particular year or gender [9–11].

The demographic distribution of the sample showed a higher proportion of females compared to males. This

pattern is consistent with current trends in dental education in India, where female enrollment often surpasses male enrollment [4]. Despite this disproportion, gender did not significantly influence overall stress scores. Both male and female students demonstrated comparable levels of perceived stress, which aligns with studies reporting that stress in dental programs arises primarily from the academic environment rather than from gender-specific factors [10,13,14]. It may also indicate that the curricular demands, clinical workload, and institutional expectations exert a uniform influence on students regardless of gender [8].

Analysis of stress scores across academic years revealed that second-year students exhibited the highest mean stress score (99.3), followed by third- and fourth-year students. Although these differences were not statistically significant, the observed trend is meaningful. The second year of dental education typically represents the transition from predominantly theoretical learning to preclinical and laboratory-based training. This shift requires students to develop psychomotor skills, adapt to a more demanding workload, and manage performance anxiety associated with preclinical competencies [9,11,16]. Previous studies have similarly reported increased perceived stress during transitional stages of dental training, where students face unfamiliar clinical expectations, time-bound laboratory work, and the pressure to achieve procedural proficiency [15,17,18].

Third- and fourth-year students demonstrated slightly lower mean stress scores. This may reflect progressive adaptation to the dental environment, increased confidence in clinical skills, and improved coping strategies acquired through experience. In many dental programs, students gain hands-on clinical exposure during these years, which, although demanding, may provide a sense of accomplishment and control that mitigates stress [14,19]. The absence of significant differences across years suggests that while stress fluctuates with academic progression, the overall impact of the dental curriculum remains relatively consistent [10,20].



Component-wise analysis of the Dental Environmental Stress (DES) questionnaire showed no statistically significant differences among academic years. However, certain patterns were evident. Second-year students consistently demonstrated higher mean scores in components such as self-efficacy, faculty relations, clinical workload, performance pressure, and treatment-related stress. These findings reflect the increased academic expectations and skill-based learning demands placed on students during this stage [11,16]. Though the results were not statistically significant, such patterns are consistent with literature highlighting that early clinical learning stages often generate greater anxiety related to acquiring technical skills, meeting faculty standards, and transitioning into clinical responsibilities [9,17].

Similarly, gender-wise analysis of DES components indicated no significant differences between males and females. This suggests that both genders perceive the dental environment as equally demanding. Although some studies in dental education have reported higher stress among female students—attributed to emotional responsiveness, societal expectations, or work–life balance considerations [12,21]—the current study did not reflect these trends. Instead, the findings support research indicating that academic pressures, evaluation methods, time constraints, and clinical productivity requirements affect all students similarly, irrespective of gender [10,14,20].

The overall non-significant findings across groups may indicate that stress determinants in dental education stem from systemic and structural characteristics of the curriculum rather than from demographic variables. Factors such as workload intensity, clinical quotas, faculty interactions, and academic assessments are common to all students and may overshadow individual differences [11,18,19]. Additionally, coping mechanisms, peer support systems, and institutional resources may play a mediating role in stress perception across different cohorts [8,1].

While the results demonstrate no statistically significant differences, the consistently higher trends observed in second-year students and certain stress components highlight the importance of early interventions. Stress management programs, mentorship initiatives, faculty–student communication enhancement, and structured orientation into clinical training may help reduce

perceived stress during transitional phases [13,17,1]. Institutions may also consider periodic mental health screening and support services to help students navigate the challenges inherent in dental training [14,19].

Conclusion

This study highlights that dental students across all academic years' experience considerable levels of stress, although differences between years and genders were not statistically significant. The elevated stress in the second year underscores the transitional challenges students face during preclinical training. The uniformity of stress across demographic groups suggests that curricular factors, rather than personal attributes, largely drive stress perception. The findings emphasize the need for comprehensive, institution-wide interventions to foster supportive learning environments and enhance student well-being.

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