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ORIGINAL ARTICALE

NAVIGATING STRESS AND PERFORMANCE:VARIABILITY IN PRE-CLINICAL PROSTHODONTICS ASSESSMENTS FOR SECOND-YEAR STUDENTS

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ABSTRACT

Background: Stress is a common factor in dental education, particularly in preclinical prosthodontics training, where students are expected to develop precise technical skills. This study investigates the relationship between stress levels and performance in denture fabrication among second-year dental students. By understanding the impact of stress, dental educators can implement strategies to improve student well-being and educational outcomes.

Methods: The study was conducted at ITS Dental College, Ghaziabad, involving 85 second-year dental students. Participants completed a trial denture base exercise using acrylic and wax components. Their work was assessed by four independent examiners using objective scoring criteria. Stress levels were measured using a self-report questionnaire, with scores indicating varying levels of perceived stress. Correlations between stress levels and the accuracy of students' preclinical performances were analysed.

Results: Preliminary findings suggest a notable correlation between higher stress levels and decreased accuracy in denture fabrication. Students reporting higher perceived stress tended to have lower scores in their preclinical work, indicating that stress negatively impacted their performance. Conversely, students with lower stress levels demonstrated more accurate and precise denture fabrication outcomes.

Conclusion: The study highlights the significant role stress plays in the performance of dental students during preclinical prosthodontics exercises. Managing stress is crucial to enhancing both the educational experience and the clinical preparedness of students. These findings suggest that incorporating stress management strategies in dental education may lead to improved performance and better overall student well-being in prosthodontics training.

Keywords: Stress management, Pre-clinical prosthodontics, Assessment methods, Performance variability.

INTRODUCTION

In the medical field, dentistry is regarded as one of the most demanding professions. In a similar vein, dentistry school coursework and training might be more demanding than in other academic programs. The undergraduate dentistry programs are known for being among the longest and most difficult since students must not only meet academic standards but also acquire the necessary clinical skills and be able to function under pressure. Numerous studies found that dental school is more demanding and intricate than medical school.[17]

Prosthodontics plays a significant role in the dental school curriculum and it is widely recognized that the tasks of prescribing, designing and fabricating dental

prostheses are intricate and challenging. Additionally, prosthodontics is a demanding discipline that necessitates advanced skills, thorough preparation, and meticulous planning.[2]

Stress in dental schools has long been a subject of debate among dental educators. It is closely linked to students' well-being, academic performance, and their capacity to handle their future roles as dental professionals.[3] Research has confirmed that dental students have noticeably greater stress levels than the whole population, even in contrast to students studying other health-related subjects, like medicine. This can be attributed to the intricate and specialized nature of dental education because undergraduate dental students must not only adjust to the demanding and stressful environment of universities, but also develop extremely precise manual skills, give clinical care to patients while still in training, develop interpersonal skills for relationships with other health professionals and schedule time for management and treatment planning.[1]

Cox (1978) defined stress as a stimulus, a response, or the outcome of an interaction between the two, where this interaction reflects an imbalance between an individual and their environment.[7] While some level of stress is beneficial, as it can prevent under-stimulation and boredom, persistent stress-related symptoms may lead to mental or physical health issues, substance abuse, and reduced efficiency in work or learning. According to Cooper's theory of stress, stress is part of a continuous cycle where stressors create stress, which in turn can influence the stressors positively. However, to the best of our knowledge, no study has specifically examined stress among dental students that considers stress outcomes as potential stressors or amplifiers of stressors.[8]

According to reports, the stresses that students face most frequently in pre-clinical, clinical and academic performance, course workload and requirements, fear of failing or falling behind, and a lack of study and relaxation time. Performance can deteriorate due to pressures associated with dentistry students moving from preclinical to clinical settings.[5] These stressors are important because they have the potential to impair dental students' performance, negatively affect their educational experiences, and impede their program's advancement along with clinical and preclinical handwork.[6]

This study seeks to explore the relationship between the level of stress experienced by second-year dental students, specifically during their preclinical prosthodontics coursework, and the precision of their performance in a complete denture fabrication exercise.

The focus is on understanding how stress influences the accuracy with which students can perform detailed and skill-intensive tasks, such as fabricating complete dentures. The study hypothesizes that elevated stress levels might impair these abilities, leading to less accurate work, which could subsequently affect the quality of the prostheses produced.

By quantifying stress levels and correlating them with performance outcomes, the study aims to provide insights into how stress management interventions might improve not only the well-being of dental students but also their clinical performance. This research has the potential to significantly impact dental education by highlighting the critical role that stress plays in the learning and performance of dental students. If a strong link is established between stress levels and the accuracy of preclinical performance, it could prompt dental schools to rethink their approach to managing student stress.

Curriculum adjustments might include integrating more comprehensive stress management programs, offering mental health resources, and modifying the pacing of demanding courses like prosthodontics to reduce student stress. Additionally, educators could be trained to recognize signs of stress in students and provide targeted support during particularly challenging periods of the curriculum.

By better supporting students through these stressful times, the curriculum could help to not only improve students' overall well-being but also enhance their ability to develop critical clinical competencies. This, in turn, could lead to better-prepared dental professionals who are more capable of handling the pressures of clinical practice, ultimately benefiting the dental profession and patient care. The findings of this research could serve as a catalyst for broader changes in dental education, ensuring that future generations of dentists are both technically proficient and mentally resilient.

MATERIALS AND METHODS

Participants

The participants were second-year dental students at the ITS Dental College, Ghaziabad who successfully completed the conventional teeth setting exercise previously as mandated by Dental Council of India guidelines. All participants signed a consent form to take part in the study.

The study assessed 85 second-year undergraduate dentistry students at ITS Dental College by having them complete a trial denture base executed on a perfect stone cast (with a wax rim) along with class I teeth settings. The student built the trial denture foundation using self-cure acrylic, and the wax rim was made from red modelling wax sheet and acrylic anatomic teeth were used. Following preclinical instruction under the guidance of a prosthodontics professors, the students carried out these procedures following theory lectures and demonstration sessions on complete denture. The students completed the mandated preclinical performance for this study during normal laboratory

hours as well as during an internal examination. Along with that, they were asked to fill out a self-report questionnaire intended to study stress levels prior to and during the exam. Four independent, blinded examiners evaluated the preclinical work, assigning marks using two distinct scoring methods: the glance method and the grading method. Two examiners assessed the students' performance based on a checklist and awarded marks accordingly while the other two used glance method for evaluation. So as to eliminate prejudice, examiners took a week or so between tests using two different scoring systems. The examiners typically assessed the teeth setting based only on their own experience and without reference to any predetermined criteria when it came to inspection and grading. The teeth setting was approved or refused under the objective scoring system based on the average of the marks given for each individual criterion, which added up to 70 points.

Table 1. Objective Checklist for Scoring Method in Preclinical Prosthodontics

Criteria	**Score(1-5)**
Trial Denture base	
The outline(extension)	
Extension	
Wax rim	
Labial Inclination	
Height(Occlusal Plane)	
Width of the wax rim	
Cutting end	
Sealing	

Soring Criteria:

1. Poor to be redone
2. Not Accepted
3. Acceptable with minor modification
4. Acceptable
5. Excellent work

Measurement of stress

Self-reported questionnaires, such as the State-Trait Anxiety Inventory (STAI) and the Perceived Stress Scale (PSS), are employed as psychological and behavioural indicators (subjective measures). However, there is a scarcity of literature for assessing stress levels in prosthodontic practice, so a specific self-report questionnaire was used, which was derived from PSS along with the scoring criteria. The self-report questionnaires included the following questions and assessed stress levels experienced by students during preclinical exercise.

Option **A** was given the score of 1
Option **B** was given the score of 2
Option **C** was given the score of 3
Individual scores obtained were then added and they ranged from:
► Scores ranging from 8-13 with higher scores indicating higher perceived stress.
► Scores ranging from 14-19 would be considered moderate stress
► Scores ranging from 20-24would be considered low stress.

Table 2. Summary of Self-Report Questionnaire on Stress and Learning Perceptions

Question :	A	B	C
How would you rate your level of stress during the laboratory exercises?	very stressful.	Stressful	Not stressful
What do you think about the duration of the laboratory exercises?	Too long	Just right	Not enough
Do you think you have enough input/feedback on your laboratory work from your instructors during laboratory exercises?	Not enough	Just right	More than enough
Do you feel the knowledge you have gained from the lecture is adequate for laboratory exercise?	Not adequate	Just right	More than adequate
Do you think the knowledge you obtained from the lectures will be helpful in preparing for clinical practice?	Not certain	No	Yes
How prepared (from your pre-clinical experiences) do you feel about treating patients in the clinic? (Self-confidence)	Unprepared	Just right	Well prepared
Do you think you have enough clinical- skill (hand-skill) training to treat patients in the clinic?	.Not enough	Just right	More than enough
How helpful are tutorials or PBL in helping you understand pre-clinical and clinical knowledge and skills?	Not helpful	Helpful	Very helpful

DATA ANALYSIS

Data were analysed using the Statistical Package for Social Sciences (SPSS, Chicago IL) version 16. Descriptive statistics were used to summarize the data. Categorical variables were expressed as proportions, and continuous variables were expressed as the mean ± standard deviation (SD).

Paired t-tests' and Pearson's correlation coefficient test were used to analyze categorical and continuous data. A P value of < 0.05 was considered significant.

RESULTS

The study involved 85 students, with 65 (75%) females and 20 (25%) males. Table one presents the mean, median, standard deviation for prosthodontics and stress scores during regular laboratory hours and exam settings. The second table compares these scores using a paired t-test to evaluate the differences between prosthodontics scores and stress levels under normal laboratory conditions versus those during exams.

Table 3. Mean, median, standard deviation for prosthodontics and stress scores during regular laboratory hours and exam settings

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Prostho Score normal laboratory	43.19	85	7.803	.846
	Prostho Score exam	45.40	85	8.255	.895
Pair 2	Stress Score normal laboratory	15.44	85	2.413	.262
	StressScore exam setting	15.60	85	3.215	.349

Table 4. Paired Samples Test Comparing Prosthodontics Scores and Stress Levels in Laboratory vs. Exam Settings

Paired Samples Test									
		Paired Differences					T	df	P value
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Prostho Score laboratory - Prostho Score exam	-2.212	8.902	.966	-4.132	-.292	-2.291	84	.024
Pair 2	Stress Score laboratory -Stress Score exam	-.165	4.186	.454	-1.068	.738	-.363	84	.718

Table 5. Paired t-Test Analysis of Prosthodontics and Stress Scores Under Laboratory and Exam Conditions

Mean		Std. Deviation	Std. Error Mean	95% ConfidenceInterval Lower
	27.753	7.744	.840	26.083
	29.800	8.811	.956	27.899

V5			Paired ... 95% Confidence Interval of the ... Upper	t	df	Significance One-Sided p
.	Pair 1	pre prostho scores (group 1) pre stress scores	29.423	33.040	84	<.001
	Pair 2	post prostho scores (group2) - post stress scores (group 4)	31.701	31.181	84	<.001

The analysis of the data revealed that there was a negligible or almost imperceptible change in the prosthodontic scores, even when there was a noticeable increase in stress levels within this specific setting. This indicates that, despite variations in stress, the prosthodontic performance scores remained largely stable and unaffected in this particular context.

DISCUSSION

Preclinical training is instrumental in fostering students' competency, confidence, and expertise prior to their interaction with real patients. This phase of training is essential as it serves as a prerequisite to clinical practice, allowing educators to assess and ensure that students possess the necessary skills and knowledge. It functions as a critical evaluation tool to identify those who may not yet be suited for clinical training, thereby ensuring that only those who meet the required standards advance to patient care.[10]

Identifying potential sources of stress can facilitate their mitigation through various strategies, including modifications to the curriculum, enhancing education for both students and staff (academic and administrative), and offering resources such as counselling services for those in need. By addressing these stressors proactively, institutions can create a more supportive environment that promotes well-being and effectiveness.[11]

When students are able to recognize potential stressors, they can better monitor and manage their own stress levels. Meanwhile, faculty can collaborate with educational specialists to implement the latest teaching methodologies, aiming to optimize student performance and reduce stress. This approach helps create a more supportive and effective learning environment for both students and educators.[12]

In this particular study, the minimal effect of stress on the accuracy of students' work can be explained by two key factors.

a. Nature of Stress

- Discrepancy in Stress Impact: The types of stress encountered by students may not have a direct or significant impact on their practical skills required for preclinical work. Stressors such as academic pressure or personal challenges often affect cognitive functions and overall mental well-being more than they influence specific manual tasks. [12]
- Cognitive vs. Manual Stress: Stress related to theoretical exams or academic workload might influence cognitive processes but may not directly affect the precise, hands-on skills required for practical tasks in prosthodontics. Practical work demands focused attention and technical skill, which can remain stable even when students are under stress.

- Stress Influence on Different Performance Aspects: The impact of stress may vary depending on the nature of the tasks performed. While stress can affect cognitive performance, it might not significantly impact the accuracy of practical, manual tasks where students are already trained and experienced. [14]

For instance, task-specific stress, where the practical aspects of prosthodontics work involve skills such as hand-eye coordination and technical precision, which might be less susceptible to the cognitive and emotional stressors that affect other areas of academic performance.[12]

b. Adaptation and Coping Mechanisms [13]

Development of Coping Strategies: Students often develop effective coping mechanisms to manage stress, which can help mitigate its impact on their performance. These strategies include:

- Time Management and Organizational Skills: Effective time management can help students balance their workload and reduce stress, thus maintaining their performance in practical tasks.
- Relaxation and Stress-Relief Techniques[15]: Techniques such as mindfulness or relaxation exercises can help students manage stress more effectively, allowing them to remain focused and accurate in their practical work.
- Resilience and Experience[16]: As students gain experience and become more familiar with preclinical tasks, their ability to handle stress improves. This increased resilience can lead to reduced stress impact, hence experienced students are better equipped to manage stress without it negatively affecting their practical skills. Familiarity with procedures and techniques can enhance their confidence and performance, even under stress.

CONCLUSION

Preclinical training is essential for building students' skills and confidence before clinical practice while serving as a critical evaluation phase. This study found minimal stress impact on students' preclinical accuracy due to the nature of stress and effective coping mechanisms like time management and resilience. Institutions can support students by addressing stressors, fostering coping strategies, and creating a supportive learning environment, with potential applications across disciplines to enhance academic and clinical performance

DECLARATIONS

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no conflict of interest.

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REFERENCES

1. Rayyan, M.R., El Elagra, M., Alqahtani, A.M., Alhomoud, S.A., Almutair, A.M., Bin Razin, K.I., Aldossary, M.F., & Alanazi, A.A. (2022) 'Stress levels among senior dental students in Saudi Arabia during fixed prosthodontics procedures', *Journal of Family Medicine and Primary Care*, 11(5), pp. 1716–1720. doi: 10.4103/jfmpc.jfmpc_1005_21.
2. Alammari, M.R. & Bukhary, D.M. (2019) 'Factors contributing to prosthodontic exam anxiety in undergraduate dental students', *Advances in Medical Education and Practice*, 10, pp. 31–38. doi: 10.2147/AMEP.S187351.
3. Maskey, B., Shrestha, K., & Mathema, S.R. (2019) 'The perception of stress among the final year students in prosthodontics', *Journal of Nepalese Prosthodontic Society*, 2(1), pp. 1–5. doi: 10.3126/jnprossoc.v2i1.26805.
4. El-Kishawi, M.Y., Khalaf, K., & Odeh, R.M. (2021) 'Determining the impact of stressors on students' clinical performance in endodontics', *Journal of Taibah University Medical Sciences*, 16(6), pp. 849–855. doi: 10.1016/j.jtumed.2021.04.002.
5. Alzahem, A.M., van der Molen, H.T., Alaujan, A.H., Schmidt, H.G., & Zamakhshary, M.H. (2011) 'Stress amongst dental students: A systematic review', *European Journal of Dental Education*, 15(1), pp. 8–18. doi: 10.1111/j.1600-0579.2010.00640.x.
6. Elani, H.W., Allison, P.J., Kumar, R.A., Mancini, L., Lambrou, A., & Bedos, C. (2014) 'A systematic review of stress in dental students', *Journal of Dental Education*, 78(2), pp. 226–242. PMID: 24489030.
7. Mackay, C., Cox, T., Burrows, G., & Lazzerini, T. (1978) 'An inventory for the measurement of self-reported stress and arousal', *British Journal of Social and Clinical Psychology*, 17(3), pp. 283–284. doi: 10.1111/j.2044-8260.1978.tb00280.x.
8. Cooper, C.L. & Baglioni, A.J. (1988) 'A structural model approach toward the development of a theory of the link between stress and mental health', *British Journal of Medical Psychology*, 61(1), pp. 87–102.
9. CDEWorld (n.d.) 'A systematic approach to complete denture fabrication'. Available at: https://cdeworld.com/courses/5286-a-systematic-approach-to-complete-denture-fabrication (Accessed on 08/11/2024).
10. Haralur, S. & Al-Malki, A. (2014) 'Student perception about efficacy of preclinical fixed prosthodontic training to facilitate smooth transition to clinical context', *Journal of Education and Health Promotion*, 3(1), p. 73.
11. Morse, Z. & Dravo, U. (2007) 'Stress levels of dental students at the Fiji School of Medicine', *European Journal of Dental Education*, 11(2), 99–103.

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12. Sanders, A.E. & Lushington, K. (1999) 'Sources of stress for Australian dental students', *Journal of Dental Education*, 63, pp. 688–697.
13. Ekpenyong, C.E., Daniel, N.E., & Aribo, E.O. (2013) 'Associations between academic stressors, reaction to stress, coping strategies and musculoskeletal disorders among college students', *Ethiopian Journal of Health Sciences*, 23(2), pp. 98–112.
14. Snijders, T., Aussieker, T., Holwerda, A., Parise, G., van Loon, L.J.C., & Verdijk, L.B. (2020) 'The concept of skeletal muscle memory: Evidence from animal and human studies', *Acta Physiologica*, 229(3).
15. Chandra Kant, N.R. & Pradhan, S. (2016) 'Stress-relieving techniques for organizational stressors', *CLEAR International Journal of Research in Commerce & Management*, 7(3).
16. Fleming, J. & Ledogar, R.J. (2008) 'Resilience, an evolving concept: A review of literature relevant to Aboriginal research', *Pimatisiwin*, 6(2), pp. 7–23.
17. Alhajj, M.N., Khader, Y., Murad, A.H., Celebic, A., & Halboub, E. (2022) 'Psychological distress among undergraduate dental students in Saudi Arabia and its coping strategies: A systematic review', *Saudi Dental Journal*, 34(5), pp. 301–310. doi: 10.1016/j.sdentj.2022.04.002.
18. Alqahtani, N.D., Al-Jewair, T.S., Al-Moammar, K., Alhaqbani, E., & Al-Hamlan, N. (2023) 'Variability in assessment of preclinical prosthodontics work of undergraduate students', *Journal of Prosthodontics*, 32(2). doi: 10.1111/jopr.13048.
19. Dutta A, Pasricha N, Singh RK, Revanna R, Ramanna PK. Harnessing Artificial Intelligence in Dentistry: Enhancing Patient Care and Diagnostic Precision. Asian J. Den. Sci. 2024; 12:7(1):379-86. DOI: 10.9734/ajds/2024/v7i1216