

ASSOCIATION OF STRESS AND SLEEP QUALITY AMONG DENTAL UNDERGRADUATES IN BANGALORE CITY**Koul M¹, Murali R², Shamala A³, Yalamalli M⁴, Kashyap B⁵, Priyanka D⁶**¹⁻⁶Department of Public Health Dentistry, Krishnadevaraya College of Dental Sciences, Bangalore, India**Address for Correspondence:**

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ABSTRACT:

Background: The evaluation of factors leading to the emerging issue of stress among dental students is of utmost importance as it allows to enhance students' psychosocial well-being and academic performance. The purpose of this study was to investigate stress provoking factors among dental undergraduate students and also to evaluate the association of stress with sleep quality among them.

Methods: In a cross-sectional design, a questionnaire consisting of modified Dental Environmental Stress questionnaire and the Pittsburgh Sleep Quality Index (PSQI) questionnaire, was administered to 188 undergraduate dental students. The responses to the questionnaire were based on a Likert scale. Means and standard deviations were determined for stress scores of individuals for each item. Fishers exact test, Mann Whitney U test, Kruskal Wallis test and logistic regression were done were used to analyse the data at the significant level of $P \leq 0.05$.

Results: The fourth year students presented with higher mean stress scores. Fear of appearing for viva was found to be most stress provoking among males as well as females was with a mean of 2.57 ± 1.07 and 2.75 ± 0.92 . Sleep quality was poorest among final year students. With increase in mean stress scores, the odds of having poor quality sleep were 1.06 times.

Conclusion: The results indicate that dental students in the clinical years have more stress and poor sleep quality. This suggests a need a more student friendly and congenial environment in the dental colleges.

Keywords: dental students, sleep quality, stress, PSQI

INTRODUCTION

Stress is an innate response in any living being.

The term stress, as coined by Hans Selye, is a biopsychosocial model that refers to the consequence of failure of an organism to respond adequately to mental, emotional or physical demands, whether actual or imagined (Selye, 1982).¹

Stress is one of the most prevalent problem faced by almost everyone at some point of time in one's life. The ability to cope up with stress is determined by individuals acquired beliefs towards it. Students are always prone to have more stress because of academic pressure, peer pressure, expectations from parents. Dentists and dental students suffer from especially high degrees of stress when compared with other health professions.^{2,3} Dentistry is a profession which requires academic excellence as well as technical expertise to excel in the field, making it more

stressful for the students. Higher prevalence of stress among dental students may be attributed to academic pressure, patient management, interpersonal skills and clinical skills essential during the dental training course, which eventually leads to more susceptibility of stress among dental students.⁴ Stress can adversely affect the sleep quality. Students in order to increase their efficiency tend to change their sleep pattern by staying awake late night leading to sleep disturbance. Sleep deprivation may have undesirable effect on the learning process, resulting in poor academic performance, and also interfering with health.^{5,6} Previous studies conducted in Lebanon, Riyadh have concluded that students subjected to more stress have poor sleep quality or disturbed sleep.⁷⁻⁹ Studies have shown higher prevalence of short sleep duration (<7hr) and poor sleep quality among university students.^{10,11}

Identification of sources of stress among dental students can help to plan strategies to alleviate the stressors and enhance students' stress coping skills. Studies to investigate sleep quality among dental students, in specific, and its relation to stress is lacking. A very few studies have evaluated the association and sleep quality among dental students in India. Thus the aim of the present study was to identify stress provoking factors and the quality of sleep at various academic levels and also to assess whether there is any association between stress and sleep quality among dental undergraduates in a dental college in Bangalore.

MATERIALS AND METHOD

STUDY DESIGN: The present study was a questionnaire based, cross sectional analytical study.

STUDY SETTING: The study population consisted of undergraduate dental students from first to fourth year (N=188) studying in Krishnadevaraya College of Dental Sciences, Bangalore.

SELECTION OF PARTICIPANTS: Convenience sampling technique was used. All the undergraduate students were included in the study. Informed written consent was obtained from the participants before the start of the study.

DATA COLLECTION: The study involved self administration of a pretested structured questionnaire. The study instrument consisted of three sections: a demographic questions, the modified Dental Environment Stress (DES) questionnaire and the Pittsburgh Sleep Quality Index (PSQI).

The first section consisted of questions related to demographics like age, gender, year of study, type of accommodation and marital status. The second section consisted of modified DES questionnaire containing 24 stress-related questions modified to suit the Indian scenario of dental professional training. Respondents evaluated the items based on their personal experience on a four-point Likert scale.^{12,13}

The third section consisted of the Pittsburgh Sleep Quality Index (PSQI) which is a self-rated questionnaire consisting of 19 questions used to assess 7 components of sleep – subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbance, usage of sleep medication, and daytime dysfunction during the previous month. Scoring of the answers is based on a 0 to 3 Likert scale. The seven component scores are then added to get a global PSQI score in the range of 0–21. A global score ≥ 5 indicates poor sleep quality in the past month.^{14,15}

All the dental undergraduate students enrolled in the college from first to fourth years were invited to participate in the study. The study was conducted over a period of 2 months from February 2017 to March 2017. In order to allow absent students to participate in the study, the questionnaire was distributed three times in all the classes.

STATISTICAL ANALYSIS: The data collected was compiled using Microsoft Excel and was subjected to statistical analysis using SPSS, version 20.1. Means and standard deviations were determined for stress scores of each item as well as for components of PSQI and were used to compare the gender and year of the study. Mann Whitney U test, Kruskal Wallis test were used to analyze and compare scores by gender, year of study. Logistic regression was done to evaluate association of stress and sleep quality. The level of significance was set at $P \leq 0.05$.

ETHICAL APPROVAL: The ethical clearance was obtained from the Institutional Review Board of Krishnadevaraya College of Dental Sciences.

RESULTS

The descriptive statistics are presented in Table 1.

Overall stress scores increased progressively in each successive class for both genders. Also, the females reported higher mean stress scores (2.14 ± 0.77) as compared to males (1.82 ± 0.81). (Table 2)

TABLE 1: Demographic distribution of the study population

	Frequency	Percentage
Age (N=188)		
18-22	185	98.4%
22-26	3	1.6%
Gender (N=188)		
Males	37	19.7%
Females	151	80.3%
Year of study (N=188)		
1 st year	45	100%
2 nd year	47	100%
3 rd year	49	100%
4 th year	47	100%
Accommodation (N=188)		
With Parents	31	16.5%
Roommate	147	78.2%
Alone	10	5.3%

TABLE 2: Comparison of mean Stress score based on gender and year of the undergraduate study

Variables	Mean stress score (Mean±SD)	P value
Year of study		0.041*
1 st year	1.72±0.68	
2 nd year	1.99±0.52	
3 rd year	2.05±0.63	
4 th year	2.72±1.12	
Gender		0.03*
Males	1.82±0.81	
Females	2.41±0.77	

*p<0.05 statistically significant, p>0.05 Non Significant, NS

The stress provoking factors differed with the year of study among the students. Highest stress provoking factor for 1st year was found to be ‘amount of assigned work’ (2.51±0.73), for 2nd year was ‘fear of appearing for viva’ (3.04±0.88) whereas for 3rd and 4th year was ‘completion of clinical requirements/quota with a mean value of 2.94±0.97 and 3.49±0.83 respectively (Table 3). Amount of assigned work, lack of time to do assigned college work, receiving criticism from staff for academic or clinical work emerged as major stress provoking factors in the preclinical years i.e., 1st and 2nd year. However, the completion of clinical requirements/quota, fear

of unemployment after graduation, fear of appearing for viva emerged as major stress provoking factors in the clinical years i.e., 3rd and 4th year.

Table 4 shows the stress provoking factors among male and female students. Highest stress causing factor among males as well as females was “Fear of appearing for viva”, followed by completion of clinical requirements/quota and amount of assigned work.

Statistically significant differences were observed between the different groups of the students in sleep categories of subjective sleep quality and habitual sleep efficiency with higher mean among 1st year students (1.2±0.76) and 4th year students (0.34±0.60) respectively. The global PSQI scores were highest among 4th year followed by 3rd year students, the result being statistically significant (Table 5).

Table 6 shows sleep quality among students in various academic levels. Majority of students having poor quality sleep were from 4th year (48.9%). Overall, 40.9% students had scores of more than 5 indicating poor sleep quality.

The dependent variable PSQI used to assess sleep quality was dichotomous (≤5: good quality sleep and >5: poor quality sleep). Logistic regression was done to evaluate association of mean stress score, gender, year of study and accommodation with the sleep quality. A statistically significant association was found between mean stress score and sleep quality. With the increase in mean value of stress, the odds of having poor quality of sleep increased by 6% (OR=1.06, CI =1.03-1.10). Also a statistically significant association was found between the year of study and sleep quality. Students in 2nd year and 3rd year had reduced odds of poor quality sleep which implies they had a good quality sleep as compared to fourth year students. Gender and type of accommodation had no significant association with poor sleep quality (Table 7).

TABLE 3: Stress provoking factors among different academic levels

		1 st year	2 nd year	3 rd year	4 th year	Entire sample	Kruskal wallis test	
		Mean±SD					Chi square value	P-value
1.	Amount of assigned work	2.51±0.73	2.74±0.92	2.24±0.86	2.96±0.75	2.48±0.73	20.97	<0.001*
2.	Lack of time for relaxation	2.11±0.80	2.64±1.05	1.98±0.88	2.81±0.92	2.53±0.64	23.35	<0.001*
3.	Lack of time to do assigned college work	2.36±0.71	2.72±0.88	2.02±0.72	2.85±0.8	2.42±0.25	29.33	<0.001*
4.	Rules and regulations of the college	2.04±0.98	2.17±1.13	2.1±1.10	2.47±1.20	1.98±0.12	3.50	0.32(NS)
5.	Approachability of the teaching staff	1.69±0.56	1.89±0.91	1.8±0.91	2.17±1.09	1.75±0.35	4.32	0.23(NS)
6.	Receiving criticism from staff for academic or clinical work	1.58±0.69	2.72±0.97	2.59±1.00	2.47±1.06	2.23±0.57	35.85	<0.001*
7.	Differences in opinion between clinical staff concerning patient treatment	-	-	2.41±1.08	2.47±1.04	2.39±0.36	0.06	0.81(NS)
8.	Lack of confidence to be a successful dentist	1.84±0.88	2.49±1.25	2.18±0.83	2.11±1.07	1.62±0.22	7.47	0.06(NS)
9.	Completion of clinical requirements/quota	1.62±0.72	2.6±0.90	2.94±0.97	3.49±0.83	2.73±1.42	71.19	<0.001*
10.	Fear of failing a course or a year	1.96±0.95	2.49±1.14	2.55±0.94	2.79±1.04	2.82±0.71	15.02	0.002*
11.	Fear of inability to pursue a postgraduate program	1.91±0.81	2.4±1.21	2.37±0.88	2.43±1.04	2.34±0.37	13.21	0.004*
12.	Fear of unemployment after graduation	2.27±0.71	2.51±1.16	2.45±1.02	2.47±1.08	2.29±0.11	1.17	0.76(NS)
13.	Difficulty in understanding lectures, textbooks	1.71±0.53	1.91±0.83	1.84±0.69	2.02±0.87	2.21±0.28	3.00	0.39(NS)
14.	Lack of confidence in clinical decision making	-	-	1.88±0.56	2.23±0.84	2.10±0.35	4.67	0.03*
15.	Getting an ideal case for clinical examination and treatment	-	-	2.24±0.78	2.96±1.02	2.69±1.28	12.27	<0.001*
16.	Patients being late or not showing for their appointments	-	-	2.16±0.75	2.7±1.12	2.58±0.47	7.07	0.008*
17.	Lack of communication with patients	-	-	2.18±1.05	2±1.14	2.32±1.22	1.06	0.30(NS)
18.	Examinations and grades	2.21±0.87	2.53±0.98	2.43±0.68	2.6±1.01	2.83±1.32	5.00	0.17(NS)
19.	Fear of appearing for viva	2.22±0.82	3.04±0.88	2.87±0.82	3.12±1.08	2.98±1.08	18.26	<0.001*
20.	Difficulty in learning manual skills required for clinical and laboratory work	1.53±0.63	2.11±0.81	2.12±0.81	2.06±0.92	1.85±0.36	17.01	0.001*
21.	Personal physical health	1.93±0.81	2.11±1.18	1.63±0.86	2.17±1.03	2.36±0.42	8.42	0.04*
22.	Financial resources	1.29±0.59	2.06±1.11	2.24±1.11	1.91±1.06	2.12±0.36	22.15	<0.001*
23.	Lack of home atmosphere in living quarters/hostel	2.09±1.04	2.28±1.28	2.43±1.08	2.02±1.13	1.51±0.14	4.06	0.26(NS)
24.	Marital problems, if any	0	0	0	0	0	0	0

*p<0.05 statistically significant, p>0.05 Non Significant, NS

TABLE 4: Gender distribution of stress provoking factors

	Males	Females	Mann Whitney U test	
	Mean±SD	Mean±SD	U statistic	P-value
Q1	2.48±0.96	2.64±0.83	2477.5	0.25(NS)
Q2	2.14±1.11	2.44±0.94	2281.5	0.07(NS)
Q3	2.32±1.00	2.52±0.82	2467	0.24(NS)
Q4	1.92±1.16	2.26±1.09	2246.5	0.06(NS)
Q5	1.46±0.61	1.99±0.93	1898.5	0.001*
Q6	1.89±0.74	2.46±1.07	1965	0.004*
Q7	1.81±0.93	2.61±1.03	451	0.002*
Q8	1.49±0.90	2.32±1.00	1470	<0.001*
Q9	2.49±1.15	2.72±1.07	2463.5	0.25(NS)
Q10	2.16±1.07	2.52±1.05	2247.5	0.06(NS)
Q11	1.84±0.93	2.27±1.01	2099.5	0.01*
Q12	2.27±1.10	2.46±1.02	2488.5	0.29(NS)
Q13	1.68±0.75	1.92±0.76	2304.5	0.07(NS)
Q14	1.86±0.57	2.11±0.76	660	0.2(NS)
Q15	2.19±0.98	2.71±0.94	560.5	0.04*
Q16	2.24±1.00	2.48±0.98	688	0.36(NS)
Q17	1.95±1.07	2.13±1.11	718	0.52(NS)
Q18	2.14±0.92	2.52±0.88	2165.5	0.02*
Q19	2.57±1.07	2.75±0.92	2548	0.39(NS)
Q20	1.65±0.59	2.04±0.86	2125.5	0.02*
Q21	1.81±0.91	1.99±1.02	2542.5	0.37(NS)
Q22	1.59±0.93	1.96±1.07	2274.5	0.06(NS)
Q23	1.54±0.84	2.37±1.15	1620	<0.001*
Q24	0	0	0	-

*p<0.05 statistically significant, p>0.05 Non Significant, NS

TABLE 5: Mean score of PSQI components in the various academic levels

	1 st year	2 nd year	3 rd year	4 th year	Entire sample	Kruskal Wallis test	
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Chi square test	P-value
1. Subjective sleep quality	1.2±0.76	1.17±0.89	0.76±0.63	0.94±0.76	1.01±0.78	8.87	0.03*
2. Sleep latency	1.2±0.99	1.17±0.99	1.02±0.92	1.11±1.13	1.12±1.00	1.01	0.80(NS)
3. Sleep duration	1.27±0.75	1.3±0.81	1.12±0.67	1.21±0.88	1.22±0.78	1.65	0.65(NS)
4. Habitual sleep efficiency	0.2±0.59	0.23±0.63	0.08±0.45	0.34±0.60	0.21±0.57	9.95	0.02*
5. Sleep disturbances	0.98±0.58	1.06±0.64	1.02±0.48	1.11±0.56	1.04±0.57	1.77	0.62(NS)
6. Use of sleeping medication	0±0.00	0±0.00	0.04±0.20	0.04±0.29	0.02±0.18	3.46	0.33(NS)
7. Daytime dysfunction	1.07±0.75	1.23±0.76	1.04±0.71	1.3±1.06	1.16±0.83	2.32	0.51(NS)
Global PSQI SCORE	5.91±2.92	5.08±1.89	6.1±3.11	6.21±3.45	5.79±2.90	3.76	0.03*

*p<0.05 statistically significant, p>0.05 Non Significant, NS, PSQI: Pittsburgh Sleep Quality Index

TABLE 6: Sleep quality among students in various academic levels

	1 st year	2 nd year	3 rd year	4 th year	Total	P value
	n (%)	n (%)	n (%)	n (%)	N (%)	
Good quality sleep (PSQI ≤ 5)	25(55.6%)	32(68.1%)	30(61.2%)	24(51.1%)	111(59.1%)	0.04*
Poor quality sleep (PSQI > 5)	20(44.4)	15(31.9%)	19(38.8%)	23(48.9%)	77(40.9%)	

*p<0.05 statistically significant, p>0.05 Non Significant, NS
PSQI: Pittsburgh Sleep Quality Index

TABLE 7: Logistic regression model

	B	S.E.	Wald	df	Odds Ratio	95% C.I. for Odds Ratio		P Value
						Lower	Upper	
Stress score	0.06	0.02	15.28	1	1.06	1.03	1.10	<0.001*
Gender								
Female	0.16	0.48	0.11	1	1.18	0.46	3.04	0.74(NS)
Male	1		0.36	1				
Year of study								
1 st	0.34	0.46	10.18	1	0.72	0.29	1.76	0.46(NS)
2 nd	1.74	0.55	0.54	1	0.18	0.06	0.51	0.001*
3 rd	1.30	0.57	5.17	1	0.27	0.09	0.84	0.02*
4 th	1		11.99	3				
Accommodation								
With parents	0.54	0.44	1.50	1	0.22(NS)	0.58	0.25	1.38
With roommate	0.04	0.86	0.00	1	0.97(NS)	0.96	0.18	5.24
Alone	1		1.64	2				

*p<0.05 statistically significant, p>0.05 Non Significant, NS, SE: standard error, df: degree of freedom

Cox & Snell R²= 0.27; Nagelkerke R²= 0.34, Model chi-square = 27.79

DISCUSSION

Dental specialty exerts heavy stress on students which might exaggerate the poor quality of their sleep.⁹ In India, there has been an increase in the number of women opting for dentistry.^{13,16} This has been identified in the present study as well where in 80.3% of the study participants were females.

Female students and those in clinical years of study reported higher stress than males or those in preclinical years. Major stress provoking factors among females as well as males were “Fear of appearing for viva” followed by completion of clinical requirements/quota and amount of assigned

work. Similar results were found in study conducted by Madhan B et al. (2012)¹⁶ and Divaris K et al. (2014)¹⁷. However, the result are in contrast to studies conducted by Acharya S (2003)¹³ and Kumar S et al. (2009)¹⁸ in which it was observed that males perceived more stress than female students.

The cause of stress did vary by academic year of study and gender. “Fear of appearing for viva” produced the most academic stress for all students irrespective of academic year with a mean of 2.98±1.08 followed by examination and grades with a mean of 2.83±1.32. The other stressors for students in all academic years were fear of failing course or year,

completion of clinical requirements/quota, getting an ideal case for clinical examination and treatment and lack of time for relaxation. Previous studies conducted by, Deshpande A et al. (2014)¹⁹, Divaris K et al. (2014),¹⁷ Kumar S et al. (2009)¹⁸ have reported examination and grades, fear of failure and lack of time for relaxation as major sources of stress. Al-Samadani KH et al. (2013)¹⁴ found that final year students were more worried due to difficulty in getting suitable patients and patients not keeping up with their appointments which prevented them from accomplishing their clinical quotas.

The results indicate a progressive increase in stress levels from 1st to 4th year. The overall mean stress score was higher among 4th year students. Also, clinical years were more stressful than the nonclinical years. Similar findings were observed by Deshpande A et al. (2014)¹⁹ and Sravani et al. (2018).²⁰ However, study conducted by Westerman GH et al. (1993)²¹ concluded the nonclinical years (I and II) were more stressful. Probable reasons for the increased stress levels in the fourth year may be because in final year, students have to appear for examination in more subjects than the previous years, and have time pressures to complete work quota in a specific period of time.^{13,19}

Students have normally irregular sleep patterns resulting in poor quality of sleep. In the present study, most of the students described their sleep quality as fairly good (53.19%) which is similar to the result of study conducted by Lohitashwa R et al. (2015).²² Majority of students having poor quality sleep were from 4th year. The results from PSQI indicate a total of 77 (40.9%) students were found to have poor quality of sleep which is in agreement to study conducted by Seun-Fadipe CT et al. (2017).²³ However, this is a relatively low percentage compared to studies conducted by Serra-Negra JM (2014)²⁴ and Sawah et al. (2015).²⁵

The association between stress and sleep quality was explored in this study. It was found that a high level of stress is a major

predictor and contributor to poor sleep quality. Similar results were seen in a studies conducted by Lund HG et al. (2010)²⁶ and Lemma S et al. (2012)²⁷ in which the level of perceived stress scale has shown significantly increasing odds of poor sleep quality with the odds ratio (95% CI) [1.35 (1.10, 1.70)]. In contrast, a study done Sawah et al. (2015)²⁵ found no relation between female sex, age, academic year, and the odds of developing poor sleep quality. Perceived stress can serve as predisposing factors for sleep difficulties in college students as the college lifestyle creates precipitating factors that enhance stress-related sleeping difficulties (e.g., hectic schedules, academic pressure etc). Also vicious cycle develops in which dental students try to deal with their multiple academic requirements and stressors by reducing their sleeping time resulting in sleep deprivation and poor sleep quality, which in turn increases their stress level.²⁶

The present study indicates a significant association between year of study and sleep quality among dental students with students in the 2nd and 3rd year of study having reduced odds of poor sleep quality as compared to final year students. It was found that increasing year of study in college was associated with increased odds of poor sleep quality which may be attributed to academic, clinical as well as exam stress among final year students. In contrast, study conducted by Lemma S et al. (2012)³⁸ found that compared to students in 4th year or above, second year [OR = 2.91, 95% CI: (2.10, 4.02)] and third year students [OR = 2.25, 95% CI: (1.62, 3.12)] had higher odds of poor sleep quality. Variations in results across studies may be explained by differences in the academic curriculum and demands across different universities.²⁷

Stress and poor quality sleep can affect cognitive and learning functions negatively. Stress not only affects mental and or physical health of the health professionals but may adversely affect the quality of care that they are going to offer to their patients. Identifying possible sources of stress may allow for their

alleviation through changes in the curriculum as well as providing resources such as counselling services to those who may require them.²⁴ Therefore, it is imperative to implement appropriate interventions to raise awareness of students about the stress coping techniques and importance of good sleep quality.

LIMITATIONS

The present study had some limitations. Due to cross sectional design of study, it is difficult to ascertain cause effect relationship. Responses are subjected to recall bias as subjective measure of sleep (PSQI) was used. As PSQI measures sleep quality during past month, chronic causes of poor sleep quality could not be assessed.

CONCLUSION

The present study brings highlights the finding that there is a high level of stress among dental students especially during the final year which results in poor quality of sleep. The highest stress provoking factor was “Fear of appearing for viva”. A congenial and more student-centred orientation of the educational system needs to be created by the dental faculty so that students can pursue their studies with less anxiety or fear. Effective assistance from faculty and families, fostering stress coping behavior and timely psychological counselling are essential for students to create a stress-free environment in the college.

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