Title: Stress and oral health among medical students.
A Cross sectional Clinical study

Running title: Stress and Oral Health

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Abstract

Aim: To evaluate the perceived stress and its effect on gingival inflammation among medical students'. **Methodology:** A Perceived Stress Scale questionnaire by Cohen and an self-administered potential stress factor questionnaire and was given to a convenient sample of 85 study subjects in an private medical college and hospital to assess perceived stress and possible potential factors. To assess the gingival inflammation, indices like Modified Quigley Hein plaque Index, Loe and Silness Gingival index, sulcus bleeding index was used; **Results:** Around 85% of them were stressed according to Perceived stress score by Cohen, and among possible potential factors; 51.8 % of study subjects who were not staying in hostel previously were stressed and 75.3 % study subjects who were having nuclear family were stressed. **Conclusion:** Majority of the first year Medical students experience perceived stress, and factors like students having experience of hostel stay and nuclear type of family showed more stress, whereas the perceived stress dint had any effect on gingival inflammation. Future longitudinal studies are emphasized to know its effect on oral health

Introduction

Stress is an pressure or worry caused by problems in somebody's life'[1], whereas it also describes external demands (physical or mental) on an individual's physical and psychological wellbeing. The perception of stress, is frequently by one's personal system of beliefs and attitudes. These self-cognitions mediate the perceived stressor and consequent student behavior in turn effecting academic performance[1, 2].

Hypothalamus-pituitary-adrenal cortex (HPA) axis, gets activated by stress reaction following in release of corticotrophin-releasing hormone from the hypothalamus, and glucocorticoids, including cortisol from the adrenal cortex [3]. In the HPA system, adrenocorticotropic hormone regulates cortisol secretion through pituitary gland. Salivary cortisol levels are closely correlated to blood cortisol levels and, therefore, reliably reflect HPA activity[4].

Among various educational systems, Medical education forms an distinctive educational procedure and is perceived as being stressful, which may have an negative efffect on cognitive functioning and learning of students in a medical school [5]. It involves the attainment of required academic, clinical and interpersonal skills within educational programmes which challenges students as they have never faced before, irrespective of their pre-professional background[2].

Academic stress appears to affect gingival inflammation, shown by more plaque accumulation and in turn effecting periodontal health [5-10].

Thus keeping in mind several stress related studies which are well established on medical students, there is paucity about medical students' stress studies in the present region and its effect, especially on oral health .Thus the present study aimed to evaluate the perceived stress and its effect on gingival inflammation among medical students'

Methodology:

SOURCE AND METHOD OF COLLECTION OF DATA

Medical students involved were from a private medical college and hospital. Also the study was approved from institutional ethical review board and being conducted with the ethical principles of the World Medical Association Declaration of Helsinki.

After informing the students about the study procedures, students voluntarily who got involved and gave written informed consent were taken into the study.

A Perceived Stress Scale self-administered questionnaire by Cohen and a self-administered potential stress factor questionnaire and was given to a convenient sample of 85 study subjects to assess perceived stress and possible potential factors.

In oral health to assess the gingival inflammation, indices like Modified Quigley Hein plaque Index, Loe and Silness Gingival index, sulcus bleeding index was used;

RESULTS

Among 85 medical study subjects, who were in age group of 17-19 years, majority were females 61.2%(n=52);51 (60%)study subjects were not staying in hostel previously , 68.2%(n=58) study subjects were having an single parent; whereas that majority were staying with nuclear family 87% (n=74) **(Table 1)**

Perceived stress scale self-administered questionnaire by Cohen, showed that majority were stressed (score>13) 85.9% (n=73). Among this majority were females 54.1 %(n=46); 60% of study subjects were not staying in hostel previously, among which , majority (n=44) study subjects were stressed, 68.2% of study subjects were having single parent as working, among which, majority (n=49) study subjects were stressed, followed by 31.8% study subjects having with both parents working, 24 study subjects were stressed;87.1% of study subjects were having a nuclear family among which majority of study subjects (n-73) were stressed, followed by 12.9% study subjects having joint family a total of 9 subjects were stressed**. (Table 2)**

Correlation (Pearson)between Various Perceived stress scale scores and clinical parameters showed non-significant correlation; Whereas Spearman Correlation test between potential stress scores like Interpersonal stress scale scores , Clinical skill stress scale scores and clinical parameters showed Non significant correlation (Table 3)

Multiple linear regression analysis of clinical parameters with perceived stress scores showed that, Significant inverse relation was found between miscellaneous stress scores only with Gingival

index (-0.0089, p<0.005), where as Non significant correlation between clinical parameters and perceived stress scores.**(Table 4)**

Whereas t test between Hostellers and Non-hostellers showed Significant difference between students staying at hostels and day boarders with their Cohen stress scores (t = 3.0453, p <0.05). Also Significant difference was observed between students staying hostels and day boarders with their PIaque scores (t = -2.2618, p <0.05) at 5% level of confidence **(Table 5)**

Discussion

While it's been usually believed that stress has an effect on health, which has long been recognized as a cause for concern in both developed and developing countries. It has been described as an unavoidable experience for undergraduate medical trainees. Stressors experienced especially during the undergraduate medical training if not addressed early, may have dire consequences on them as professionals, their patients and the society as a whole. The present study tried to overcome and give a clearer cut and differentiated picture of the perceived stress and its effect on gingival health.

As the study comprised of perceived stress component, the perceived stress was estimated with the help of PSS, which showed that majority were stressed (i.e having score more than 13) 85% (n=73) followed by 14.1% (n=12) not stressed. Among this majority were females 54.1 %(n=46) followed by males 31.8 %(n=27). The results of the present study are in accordance with most of the other studies [19, 28, 31, 32], among health professionals. One possible reason could be due to the fact that most of the students are not adequately prepared on what to expect during the medical training and so may not be able to cope effectively when faced with pressures and expectations of being a medical student, thereby they perceive it as stressed during their academic course.

Around 60% of study subjects were not staying in hostel previously, among which , majority (n=44) study subjects were stressed, followed by 40% study subjects stayed in hostels, 29 study subjects were stressed which is seen in a similar study [37] . Stress among subjects staying in hostel previously might be due to their constant pressure of being staying outside since their college days before professional course, and it has continued after joining medical course. And for study subjects not staying in hostel previously also felt stressed, which might be due to coming out of family for first time.

Around 68.2% of study subjects were having single parent as working, among which, majority (n=49) study subjects were stressed, followed by 31.8% study subjects having with both parents working, 29 study subjects were stressed . As in the modern era with rising cost of living probably single parent working status observed by their wards makes them things stressful.

Around 87.1% of study subjects were having a nuclear family among which majority of study subjects (n-73) were stressed, followed by 12.9% study subjects having joint family a total of 9 subjects were stressed. This might be due to the poorer interactions with the family members by which they can't share and discuss their problems and relieve stress which is also seen in other studies [33] whereas gender wise distribution showed no differences in stress among male and female which is in according to a similar study [20]

Whereas significant difference was observed in perceived stress in students having hostel stay experience, which is seen in other study too [32]. This could be due to staying away from home after schooling, separated from family, lack of adjustment of hostel facilities like food and accommodation.

As discussed perceived stress scores were high in students staying in hostels which are in accordance to many studies [37] and also significant difference was observed between students staying hostels and day boarders with their Plaque scores, which means that PI scores are significantly lesser in hostilities as compared day boarders. This could be due once they have joined medical course and also staying with the same peer group might have played a role in keeping their oral health better. Over all the results suggest that majority of subjects were having perceived stress which shows that there is also need to bring about changes in the quality of evaluation system.

The second part of the study was to know that whether the perceived stress has any effect on gingival health. But it didn't show any significant association towards the same. In the present study, probably the reason of being not effecting gingival health would be; they might have perceived life as stressed, wherein perceived stress as such might not have affected health aspect.

One of the limitations of the present study as mentioned previously would be because of the cross sectional study which precludes evaluation of temporal associations and information was collected on self-administered questionnaires; there remains the possibility of information bias. Future this cohort can be longitudinally followed to know the effect of perceived stress on cortisol, interleukin 1 beta and gingival health. Prospective studies are

Necessary to study the associations between occurrence of stressors and incidence of stress

CONCLUSION

Most of the first year medical students showed perceived stress, among which factors in students having experience of hostel stay showed more stress, whereas the perceived stress didn't had effect on gingival health.

There is need to address these stressors by student advisors, peer education, and planning academic schedule and curricula of professional health sciences and further to develop scientific evidence based modules to effectively manage stress in academic environment. The students should be taught different stress management techniques to improve their ability to cope with a demanding professional course.

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Tables

Table 1: Gender, Parent working status, Family and Stay wise Distribution of study subjects

	Frequency(Out of 85)	**Percent (%)**
Females	52	61.2

Males	33	38.8
Both Parent Working	27	31.8
Single Parent Working	58	68.2
Subject from Joint Family	11	12.9
Subject from Nuclear Family	74	87.1
Not Staying at Hostel	51	60.0
Staying at Hostel	34	40.0

Table 2 Stress scale scores (Cohen) among various factors

Gender	< 13(Not stressed)	>=13(Stressed)
Female Count	6(7.1%)	46(54.1%)
Male Count	6(7.1%)	27(31.8%)
Total Count	12(14.1%)	73(85.9%)
Type of parents working status		
Both	3(3.5%)	24(28.2%)
Single	9(10.6%)	49(57.6%)

Total Count	12(14.1%)	73(85.9%)
Type of family		
Joint	2(2.4%)	9(10.6%)
Nuclear	10(11.8%)	64(75.3%)
Total Count	12(14.1%)	73(85.9%)
Type of Previous stay		
Staying at Hostel	7(8.2%)	44(51.8%)
Not Staying at Hostel	5(5.9)	29(34.1%)
Total Count	12(14.1%)	73(85.9%)

Table 3: Correlation between Various Perceived stress scale scores and clinical parameters

Parameters	**Pearson Correlation between Cohen stress scores with**		
	r-value	t-value	p-value
Plaque Index	-0.1415	-1.2465	0.2164
Gingival Index	-0.1443	-1.2717	0.2074
Bleeding on probing	-0.1647	-1.4554	0.1497
Parameters	**Pearson Correlation between potential factor stress scale scores with**		
	r-value	t-value	p-value
Plaque Index	-0.0829	-0.0829	-0.0829
Gingival Index	-0.1525	-0.1525	-0.1525
Bleeding on probing	-0.0788	-0.0788	-0.0788
Parameters	**Pearson Correlation between Academics stress scores with**		
	r-value	t-value	p-value
Plaque Index	-0.0585	-0.0585	-0.0585
Gingival Index	-0.1036	-0.1036	-0.1036
Bleeding on probing	-0.0659	-0.0659	-0.0659
Parameters	**Spearman Correlation between Inter personal relations stress scores with**		

	r-value	t-value	p-value
Plaque Index	0.0359	0.0359	0.0359
Gingival Index	0.0190	0.0190	0.0190
Bleeding on probing	0.0861	0.0861	0.0861

Parameters	**Spearman Correlation between clinical skill stress scores with**		
	r-value	t-value	p-value
Plaque Index	0.0059	0.0512	0.9593
Gingival Index	-0.0298	-0.2599	0.7957
Bleeding on probing	0.0378	0.3298	0.7424

Table 4: Multiple linear regression analysis of clinical parameters with perceived stress scores.

Dependent variables	Independent variables	Estimates	SE	t-value	p-level
P.I	Intercept	0.3444	0.0542	6.3514	0.0001
	Cohen stress scores	-0.0043	0.0039	-1.1092	0.2710
	Academics stress	0.0042	0.0058	0.7241	0.4713
	Inter personal relations stress	0.0102	0.0118	0.8685	0.3880
	Miscleneous stress	-0.0071	0.0055	-1.2841	0.2032
	Clinical skills stress	0.0033	0.0069	0.4829	0.6306
	R= .24136348 R^2= .05825633				
	F(5,72)=.89079 p<.49195 Std.Error of estimate: .14308				
G.I	Intercept	0.1896	0.0348	5.4494	0.0000
	Cohen stress scores	-0.0008	0.0025	-0.3173	0.7519
	Academics stress	0.0011	0.0037	0.2854	0.7762
	Inter personal relations stress	0.0106	0.0076	1.4023	0.1651
	Miscleneous stress	-0.0089	0.0035	-2.5192	**0.0140***
	Clinical skills stress	0.0022	0.0044	0.4992	0.6192
	R= .33049083 R^2= .10922419				
	F(5,72)=1.7657 p<.13084 Std.Error of estimate: .09178				
B.O.P	Intercept	0.2661	0.0554	4.8045	0.0001
	Cohen stress scores	-0.0048	0.0040	-1.2077	0.2311
	Academics stress	0.0032	0.0060	0.5301	0.5977
	Inter personal relations stress	0.0192	0.0120	1.5958	0.1149
	Miscleneous stress	-0.0103	0.0056	-1.8365	0.0704

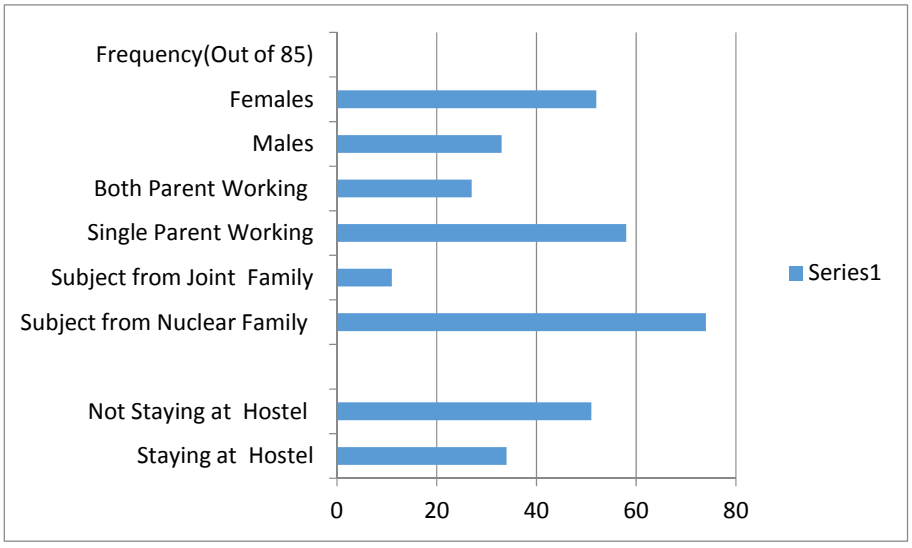
	Clinical skills stress	0.0055	0.0070	0.7808	0.4375
	R= .32552175 R^2= .10596441				
	F(5,72)=1.7067 p<.14402 Std.Error of estimate: .14610				

Table 5: Hostellers and Non-hostellers Comparison with various variables by t test

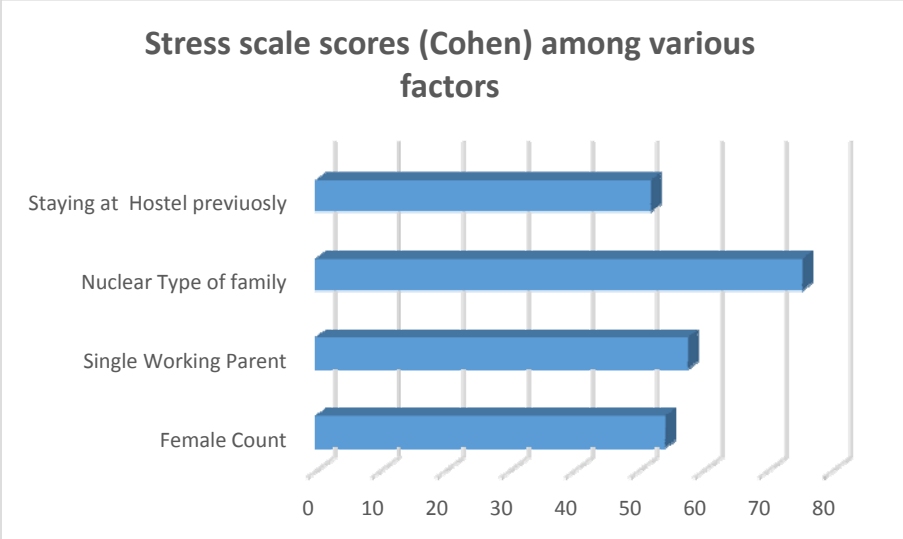
Variables	Hostellers		Non-hostellers (Day boarders)		t-value	p-value
	Mean	Std.Dev.	Mean	Std.Dev.		
Cohen stress scores	21.84	6.43	17.68	5.53	3.0453	**0.0032***
Total stress	22.94	12.43	18.51	9.91	1.7431	0.0854
Academics stress	8.45	4.72	6.89	3.86	1.5941	0.1151
Inter personal relations stress	1.81	1.89	2.00	1.84	-0.4498	0.6541
Miscellaneous stress	8.97	4.75	6.45	3.79	2.5961	0.0113
Clinical skills stress	3.68	3.39	3.23	2.77	0.6327	0.5288
P.I	0.23	0.09	0.30	0.16	-2.2618	**0.0266***
G.I	0.13	0.10	0.15	0.09	-1.1617	0.2490
B.O.P	0.14	0.15	0.20	0.15	-1.6914	0.0948

Graphs

Graph 1: Gender, Parent working status, Family and Stay wise Distribution of study subjects



Graph 2 :


Stress scale scores (Cohen) among various factors
Staying at Hostel previuosly
Nuclear Type of family
Single Working Parent
Female Count
0
10
20
30
40
50
60
70
80