

Association of Recurrent Aphthous Ulcers With Stress Among Students In An Indian Dental Institution

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Abstracts: Background: Recurrent aphthous ulcers are painful oral lesions with no proven effective treatment. A definitive cause of these ulcerations still remains elusive. It is believed that psychological stress may be a significant contributor. Aim: The aim of the present study was to determine whether there was any significant association of Recurrentaphthous ulcers with episodes of stress by determining the prevalence of ulcers and levels of stress tolerance among dental students. Materials and methods: A cross sectional survey was carried out on 341 students of Manipal College of Dental Sciences, Manipal, India by distributing questionnaires. The questionnaire had two sections, the first part dealt with ulcers and the later part comprised of a perceived stress scale. The data collected was analyzed with Independent sample t test and ANOVA with post hoc Tukey's test using the SPSS 16 version software. Results: Prevalence of ulcer was found to be 66.9%. Comparison of mean stress scores between the 'ulcer-experienced' and ulcer-free groups showed no difference. Assessment of stress among undergraduates, interns and post graduates who had reported ulcer experience revealed that interns were able to handle the stressful situations significantly better than undergraduates and post graduates. Conclusion: The present study did not show any association between episodes of ulcers and stressful events.[Pratibha PK NJIRM 2012; 3(3) : 141-147]

Key words:Prevalence, Recurrent aphthous ulcer, Stress,Students

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Introduction:Recurrent aphthous ulcers (RAU) or canker sores are an extremely common phenomenon and the dentist is often expected to suggest a treatment to alleviate the associated discomfort. It is estimated that RAU affect between 15 – 25 percent of the population. Aphthae can occur in any age group, but it is more commonly found in the second decade¹.

The worldwide distribution, high frequency and decreased quality of life generated by RAU have resulted in much research into the etiology and effective therapy of this disease. Many factors have been implicated in the promotion and / or exacerbation of RAU. These include positive family history, local trauma, nutritional deficiency, food hypersensitivity, immune disturbances, smoking cessation and psychological stress, among others^{2,3,4,5,6}.

Earlier studies have suggested that stress and anxiety could provoke episodes of RAU, but the results are varied⁷. Academic examination related stress has been shown to increase physiological and self-reported measures of stress and to decrease

immune functioning. Students showed increased salivary cortisol concentrations and also reported greater acute perceived stress during the examination period compared to the non-examination period⁸. Although cortisol concentrations and perceived stress reported were significantly higher during the examination period, similar levels of stress were also seen during the non-examination period. Therefore, if stress is a precipitating factor, the possibility of experiencing ulcers in the student population could be more.

A high prevalence of RAU has also been reported previously in the student population⁹. Hence, the present investigation intended to determine the prevalence of recurrent aphthous ulcers among students in an Indian dental school and various characteristics associated with episodes of ulcers, with emphasis on the role of stress. We also attempted to determine the levels of stress tolerance among different groups of dental students.

Material and Methods:A cross - sectional study was carried out among 341 dental students, which

included undergraduates, interns and post graduates. The data were collected with the help of questionnaires. Ethical committee approval was obtained from the Kasturba hospital institution review board prior to commencement of the study. The questionnaires had two sections. The first part contained personal information and questions related to aphthous ulcers, such as ulcer experience, number of episodes in the last six months, number of ulcers in each episode, duration of each episode, self-reported site, symptoms and remedial measures, associated conditions, allergies and self-reported periods of stress, tobacco consumption and family history.

The second part dealt with 10 questions about perceived stress using a modified perceived stress scale (PSS)¹⁰. PSS scores are obtained by reversing responses (e.g., 0 = 4, 1 = 3, 2 = 2, 3 = 1 & 4 = 0) to the four positively stated items (items 4, 5, 7, & 8) and then the responses for perceived stress scale (5 point Likert scale) were added together to give an overall stress score. This was followed by comparison of stress scores in those with or without aphthous ulcers. Stress levels between the ulcer – experienced and ulcer-free groups were compared using Independent sample t test with the SPSS 16 version software. Comparison of stress scores among student groups was carried out using ANOVA with post hoc Tukey’s test.

Results: A total of 341 dental students completed the survey out of which 66.9% (228) reported that they had experienced oral ulceration. (Table 1)

Table1 :Prevalence of recurrent aphthous ulcers among dental students

		N	%
experienced ulcer	yes	228	66.9%
	no	113	33.1%

Among those who complained of ulcer episodes, the majority had their last experience within the preceding six months (34.4%) to about 1 year (37%). Nearly half of these subjects had at least one episode previously (50.2%) with a majority (95.1%) having 1-2 ulcers during each episode and lasting for 3-5 days (53.1%). Many of the participants had ulcers in multiple areas (27.8%), with cheek and

lower lip area showing predominance (22.9 and 21.1% respectively). Slight (47.6%) to moderate pain (41%) was frequently observed. More than half of the participants had used vitamins and topical gels (50.2%) and a minor proportion of individuals had sought some home remedies (7.5%) and approximately 55.8% of the study participants opined that remedial measures were helpful. Many respondents (28.3%) felt that cheek bite, sharp teeth or tooth brush trauma were associated factors for ulceration. 93.8% of the students reported not having been exposed to tobacco, in any form. Positive family history was reported by about 44.1% of the study participants. (Table 2)

Table2 :Factors associated with ulcers in ‘ulcer-experienced’ subjects

Ulcer experience		N	%
When last experience d ulcer	Experiencing presently	16	7.0%
	1 month	49	21.6%
	6 months	78	34.4%
	1 year	84	37.0%
Episodes of ulcer	Once	113	50.2%
	2-3	53	23.6%
	4 or more	17	7.6%
	None	42	18.7%
Ulcers in each episode	1-2	215	95.1%
	3-6	8	3.5%
	7 or more	3	1.3%
How long they last	0-2 days	85	37.6%
	3-5 days	120	53.1%
	6 days or more	21	9.3%
Part of mouth	Upper lip	9	4.0%
	Upper gum	11	4.8%
	Throat	0	.0%
	Cheek	52	22.9%
	Lower lip	48	21.1%
	Lower gum	22	9.7%
	Tongue underside	7	3.1%
	Tongue top	15	6.6%
	Multiple areas	63	27.8%
How painful	No pain	17	7.5%
	Slight pain	108	47.6%
	Moderate pain	93	41.0%
	Severe pain	9	4.0%
Any treatment taken	No treatment	96	42.3%
	Vitamins / topical gels	114	50.2%
	Home remedy	17	7.5%
Was it	Yes	126	55.8%

helpful	No	25	11.1%
	Not applicable	75	33.2%
Associated with any condition	Fever	6	2.7%
	Skin problems	2	.9%
	Gastric disturbance	26	11.5%
	Repeated infections	2	.9%
	Vitamin deficiency	12	5.3%
	Spicy food	31	13.7%
	Sharp teeth / cheek bite / tooth brush injury	64	28.3%
	Diabetes	0	.0%
	Hormonal changes	4	1.8%
	Ortho treatment	3	1.3%
	None of the above	48	21.2%
	Multiple conditions	28	12.4%
	Allergic	Flavored lozenges	2
New tooth paste / mouth rinse / gum paint		8	3.5%
Strawberry / pine apple/ tomato		8	3.5%
Any other		71	31.4%
No allergy		137	60.6%
Associated with stress	Yes	62	27.3%
	No	163	71.8%
	5.00	2	.9%
Habit of smoking / tobacco	Never	213	93.8%
	Occasionally	10	4.4%
	Regularly	3	1.3%
	Previous smoker	1	.4%
Change in ulcer after smoking cessation	No change	6	2.6%
	Increase	2	.9%
	Decrease	1	.4%
	Not applicable	218	96.0%
Any one in family suffers ulcers	Yes	100	44.1%
	No	127	55.9%
Specify cause of stress	Examinations / work deadlines	39	17.2%
	Death of near ones	1	.4%
	Family disputes	0	.0%
	Financial constraints	0	.0%
	Change of place or food habits	6	2.6%
	Any other	6	2.6%
	Not applicable	165	72.7%
Multiple reasons	10	4.4%	

There was no significant difference in the means for individual or over all added scores of stress questionnaire among the 'ulcer-experienced' and 'ulcer-free' participants. (Table 3)

Table 3 : Comparison of mean stress scores between 'ulcer-experienced' and 'ulcer-free' subjects

	experienced ulcer				p-value
	Yes (228)		No (113)		
	Mean	SD	Mean	SD	
How often upset	1.75	1.05	1.66	1.08	0.502
How often unable to control things	1.65	1.10	1.51	1.08	0.28
How often felt stressed	1.83	1.13	1.66	1.14	0.205
Felt confident to handle problems	1.24	.90	1.14	0.84	0.35
Felt things going your way	1.58	1.00	1.60	1.04	0.875
Could not cope with all things	1.71	1.00	1.64	1.04	0.554
Able to control irritation	1.46	.93	1.39	0.92	0.505
You were on top	1.90	.98	1.75	1.01	0.185
Angered	1.96	.97	1.78	1.02	0.119
Could not over come	1.49	1.06	1.26	1.02	0.052
Total stress	16.56	5.98	15.40	6.12	0.094

A comparison of overall stress scores between UGs, PGs and interns in the 'ulcer-experienced' group was also carried out, which showed no significant difference between the three categories. However, interns had significantly higher mean score for questions "felt confident to handle problems" and "felt things going your way" than undergraduates. No significant difference was noticed between undergraduate and post graduate categories. Further, under graduates had higher mean scores for the question "could not cope with all things" than interns. (Table 4)

Table 4 : Comparison of stress among UG, Interns and PGs among subjects with ulcer experience

	N	Mean	SD	p-value	
How	UG	173	1.80	1.02	0.121

often upset	Intern	31	1.39	1.28	
	PG	24	1.83	0.87	
How often unable to control things	UG	173	1.66	1.04	0.951
	Intern	31	1.65	1.45	
	PG	24	1.58	1.02	
How often felt stressed	UG	173	1.84	1.08	0.304
	Intern	31	1.58	1.39	
	PG	24	2.04	1.12	
Felt confident to handle problems	UG	173	1.34	0.90	0.012
	Intern	31	0.87	0.96	
	PG	24	1.00	0.66	
Felt things going your way	UG	173	1.69	1.01	0.017
	Intern	31	1.19	0.98	
	PG	24	1.33	0.82	
Could not cope with all things	UG	173	1.79	0.98	0.052
	Intern	31	1.32	1.17	
	PG	24	1.63	0.77	
Able to control irritation	UG	173	1.47	0.89	0.753
	Intern	31	1.52	1.23	
	PG	24	1.33	0.76	
You were on top	UG	173	1.91	0.94	0.236
	Intern	31	1.68	1.22	
	PG	24	2.13	0.90	
Angered	UG	173	1.92	0.99	0.557
	Intern	31	2.13	1.12	
	PG	24	1.96	0.46	
Could not overcome	UG	173	1.51	1.04	0.818
	Intern	31	1.39	1.31	
	PG	24	1.46	0.83	
Total Stress	UG	173	16.93	5.79	0.159
	Intern	31	14.71	7.50	
	PG	24	16.29	4.85	

Discussion: The present study was designed to determine the prevalence of RAU among dental students in an Indian dental school and to determine factors related to the development of these lesions. The self-reported prevalence of RAU in the present study was found to be 66.9%, which is similar to other studies. Ship JA¹¹, reported a prevalence varying from 5% to 66% in the general population while among Danish dental students¹²,

the prevalence of recurrent aphthous ulcerations was noted to be about 56%.

Recurrent aphthous ulcers occur on areas of the mouth where the mucosa is non-keratinized and loosely attached, in particular, the buccal mucosa and labial mucosa, floor of the mouth, ventral surface of the tongue and soft palate¹³. 22.9 % of the ulcers reported in the present study were observed on the cheeks. Safadi in 2009 in a study on Jordanian dental students observed that 92% of the subjects reported pain and two – thirds of the subjects noticed that ulcers lasted for less than a week whereas a minority of patients felt ulcer duration extended beyond two weeks¹⁴. Similar observations were evident in the present investigation.

Episodes of ulcers may be precipitated by local trauma, stress, food intake, drugs, hormonal changes and vitamin and trace element deficiencies. In the present study, 28.3% of the students reported onset of ulcers following traumatic injuries like cheek bite, sharp teeth and toothbrush injury. Traumatic ulcers caused by dentures with over extended or unbalanced occlusion have been seen in about 5% of denture wearers¹⁵. 1.3% of the subjects experienced ulcer following orthodontic treatment. In the general population, higher incidences have been reported. Kvam et al noted that 28.7% of those undergoing orthodontic treatment experienced ulcerations, especially with fixed appliances¹⁶. It is imperative to distinguish RAU from traumatic oral ulcers where the source can be identified with a mechanical, chemical, thermal or radio therapeutic cause.

Foods containing gluten, chocolate, peanuts, strawberries, tomatoes etc. have been implicated in the occurrence of these ulcers¹⁷. There were no such reports in the present investigation. Incidents of ulcers were mostly associated with the use of flavoured lozenges. It appears that the crusty and acidic nature of the lozenge may be a contributory factor.

Vitamin supplements and topical gels are commonly prescribed by general practitioners and clinicians during episodes of ulcers. We observed that more than half of the participants also resorted to these

measures. Haematinic deficiencies have been found in about 20% of patients with RAU¹⁸. Replacement of this deficiency has resulted in remission of the symptoms¹⁹.

Majority of the students reported not using tobacco. This is not completely reliable as the students may not have revealed the correct information for fear of scrutiny by faculty. It has been suggested that cigarette smoking prevents aphthous ulcers by causing increased keratinization of the oral mucosa. Further, it has been proposed that a component of tobacco which is systemically absorbed might be responsible for protecting against aphthous ulcer. Smokeless tobacco, on the other hand, was found to be protective, suggesting nicotine as the protective factor²⁰. It was previously reported that adjusted odds of RAU were greatest for those 17 to 29 years of age (Adjusted OR 2.7; 95% CI 1.4 -5.5). Never smokers had greater risk of RAU (OR 9.2; 95% CI 2.8 -3.1) compared with those who smoked more than 10 cigarettes per day²¹. Axell and Henricsson observed a negative correlation between the prevalence of ulcers and tobacco habits. The suppression of ulcers was most evident for those groups smoking pipe or cigarettes without filter and only moderate for those using snuff. They also noted that heavy smokers had a lower frequency of ulcer than moderate smokers²².

44.1% of the students recall family members having suffered painful episodes of ulcers. It has been proposed that patients with a positive family history of RAS may develop oral ulcers at an earlier age and have more severe symptoms than those with no such history²³. No consistent association has been found though reports do implicate genetic determinants^{24,25}.

We also found no difference in stress levels between those who experienced ulcers and those who did not. Our findings have been supported by previous investigations. Pedersen A in 1989 conducted a study on 22 patients testing the hypothesis that psychological stress is a provoking factor in attacks of RAU²⁶. He found no association and concluded that standardized circumstances are needed to demonstrate such associations.

Nevertheless, students in general appear to be under some duress due to the fear of impending exams or compulsion to complete assignments given. Further, stress has been implicated to play a role in the aetiology of recurrent aphthous stomatitis, particularly in patients who have an underlying anxiety trait^{27,28,29}.

A report by Kasi PM et al in 2007 showed that significant levels of stress were identified among medical graduates, which led to their management of stress using negative coping mechanisms³⁰. It has also been suggested that stress could lead to habits that injure the oral mucosa, such as bites in cheeks and lips, leading to oral ulcer manifestation³¹.

Internship is an exciting time in a future dentist's career. Due to independence at work-setting, no compulsion of attending lectures, no dead lines of work schedules and exam-free environment, it has been observed that the interns in the present study were found under lower stress than other student and postgraduate categories. Internship, in dental schools in India, is a period following the final degree exams where students are allowed to work freely under continuous guidance by superiors giving them the opportunity to have hands on experience on a variety of dental procedures. This promotes their skills and builds their confidence enabling them to work self-reliantly in a general dental practice. Their enthusiasm towards this change in the working environment from that observed during student life may be contributing to lower stress among interns. Financial support by family members, is another factor which may also reduce relative stress levels in the Indian scenario, unlike that in other countries.

Nonetheless, there are contradictory reports on comparison with internship in other institutions. In a study by Willcock et al in 2004, internship was found to be a stressful time for medical graduates³². This was attributed to a number of factors, including a stressful work environment, long working hours, conflict between vocation and other personal life tasks, and individual psychological vulnerability³³. According to Lam TP et al 2010, interns in Hong Kong experienced considerable depression, anxiety and stress³⁴. Work load was found to be the most significant stressor.

Although the causes of RAU are varied, management would be directed primarily towards relief of symptoms due to the relatively mild course of RAU. Treatment objective should be to decrease the symptoms, reduce ulcer number and size as well as prolong duration of ulcer free periods. Chlorhexidine mouthwash without alcohol base may be recommended along with topical anesthetic gel (2% viscous Lignocaine hydrochloride) to reduce the associated discomfort. Patients should also be advised to maintain good daily oral hygiene. Avoidance of irritating agents, such as acidic, hard, spicy and salty foods and alcoholic beverages may also be desirable.

The study may have its limitation in that the data collected was based on subject recall of ulcer experience.

Conclusion:In the present study, we were able to determine a self-reported prevalence of 66.9% of recurrent aphthous ulcers among dental students in an Indian dental school. Evaluation of stress levels among students revealed that interns were able to cope better with demanding situations as compared to undergraduate and post graduate students. However, stress was not found to be associated with ulcer episodes as the mean stress scores between the 'ulcer-experienced' and 'ulcer-free' groups was not significantly different.

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References:

1. Porter SR, Scully C, Pedersen A. Recurrent aphthous stomatitis. *Crit Rev Oral Biol Med* 1998; 9: 306 – 321.
2. Scully C, Gorsky M, Lozada – Nur F. The diagnosis and management of recurrent aphthous stomatitis: a consensus approach. *J Am Dent Assoc* 2003; 134: 200 – 207.
3. Woo SB, Sonis ST. Recurrent aphthous ulcers: a review of diagnosis and treatment. *J Am Dent Assoc* 1996; 127: 1202 – 1213.
4. Casiglia JM. Recurrent aphthous stomatitis: etiology, diagnosis and treatment. *Gen Dent* 2002; 50: 157 -166.

5. Vincent SD, Lilly GE. Clinical, historic and therapeutic features of aphthous stomatitis. *Oral Surg Oral Med Oral Pathol* 1992; 74: 79 – 86.
6. Ship JA, Chavez EM, Doerr PA, Henson BS. Recurrent aphthous stomatitis. *Quintessence Int* 2000; 31: 95 – 112.
7. Gallo CB, Mimura MAM, Sugaya NN. Psychological stress and recurrent aphthous stomatitis. *Clinics* 2009; 64(7): 645 – 648.
8. Murphy L, Denis R, Ward CP and Tartar JL. Academic stress differentially influences perceived stress, salivary cortisol and immunoglobulin – A in undergraduate students. *Stress* 2010; 13: 365 – 370.
9. Ship II, Brightman VJ, Laster LL. The patient with recurrent ulcers and the patient with recurrent herpes labialis: A study of two population samples. *J Am Dent Assoc* 75:645, 1967.
10. Cohen S, Kamarck T, and Mermelstein R. A global measure of perceived stress. *Journal of Health and Social Behavior* 1983; 24: 386-396.
11. Ship JA. Recurrent aphthous stomatitis. An update. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1996; 81: 141 – 147.
12. Donatsky O. Epidemiologic study on recurrent aphthous ulcerations among 512 Danish dental students. *Community Dent Oral Epidemiol* 1973; 1: 37 – 40.
13. Schneider LC, and Schneider AE. Diagnosis of oral ulcers 1998; 65(5 & 6): 383 – 387.
14. Safadi AR. Prevalence of recurrent aphthous ulceration in Jordanian dental patients. *BMC Oral Health* 2009; 9: 31.
15. Budtz-Jorgensen E. Oral mucosal lesions associated with the wearing of removable dentures. *Journal of Oral Pathology and Medicine* 1981; 10 (2): 65 – 80.
16. Kvam E, Gjerdet NR, Bondevik O. Traumatic ulcers and pain during orthodontic treatment. *Comm Dent Oral Epidemiol* 1987; 15 (2): 104 – 107.
17. Scully C, Gorsky M, Lozada – Nur F. The diagnosis and management of recurrent aphthous stomatitis. A consensus approach. *JADA* 2003; 134: 200 – 207.
18. Field AE, Rotter E, Speechley JA, Tyldesley WR. Clinical and haematological assessment

- of children with recurrent aphthous ulceration. *Br Dent J* 1987; 163: 19 – 22.
19. Porter S, Flint S, Scully C, Keith O. Recurrent aphthous stomatitis: the efficacy of replacement therapy in patients with underlying hematinic deficiencies. *Ann Dent* 1992; 51 (2): 14 -16.
 20. Grady D, Ernster VL, Stillman L, Greenspan J. Smokeless tobacco use prevents aphthous stomatitis. *Oral Surg Oral Med Oral Pathol* 1992; 74 (4): 463 – 465.
 21. Chattopadhyay A, Chatterjee S. Risk indicators for recurrent aphthous ulcers among adults in the US. *Community Dent Oral Epidemiol* 2007 Apr; 35(2): 152 – 159.
 22. Axell T, Henricsson V. Association between recurrent aphthous ulcers and tobacco habits. *Eur J Oral Sci* June 1985; 93(3): 239 – 242.
 23. Ship II. Inheritance of aphthous ulcers of the mouth. *J Dent Res* 1965; 44: 837 – 844.
 24. Albanidou-Farmaki E, Kayavis IG, Polymenidis Z, Papanayotou P. HLA-A, B, C and DR antigens in recurrent oral ulcers. *Ann Dent* 1988; 47: 5–8.
 25. Shohat-Zabarski R, Kalderon S, Klein T, Weinberger A. Close association of HLA-B51 in persons with recurrent aphthous stomatitis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1992; 74: 455–458.
 26. Pedersen A. Psychologic stress and recurrent aphthous ulceration. *J Oral Pathol Med* 1989Feb; 18(2): 119 – 122.
 27. McCartan BE, Lamey PJ, Wallace AM. Salivary cortisol and anxiety in recurrent aphthous stomatitis. *Journal of Oral Pathology & Medicine* 1996; 25(7): 357 – 359.
 28. Soto – Araya M, Rojas – Alcayaga G, Esguep A. Association between psychological disorders and the presence of Oral lichen planus, Burning mouth syndrome and Recurrent aphthous stomatitis. *Med. Oral* 2004; 9: 1 -7.
 29. Albanidou-Farmaki E, Pouloupoulos AK, Epivatianos A, Farmakis K, Karamouzis M and Antoniadis D. Increased anxiety level and high salivary and serum cortisol concentrations in patients with recurrent aphthous stomatitis. *Tohoku J Exp Med* 2008; 214: 291 – 296.
 30. Kasi PM, Khawar T, Khan FH, Kiani JG, Khan UZ, Khan HM, Khuwaja UB and Rahim M. Studying the association between postgraduates trainees’ work hours, stress and the use of maladaptive coping strategies. *J Ayub Med Coll Abbottabad* 2007;19 (3): 37 – 41.
 31. Paterson AJ, Lamb AB, Clifford TJ & Lamey PJ. Burning mouth syndrome: the relationship between the HAD scale and parafunctional habits. *J Oral Pathol Med* 1995; 24: 289 – 292.
 32. Willcock SM, Daly MG, Tennant CC and Allard BJ. Burnout and psychiatric morbidity in new medical graduates. *The Medical Journal of Australia* 2004; 181(7): 357 – 360.
 33. Clark DC, Salazar-Gruesco, Grabler P, Fawcett J. Predictors of depression during the first 6 months of internship. *Am J Psychiatry* 1984; 141: 1095 -1098.
 34. Lam TP, Wong JG, Ip MS, Lam KF, Pang SL. Psychological well-being of interns in Hong Kong: what causes them stress and what helps them. *Med Teach* 2010; 32 (3): e120 - 126.