



ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2020; 6(3): 458-462
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www.oraljournal.com
Received: 14-05-2020
Accepted: 16-06-2020

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Prevalence of recurrent aphthous stomatitis and its association with stress among undergraduate students in a dental institution– a cross sectional study

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Abstract

Background: Recurrent aphthous stomatitis (RAS) is one of the most common mucosal disorders of the mouth. The exact etiology of aphthous ulcer is uncertain, but precipitated factors include stress, trauma, food sensitivity etc. The aim of this study was to estimate the prevalence of RAS among dental students and to find out its association with stress.

Methodology: A cross sectional study was conducted among 100 undergraduate dental students. The data were collected using questionnaires in two sections-1) Prevalence of occurrence of RAS was assessed by using a self reported questionnaire and 2) Stress factor was assessed by using perceived stress scale.

Results: This study was carried out in 100 under graduate students out of which 61% experienced aphthous ulcer. 26(42.6%) of students with aphthous ulcer had moderate stress and 35(57.4%) had severe stress. Perceived stress scores were high in dental students especially among the ulcer experienced group (61%) ($p=0.001$).

Conclusion: This study outlines the factors involved in prevalence of recurrent RAS and its association with stress and reports the observational methods that can be enlisted to decrease the stress among dental students and improve their academic performance.

Keywords: Recurrent aphthous stomatitis, oral ulcer, stress, dental students, canker sore.

1. Introduction

The term aphthous comes from the Greek word “aphtha”, meaning ulcer. Aphthous ulcers or recurrent aphthous stomatitis (RAS) are benign ulcerated, painful, shallow round ulcers with an erythematous halo covered by a yellowish-gray fibromembranous layer lesions commonly found in the, with uncertain etiology, still controversial treatment and a differential diagnosis that requires attention and clinical experience^[1].

The estimated prevalence of oral ulcers worldwide is 4%, with aphthous ulcers being the most common, affecting as many as 25% of the population worldwide. RAS occurs usually in the non-keratinized areas like lips, ventral surface of the tongue, buccal mucosa, floor of the mouth and soft palate^[2].

Stanley classified RAS into 3 types- Minor, Major and Herpetiform ulcers. 80% of RAS are minor RAS or mild aphthous ulcers. They are small ulcers of 8-10mm size, 1 to 5 in number, affecting nonkeratinised mucosa and heals in 10-14 days without scarring. Major aphthous ulcers (10-15% of RAS) are larger than minor ones (>1cm) and may involve the keratinised oral mucosa such as the hard palate, fauces etc. They may take upto 6 weeks to heal and often leave a scar. In Herpetiform ulceration, there are groups of small ulcers more than 10, may be up to 100 in number of 1-3mm in diameter and last for about 10-14 days and heal without scarring^[3].

RAS does not have a clear etiology. The development of recurrence can be related to hereditary, psychosomatic, infectious, hormonal (periods, pregnancy or post-menopausal) factors, trauma, stress, food allergies, nutritional deficiencies (iron, vitamin B12 and folic acid) and hematological abnormalities^[4].

Studies of Ship *et al.* [5] and Miller *et al.* [6] showed association between RAS and stress whereas studies of Ferguson *et al.* [7] and Heft and Wray [8] did not show any association between them. Studies reveal an increased prevalence of RAS in students and also with higher level of education. This finding supports the role of stress and anxiety in occurrence of RAS among educated patients, especially during the time of examination.

The role of stress that results in RAS episodes is still unclear. Onset of ulcer may be attributed to the elevated levels of salivary cortisol or reactive oxygen species in the saliva. Stress can also lead to cheek or lip bite, or aggravate actions causing injury to the oral mucosa. The symptoms caused by RAS, such as pain during speaking, eating, and swallowing; discomfort; impairment in food and liquid intake; and can deeply affect the oral health-related quality of life of patients [9].

This cross sectional study was conducted to estimate the prevalence of aphthous ulcers among undergraduate dental students and to find out its association with stress.

2. Materials and methods

Sample

This cross-sectional study was carried out among 18-22 year old First, second and third year undergraduate students of The Oxford Dental college, Bengaluru. The ethical clearance for the present study was obtained from the Ethical Review Committee. An informed consent was obtained from all the willing participants. The data was collected using simple random sampling technique and a total of 100 students were finalized. Students suffering from systemic diseases and taking medications like steroids that leads to immunosuppression were excluded.

Data collection

The entire study sample was informed about the principles of the study and appealed to fill up the questionnaires which were circulated by investigator. The data were collected using a self reported questionnaires. The questionnaires had two sections.

Questionnaire

First part included personal details and second part recorded details related to aphthous ulcers such as history of ulcer, prognosis period and site of ulcer. Interrogations regarding the presence of frequent oral ulcers and questions regarding the life style, stress factors, anxiety level, health and medications taken observed by the subjects were assessed.

Perceived stress scale

Stress factor of the undergraduate students was assessed using Perceived stress scale [10]. The Perceived Stress Scale (PSS) is the most widely used psychological instrument for measuring the perception of stress. It is a measure of the degree to which situations in one's life are appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives. The scale also includes a number of direct queries about current levels of experienced stress. The items are easy to understand, and the response alternatives are simple to grasp. The questions in the PSS ask about feelings and thoughts during the last month. PSS included of 14 items with answers varying from never to sometimes, fairly often and very often on the basis of the occurrence. The scale produces a single score with high and low scores indicating higher and lower levels of stress. The PSS-14 has a probable range from 0 to 56 scores.

3. Statistical analysis

The data was analyzed by using SPSS version 22 software (SPSS Inc., Chicago, IL, USA). Differences in proportions were compared using the Chi square test. Mean stress scores versus gender and professional years was calculated with Student's *t*-test and ANOVA respectively. Binary logistic regression analysis to evaluate the influence of the different stress levels on RAS. The level of significance was set at $P < 0.05$.

4. Results

Study was carried out in 100 dental students out of which 61% students showed the presence of aphthous ulcers. (Figure 1) When the rate of RAS was compared according to various levels of stress measured by Perceived Stress Scale (PSS), 20% students showed low stress 39% showed moderate stress and 41% showed severe stress. (Figure 2)

Distribution of ulcer related characteristics among study samples (Table 1)

6 students were suffering from RAS at the time of the study, 65 of them had ulcer 1 month back, and 28 of them had ulcer more than a year back. 67(67%) students showed the previous occurrence of RAS and 33(33%) participants didn't show any previous occurrence of ulcers. When the duration of RAS was taken into consideration for 53(53%) students it lasted for less than 10 days, for 41% it lasted for 10 – 14 days, 3 (3%) it lasted for more than 14 days and 3(3%) didn't know the duration of RAS. 54(54%) of the study population were having some or other medical problems whereas 46(46%) of them were not having any medical problem. 63(63%) of the study populations was on medication and 37 (37%) were not under any medication.

When type of food was taken into consideration 29 (29%) participants were having hot spicy food, 52(52%) were having salty food and 19 (19%) were having acidic food. When food allergy was taken into consideration 49(49%) participants were having food allergy and 51(51%) didn't had any food allergy.

When the relationship between ulcer and menstruation was taken into consideration 51 (51%) students showed a relationship and 49 (49%) of them showed no relationship.

Considering association between RAS and stress levels among study samples, students who were having aphthous ulcers 26(42.6%) students showed moderate stress and 35(57.4%) of had severe stress. (Table 2)

Considering association between RAS and low stress level with previous history among study samples 10(50%) of the study sample had experienced RAS one month before, 7(35%) had RAS before 1 year and 3 (15%) had RAS during that particular time and it was not statistically significant. When the last time occurrence of RAS and severe stress level was taken into consideration, 28(68.3%) of the study sample had experienced RAS one month before, 13(31.7%) had RAS before 1 year. (Table 3)

Considering association between stress levels and psychological profile of RAS patients RAS patients with severe stress 10 (28.6%) were having hot and spicy food, 20 (57.1%) were having salty food and 5(14.3%) were having acidic food. It was not statistically significant. (Table 4)

When the relationship between ulcer and menstruation was taken into consideration, among severe stress people 16 (45.7%) reported the occurrence of RAS during menstruation. It was not statistically significant. (Table 4)

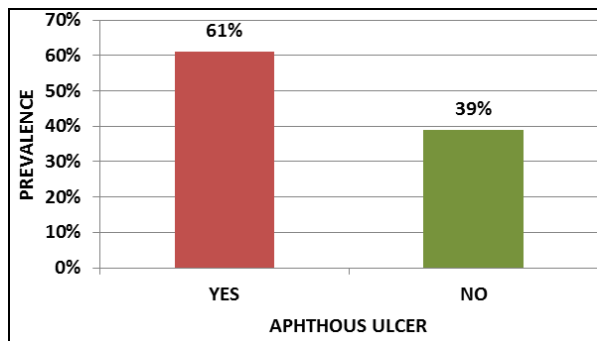


Fig 1: Prevalence of RAS among study samples

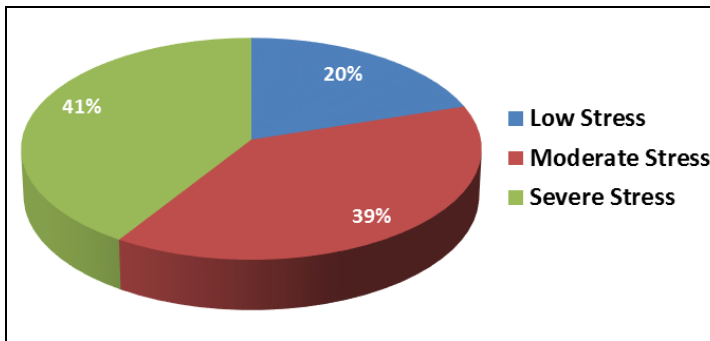


Fig 2: Distribution of stress levels among study samples

Table 1: Distribution of ulcer related characteristics among study samples

Variables	Category	n	%
Type of Food	Hot spicy food	29	29%
	Salty food	52	52%
	Acidic food	19	19%
Food Allergy	Yes	49	49%
	No	51	51%
Ulcer & Menstruation	Yes	51	51%
	No	49	49%
Stress and anxiety	Yes	42	42%
	No	58	58%
Which are those Associated Factor	Stress	61	61%
	Others	39	39%
Ulcer Before	Yes	67	67%
	No	33	33%
Ulcer last for	< 10 days	53	53%
	10 - 14 days	41	41%
	> 14 days	3	3%
	Don't know	3	3%
Any other factors associated	Stress	67	67%
	Anxiety	33	33%
Last time occurrence of ulcer	Before 1 month	65	65%
	Before 1 Year	28	28%
	At Present	6	6%
	Don't Know	1	1%
Problem with Menstruation	Yes	57	57%
	No	43	43%
Any medical problem	Yes	54	54%
	No	46	46%
On medications	Yes	63	63%
	No	37	37%
Frequently have spicy food	Yes	19	19%
	No	81	81%
Feelings during stress /anxiety	Express your feelings	69	69%
	Acts like you are ok	31	31%

Table 2: Association between RAS and Stress levels among study samples

Stress Levels	Yes		No		χ^2 Value	P-Value
	n	%	n	%		
Low Stress	0	0.0%	20	51.3%	42.040	<0.001*
Mod. Stress	26	42.6%	13	33.3%		
Severe Stress	35	57.4%	6	15.4%		

P-Value <0.001*, statistically significant

Table 3: Association between stress levels and RAS related characteristics among study samples

Variables	Category	Low Stress		Mod. Stress		Severe Stress		P-Value
		n	%	N	%	n	%	
Ulcer Before	Yes	14	70.0%	26	66.7%	27	65.9%	0.95
	No	6	30.0%	13	33.3%	14	34.1%	
Ulcer last for	< 10 days	5	25.0%	23	59.0%	25	61.0%	0.11
	10 - 14 days	14	70.0%	14	35.9%	13	31.7%	
	> 14 days	0	0.0%	1	2.6%	2	4.9%	
	Don't know	1	5.0%	1	2.6%	1	2.4%	
Last time occurrence of ulcer	Before 1 month	10	50.0%	27	69.2%	28	68.3%	0.17

	Before 1 Year	7	35.0%	8	20.5%	13	31.7%	
	At Present	3	15.0%	3	7.7%	0	0.0%	
	Don't Know	0	0.0%	1	2.6%	0	0.0%	
Problem with Menstruation	Yes	9	45.0%	23	59.0%	25	61.0%	0.47
	No	11	55.0%	16	41.0%	16	39.0%	
Any medical problem	Yes	8	40.0%	23	59.0%	23	56.1%	0.36

Table 4: Association between stress levels and psychological profile of RAS patients

Variables	Category	Mod. Stress		Severe Stress		P-Value
		n	%	N	%	
Type of Food	Hot spicy food	9	34.6%	10	28.6%	0.85
	Salty food	13	50.0%	20	57.1%	
	Acidic food	4	15.4%	5	14.3%	
Food Allergy	Yes	15	57.7%	17	48.6%	0.48
	No	11	42.3%	18	51.4%	
Ulcer & Menstruation	Yes	14	53.8%	16	45.7%	0.53
	No	12	46.2%	19	54.3%	
Any medical problem	Yes	17	65.4%	18	51.4%	0.28
	No	9	34.6%	17	48.6%	
On medications	Yes	15	57.7%	25	71.4%	0.26
	No	11	42.3%	10	28.6%	
Frequently have spicy food	Yes	5	19.2%	9	25.7%	0.55
	No	21	80.8%	26	74.3%	
Feelings during stress /anxiety	Express your feelings	17	65.4%	23	65.7%	0.98

5. Discussion

The prevalence of aphthous stomatitis in the present study was 61% and similar results were obtained by Maheswaran *et al.* [11] among the students of a dental institution in south India. Studies of Handa *et al.* [12] from Jaipur reported a prevalence of 26%. Studies from other parts of the world such as Japan [13], Sulaimani City [14], Iran [15] and Turkey [16] reported prevalence rates of 31%, 28.2%, 25.2% and 25.5% respectively.

As our study population was undergraduate dental students, we can attribute this high prevalence rate of aphthous ulcer in this study to stress because compared to other professional courses dental students endure more stress due to the nature of the dental curriculum and work load. Ship JA [17] reported frequency of RAS as 66.9% and Donatsky O [18] mentioned as 66% among Danish dental students. In this study 41% (41 students) of the students were under high stress as indicated by the high PSS score. (Figure 2)

There are a number of studies suggesting association of anxiety, depression, and psychological stress with RAS. Huling LB, [19] recorded daily stress of events in 160 cases of patients of RAS and observed that stressful events may lead to initiation of new RAS episodes. On the contrary study of Pedersen A [20] on 22 patients found no association between stress and RAS and concluded that standardized circumstances are needed to demonstrate such associations using increased keratinization of the oral mucosa.

There are studies showing the role of stress in the development of RAS especially in those who have an underlying anxiety trait. 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 mechanisms [21]. As a result of stress habits like biting the cheeks and lips may develop which will injure the oral mucosa and cause oral ulcers.

In the present study 51% of female students were affected by RAS. The findings were similar to study by Safadi in Jordanian dental patients [22]. In addition to this Patil *et al.* [9] also reported that females (56.3%) were more habitually affected compared to males (43.7%) and the results were statistically significant. It could be due to more level of stress among females due to emotional conditions which can have an effect on their immune response. Also, hormonal changes during pregnancy and menstruation also have an impact on stress. [9] On contrary to this Rao *et al.* found that males had higher Recurrent aphthous stomatitis (87%) compared to females (74%) [23].

Among the participants, females had higher RAS prevalence compared to males, which is similar to study reported by Handa *et al.*, where females are more commonly affected than males. [12] The Mean stress scores of females were more compared to males in this study were similar to study reported by Singh *et al.* [24] in which female nursing students perceived more stress than male students.

In the present study even though there was increased stress among

dental students we could not find a difference in stress experienced between 1st year, 2nd year and 3rd year BDS students. This is in contrary to the studies of Handa *et al.* and Singh *et al.* who reported that higher class students felt more stress when compared to juniors. The reason for increased stress among 1st year students may be because first year is a transitional period from school to professional education and they are finding it difficult to cope up with the vast curriculum.

In the present study majority of the participants (53) were having ulcers during each episode lasting for less than 10 days. Similar observations were seen in the study of Safadi in 2009 in a study on Jordanian dental students who noticed that two – thirds of the subjects, ulcers lasted for less than a week. [22].

In our study 54 had some kind of medical problem and 63 were on medications not related to ulcer treatment. Some medical conditions and medications are important factors in the occurrence of the ulcer [25]. This study didn't record the location of the ulcers.

The Perceived Stress Scale (PSS) in the present study stated that stress level is positively correlated with RAS. Correspondingly Rao *et al.* [23], stated that existence of stress adds to the chances of having RAS by 3.1 times. Similarly, Gallo *et al.* [26] observed that patients with recurrent aphthous stomatitis exhibited high level of stress than the control group.

6. Conclusion

This study has outlined the factors involved in prevalence of recurrent aphthous stomatitis and its association with stress and reported the observational methods that can be enlisted to decrease the stress among dental students but also improve their academic performance. The current data can assist in premeditated planning to ensure wellbeing for future dentists. When we evaluated with modified perceived stress scores (PSS), we found a significant association between stress and aphthous ulcer which was confirming the above said finding.

This study suggested impact of psychological factors such as anxiety, stress and depression on the quality of life of RAS patients. Although depression and anxiety levels were comparable to normal individuals, but psychological stress was found to be an important trigger factor for the initiation of recurrent ulcers.

7. Limitations

Family history has not been recorded in the current study. 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 history. As this is a questionnaire based study, the patients may try to under report the facts, which is the main drawback of questionnaire-based studies. Sample size taken was small. Severity of the aphthous stomatitis was not considered.

Stress levels between different years among the dental students were not taken separately.

7. Acknowledgement

I thank my staff and colleagues from The Oxford Dental College Bangalore who provided insight and expertise that greatly assisted the research. I thank my guide Dr. Shilpashree K.B for assistance with methodology, and for comments that greatly improved the manuscript. I would also like to show our gratitude to Dr. Archana Krishna Murthy and Dr. Madhusudhan S for sharing their pearls of wisdom with us during the course of this research, and I thank Dr. David Albert Coutinho and Dr. Mugdha Khond for assisting in collecting the data.

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