

# Association of bedtime with recurrent aphthous stomatitis: A cross-sectional study among health-care professional students

Mamata Kamat<sup>1</sup>, Uma Datar<sup>1</sup>, Umesh Wadgave<sup>2</sup>, V K Varsha<sup>3</sup>

<sup>1</sup>Department of Oral Pathology and Microbiology, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Sangli, Maharashtra, <sup>2</sup>Department of Public Health Dentistry, ESIC Dental College and Hospital, Gulbarga, <sup>3</sup>Department of Oral Pathology and Microbiology, Rajarajeshwari Dental College and Hospital, Bengaluru, Karnataka, India

## Abstract

**Background:** Although recurrent aphthous stomatitis (RAS) is the most common oral mucosal disease, the etiology remains poorly understood till date. In addition, RAS lacks definitive therapeutic options, and hence, it becomes even more important to know the etiological factor so as to relieve the symptoms and render treatment effectively. Recently, late bedtime has been shown to be associated with RAS. Due to prolonged duty hours along with lengthy learning and training periods, late bedtime is a frequent observation among health-care professional students. However, this is a less explored field in the previous studies on RAS.

**Aims:** This study aimed to evaluate the role of bedtime in the causation of RAS among health-care professional students.

**Methods:** This present cross-sectional survey was carried out among medical, dental and nursing students studying in our medical campus, using an anonymous, self-administered questionnaire consisting of 18 items. The collected data was statistically analyzed and interpreted. Descriptive analysis and Chi-square tests were employed to assess the association of RAS with various variables.

**Results:** Among a total of 1111 students who participated in the study, 39.8% ( $n = 442$ ) experienced RAS. Factors such as history of digestive tract disease, family history and stress showed a positive correlation with RAS. Interestingly, both during examination and nonexamination period, RAS was more prevalent among students with bedtime  $> 11$ pm than in students with bedtime  $< 11$  pm.

**Conclusion:** The study indicates that late bedtime is an independent risk factor for RAS and thus clinicians should focus on recommending a healthy lifestyle with adequate sleep to patients with RAS. This would benefit patients with RAS, especially health-care professional students, and could probably contribute to long-term remission in RAS.

**Keywords:** Aphthous, association, sleep, stomatitis

**Address for correspondence:** Dr. Mamata Kamat, Department of Oral Pathology and Microbiology, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Sangli - 416 416. Maharashtra, India.

E-mail: kmamata@yahoo.com

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## INTRODUCTION

Majority of the oral lesions result from the interaction among the host, lifestyle and environmental factors.<sup>[1]</sup> Recurrent aphthous stomatitis (RAS) or canker sore is one such common condition, which is characterized by recurrent, painful, multiple, small, round or ovoid ulcers with circumscribed margins, erythematous haloes and yellow or gray floors.<sup>[1-5]</sup>

RAS chiefly occurs in childhood or adolescence; with a peak incidence in the third decade.<sup>[4]</sup> RAS is generally seen on the unattached oral mucosa of the lips, cheeks and tongue.<sup>[2,6]</sup> A multifactorial etiology has been proposed that includes microbial, nutritional, hormonal, mechanical injuries, immune dysregulation, genetic factors and stress.<sup>[7-11]</sup> However, a definitive cause of RAS remains largely unknown till date.

The average incidence varies between 5% and 25% in the general population.<sup>[8]</sup> Literature reports a high prevalence of RAS among the student population.<sup>[9,12,13]</sup> This has been attributed to the demanding academic activities, especially in professional students. Furthermore, with the increasing use of modern gadgets and technologies, late bedtime is frequently observed in students. Sleep disorders are known to cause immune dysregulation, which can render an individual susceptible to RAS.<sup>[4]</sup> However, literature shows few studies linking the association of RAS and bedtime, especially among health-care professional students.<sup>[4]</sup>

Hence, considering the above-mentioned facts, the present questionnaire survey intended to determine the prevalence of RAS and various factors associated with RAS with emphasis on the role of bedtime among the health-care professional students of Bharati Vidyapeeth Medical Campus, Sangli, India.

## METHODS

After obtaining clearance from the Institutional Ethical Committee, the present cross-sectional survey was conducted among the students who fulfilled the following inclusion and exclusion criteria.

### Inclusion criteria

- Subjects who give written informed consent to participate in the study
- Students studying in medical, dental and nursing colleges of Bharati Vidyapeeth Medical Campus, Sangli, Maharashtra.

### Exclusion criteria

- Subjects with habit of tobacco smoking

- Subjects suffering from psychological disturbances, sleep disorders, inflammatory and allergic conditions
- Subjects with a history of syndromes where RAS is one of its symptoms.

The data was collected with a help of anonymous self-administered questionnaire. Before starting the study, all the participants were explained the purpose of the study and were given information about RAS. The questionnaire consisted of a total of 18 items; including demographic and RAS-related information (size, number, duration of RAS and related factors such as bedtime, stress and family history).

The obtained data was entered into Microsoft Excel and statistically analyzed. Statistical analysis was performed using SPSS software version 16. Descriptive analysis of all variables was done. Chi-square test was employed to assess the association of RAS with various variables.

## RESULTS

A total of 1111 students consisting of medical, dental and nursing colleges participated in the survey. The mean age was 20.3 years. The descriptive data is depicted in Table 1. It was found that 39.8% ( $n = 442$ ) of students experienced RAS, while 60.2% ( $n = 669$ ) did not [Table 2]. Among the students with RAS, 61 subjects (13.8%) experienced prodromal symptoms, while 381 (86.2%) did not. Lip mucosa was the most commonly affected site (40.7%) followed by buccal mucosa (32.6%) and other locations. Maximum number of students (81.7%) experienced 1–2 ulcers during each attack of RAS. The majority of RAS positive students had ulcers <1 mm (57.5%) and the maximum number of students (93.9%) reported that the usual time taken to heal was 1–2 weeks.

The correlation between RAS and parameters such as history of digestive tract disease, history of allergy, family history and stress is depicted in Table 3. The results showed a positive correlation of RAS with history of digestive tract diseases, family history and stress. However, the history of allergy ( $P = 0.75$ ) and frequency of catching cold ( $P = 0.337$ ) did not show any association with RAS.

Both during examination and nonexamination period, RAS was more prevalent among students with bedtime >11pm than in students with bedtime <11pm,  $P = 0.022$  and  $0.04$ , respectively [Tables 4 and 5].

## DISCUSSION

RAS is the most common oral mucosal disease, which affects the quality of life.<sup>[3]</sup> Due to the high prevalence and

associated pain, RAS is considered as one of the public health concerns.<sup>[3]</sup> The present cross-sectional survey was undertaken to establish the prevalence of RAS among the health-care professional students of Bharati Vidyapeeth Medical Campus, Sangli, India, and to assess various factors related to the occurrence of RAS.

**Table 1: Descriptive data of study population**

	Number of students ( <i>n</i> =1111), <i>n</i> (%)
Faculty	
Medical	339 (30.5)
Dental	578 (52)
Nursing	194 (17.5)
Gender	
Male	397 (35.7)
Female	714 (64.3)
Usual bedtime	
Before 11 pm	194 (17.5)
After 11 pm	917 (82.5)
Bedtime during examination time	
Before 11 pm	105 (9.5)
After 11 pm	1006 (90.5)
History of digestive tract disease	
Yes	114 (10.3)
No	996 (89.6)
History of allergy	
Yes	175 (15.8)
No	935 (84.2)
History of RAS among family members	
Yes	149 (13.4)
No	688 (61.9)
Don't know	274 (24.7)
Frequency of stress	
Rarely	193 (17.4)
Sometimes	711 (64)
Always	207 (18.6)

RAS: Recurrent aphthous stomatitis

**Table 2: Prevalence of recurrent aphthous stomatitis among study population**

RAS	Number of students (%)
Yes	442 (39.8)
No	669 (60.2)

RAS: Recurrent aphthous stomatitis

**Table 3: Correlation between RAS and various parameters**

Positive RAS <i>n</i> (%)	RAS		<i>P</i>
	Negative RAS	<i>n</i> (%)	
History of Digestive tract disease			
Yes	62 (54.4%)	52 (45.6%)	0.003*
No	380 (38.2%)	616 (61.8%)	
History of allergy			
Yes	78 (44.6%)	97 (55.4%)	0.75
No	364 (38.9%)	572 (61.1%)	
Family history			
Yes	121 (81.2%)	28 (18.8%)	0.001*
No	216 (31.4%)	472 (68.6%)	
Don't know	105 (38.3%)	169 (61.7%)	
Stress			
Rarely	58 (30.1%)	135 (69.9%)	0.001*
Sometimes	278 (39.1%)	433 (60.9%)	
Always	106 (51.2%)	101 (48.8%)	

\*Chi-square test,  $P \leq 0.05$

Literature reports a prevalence of 5%–25% in the general population and about 50%–60% in the professional population,<sup>[8]</sup> that has been linked to pressure from academic activities.<sup>[9]</sup> A prevalence of 56% in Danish dental students,<sup>[13]</sup> 23.3% in college students<sup>[9]</sup> and 53.2% in the student population<sup>[4]</sup> has been reported in the literature. Recently, a study on RAS among the student population by Ma *et al.* reported a prevalence of 53.2% among the student population.<sup>[4]</sup> In the present study, the prevalence of RAS was 39.8%. The variation in the prevalence rate can be attributed to differences in the study design and methodology, sample size and study population.

Literature reports that RAS is frequently seen in females ( $n = 5$ ) which was also observed in the present study. RAS has a predilection to occur on the nonkeratinized mucosa such as buccal mucosa, labial mucosa, floor of the mouth, ventral surface of the tongue and soft palate.<sup>[9]</sup> The same was observed in the present study where labial mucosa (30.7%) was the most frequently affected site.

Various predisposing factors have been suggested for RAS. These include local and systemic factors such as trauma, genetics, vitamin deficiencies, immune dysfunction, stress and digestive tract disorders.<sup>[2,5,6,14]</sup> Recently, association of late bedtime and RAS has also been reported.<sup>[4]</sup>

In the present study, more number of students with RAS (54.4%) had a history of digestive tract disease than those without RAS and the difference was statistically significant ( $P = 0.003$ ). Similar findings have been reported in the literature.<sup>[5,6]</sup> This has been attributed to food and microelement deficiencies in patients with gastrointestinal disturbances.<sup>[6]</sup>

Our results showed a positive correlation between family history and RAS (statistically significant  $P = 0.001$ ). This association between RAS and positive family history is linked to alteration in the metabolism of interleukins, interferon- $\gamma$ , tumor necrosis factor-alpha and selected human leukocyte antigen allele.<sup>[6]</sup>

Similarly, a positive correlation was found between stress and RAS (significant  $P = 0.001$ ). It is suggested that stress induces immunoregulatory activity, alters immune functioning and leads to increased salivary cortisol concentrations.<sup>[6,10]</sup> It is also postulated that stress may lead to parafunctional oral habits which initiate ulcerations in susceptible individuals.<sup>[10]</sup> Stress due to academic activities could be linked as the stress-inducing factor in the current study population.

Interestingly, in the present study, both during examination and nonexamination periods, it was found that subjects with late bedtime (>11pm) had more risk of RAS than those who slept early (statistically significant  $P = 0.022$  and  $0.04$ , respectively). This finding is in accordance with a similar study by Ma *et al.*<sup>[14]</sup> Similarly, a total of 44.7% of subjects reported the association of lack of sleep to RAS in a study by Baccaglini *et al.*<sup>[15]</sup> This indicates that late bedtime is an independent risk factor for RAS. However, as these studies included a mixed population of students from various courses, we exclusively focused on the health-care professional students. The associated mechanism linking late bedtime and RAS is summarized in Figure 1. However, there is less research on this relationship. Moreover, such studies are not done in the Indian student population. Hence, an attempt has been made in the present study to understand this association. Nevertheless, factors such as recall bias, social desirability bias and the subject's sincerity toward the completion of the questionnaire should be taken into consideration while considering the results of the study.

Overall, this paper broadens the knowledge on the unexplored information regarding the relationship between bedtime and

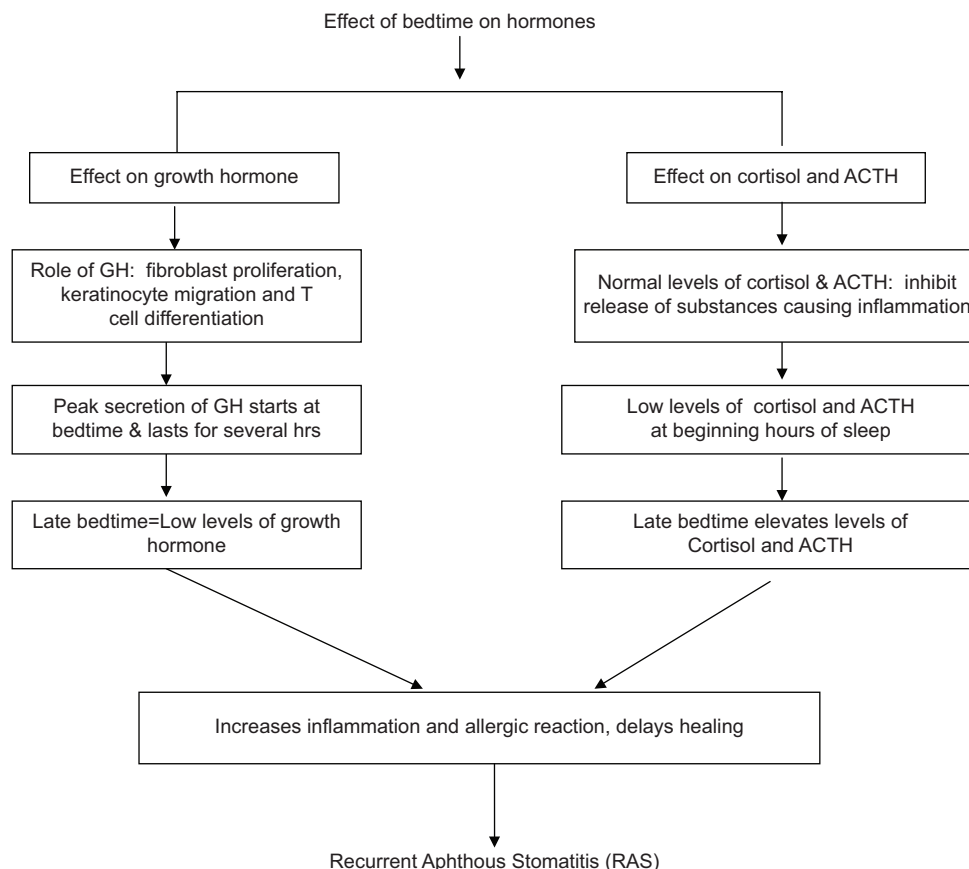
RAS. In addition, the outcomes of this study highlight the importance of adequate sleep on reducing the risk of RAS among health-care professional students including dental professionals. Hence, further research in this subject may shed light on the etiopathogenic mechanism of RAS and aid in the development of preventive measures for RAS.

## CONCLUSION

In the present study, the prevalence of RAS was found to be 39.8% among health-care professional students. It was found that late bedtime has a significant effect on the incidence of RAS. However, future research needs to be undertaken with larger sample size and varied population to further strengthen the association between bedtime and RAS. Furthermore, early and adequate bedtime habits can be recommended to reduce the incidence and recurrence of RAS.

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**Figure 1:** Mechanism of association between recurrent aphthous stomatitis and bedtime. ACTH; Adenocorticotrophic Hormone, GH; Growth Hormone

**Table 4: Association of bedtime and recurrent aphthous stomatitis during nonexamination period**

RAS	Usual bedtime (%)		$\chi^2$	P
	Before 11 pm	After 11 pm		
Number of positive RAS	63 (32.5)	379 (41.3)	5.242	0.022*
Number of negative RAS	131 (67.5)	538 (58.7)		

\*Chi-square test,  $P \leq 0.05$ . RAS: Recurrent aphthous stomatitis

**Table 5: Association of bedtime and recurrent aphthous stomatitis during examination period**

RAS	Bedtime during examination period (%)		$\chi^2$	P
	Before 11 pm	After 11 pm		
Number of positive RAS	32 (30.5)	410 (40.8)	4.194	0.04*
Number of negative RAS	73 (69.5)	596 (59.2)		

\*Chi-square test,  $P \leq 0.05$ . RAS: Recurrent aphthous stomatitis

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### Conflicts of interest

There are no conflicts of interest.

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