



Prevalence of recurrent aphthous ulcers among dentistry students and its association with anxiety

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ABSTRACT

Introduction: Recurrent aphthous stomatitis (RAS) is a common ulcerative inflammatory condition of the oral mucosa. Considering the contradictory findings of previous research about the association between anxiety and RAS, the present study aimed to determine the prevalence of RAS and its association with anxiety among dentistry students.

Materials and Methods: In this descriptive-analytical study, a total of 241 dentistry students of G. University were divided into two groups (those with a history of RAS and healthy subjects) after recording their demographic and required information. Also, Cattell's questionnaire was used to evaluate the level of anxiety. The results were analyzed using SPSS v.21 software, and a p-value of <0.05 was considered statistically significant.

Results: 2.40% of subjects suffered from RAS. This condition was more prevalent in winter, and its incidence was significantly different between the two groups in terms of the presence of a family history of RAS ($p=0.01$), food allergy ($p=0.05$), and regular exercise ($p=0.040$). Subjects with RAS had a significantly higher anxiety intensity in the areas of lack of ego strength, superego susceptibility, and ergic tension compared to subjects without RAS ($p<0.0001$).

Conclusion: The results showed that some areas of anxiety, including lack of ego strength, can be predictors of RAS. Therefore, teaching life skills such as anxiety management and its timely diagnosis and treatment can play an essential role in the prevention and treatment of RAS.

Keywords: Recurrent aphthous stomatitis; Anxiety; Dentistry students.

Introduction

Recurrent aphthous stomatitis (RAS), as the most common ulcerative condition of the oral mucosa, can be observed as multiple small, symmetrical, painful ulcers with a characteristic yellowish-gray pseudo-

membranous center and erythematous margin on non-keratinized mucosa. Aphthous ulcers occur in 25% of people, with a higher prevalence among females, which increases with age [1].

Morphologically, RAS is divided into three types minor (the most prevalent form), major, and herpetiform, based on clinical characteristics and wound healing time, it is divided into two types simple (with the highest prevalence and fastest healing) and complex (with severe pain and disability, and longer healing process [1,2]. Genetics, some medicines (e.g., bisphosphonates, aspirin, and some NSAIDs), microorganisms (e.g., oral streptococci and *Helicobacter pylori*), anxiety, trauma (sharp teeth or anesthetic injections), sodium lauryl sulfate in toothpaste, anemia, and nutritional deficiencies are the predisposing factors of RAS. Furthermore, smoking has been reported to have a negative relationship with RAS by stimulating the thickening of the keratinized layer of the oral mucosa [1-3].

Anxiety plays an indirect role in the development of RAS by stimulating the sympathetic system (leading to increased sensitivity of the oral mucosa to trauma and consequent local issues due to decreased saliva and dry mouth) and increasing oral mucosal traumas (caused by increased oral parafunction like bruxism). Moreover, it can directly increase the incidence of RAS by affecting the immune system and increasing the susceptibility of the oral mucosa to inflammation [3,4]. Although in some previous studies, stress and anxiety have been reported as influential factors in the occurrence of RAS [2,5,6], the correlation between them remains controversial. On the other hand, in some other studies, no significant relationship has been reported between the severity of psychological/anxiety factors with RAS [3,7,8]. Considering the contradictory findings of previous studies, the present study aimed to determine the prevalence of RAS among dentistry students and its relationship with anxiety.

Materials and Methods

This cross-sectional-comparative study was conducted on dentistry students of Guilan University of Medical Sciences. After obtaining informed written consent from participants; a convenience sequential non-probability sampling method was used to include them in the study. The inclusion criteria were the willingness of dentistry students of any gender and age to participate, and the exclusion criteria were unwillingness to participate and the presence of any wound caused by a chipped tooth, repaired broken tooth, orthodontic appliance, partial prosthesis, and aphthous-like ulcers caused by taking NSAIDs [9]. Also, RAS was considered a wound that recurs at least twice a year [9]. Based on the study by Chamani et al. [9], the sample size was determined to be 241 peo-

ple with a confidence interval of 95% and a margin error of 5%. To acquaint the participants with RAS wounds, sufficient information about RAS types and their differential diagnoses was provided to them in illustrations. Then, they were asked to complete the RAS questionnaire and the Persian version of the Cattell questionnaire (related to anxiety). The RAS questionnaire included demographic information such as age, gender, height, weight, BMI, marital status, history of allergies, drug use, systemic diseases, family history of RAS, the season of RAS occurrence, the first incidence of RAS, location of ulcers, association between menstruation and types of emotional/psychological anxiety with ulcer onset, and smoking history. The Persian version of Cattell's anxiety questionnaire, whose validity and reliability have been approved by the psychiatric community, includes 40 questions that measure the total anxiety score by measuring the level of hidden/overt anxiety, and the level of awareness/unawareness of the individual regarding their anxiety. The scores vary between 0 and 80, and scores of ≥ 28 indicate the presence of a spectrum of anxiety, which is interpreted as follows:

Score 0-3 (0-27): minimal anxiety; calm, stable, and comfortable personality.

Score 4-6 (28-40): mild anxiety.

Score 7 or 8 (scores 41-49): moderate anxiety.

Score 9 or 10 (scores 50-80): severe anxiety; needs psychotherapy or counseling [9].

After completing the questionnaires, data were analyzed based on the variables, using chi-square, t-test, and Mann-Whitney tests, through the SPSS software v.21, at a significance level of $P < 0.05$. Ethical considerations: The present research has been approved by the Ethics Committee of the Research and Technology Vice-Chancellor of the Faculty of Medical Sciences and Health Services of Guilan with the ethics code of IR.GUMS.REC.1394.5.5. After providing the participants with adequate information about the study process and obtaining informed written consent from them; a convenience sequential non-probability sampling method was used to include them in the study. Also, the present study followed the World Medical Association Declaration of Helsinki [Ethical principles for medical research involving human subjects].

Results

A total of 241 participants with a mean age of 23.2 ± 2.8 years were randomly divided into two case (with a his-

tory of RAS; n=97) and control (without a history of RAS; n=144) groups, of whom 55.6% and 44.4% were female and male, respectively. The prevalence of RAS in the samples was 40.2%. The participants were distributed almost equally in the two groups regarding age and gender. According to the findings, RAS was mostly prevalent in lips (30.9%), buccal mucosa (14.4%) and soft palate (12.4%), respectively. In addition, the highest prevalence of RAS based on seasons was reported to be in winter (63.9%), spring (60.8%), summer (52.6%), and autumn (40.2%), respectively. 9.62% of the case group reported an increased incidence of RAS during exams and 1.35% after receiving a low score.

Also, 21% of female students reported the occurrence of RAS simultaneously with the onset of menstruation. Family history of RAS ($p=0.01$), systemic diseases ($p=0.029$), food allergy ($p=0.05$), and regular 20-minute exercise at least three times a week ($p=0.040$) were significantly higher in the case group compared to the control group. However, no significant difference was observed between the two groups in terms of smoking ($p=0.107$), BMI ($p=0.0927$), marital status ($p=0.404$), and place of residence ($p=0.244$). In the examination of the level of anxiety based on Cattell's questionnaire, in normal subjects (without anxiety), the frequency percentage of poor self-sentiment integration (lack of integration), lack of ego strength (emotional instability), paranoid trend (protension; suspiciousness), superego susceptibility (guilt proneness), and ergic tension or id pressures (tension) were only 10.8%, 14.5%, 10.8%, 20.7%, and 30.3%, respectively, while other subjects showed mild to severe degree of anxiety (Table 1).

Overall, only 22.8% of subjects had a calm, stable, and comfortable personality. While 47.7%, 20.3%, and 9.1% had mild, moderate, and severe anxiety, respectively. Moreover, the case group had higher anxiety intensity than the control group in all anxiety areas of Cattell's questionnaire ($p<0.0001$). Multiple analyses of RAS predictive factors based on the logistic regression model using the Backward LR method showed that having a family history of RAS increases its incidence 7.06 times. Furthermore, a 1-point increase in anxiety in C-D (lack of ego strength) and Q4-D (ergic tension) resulted in a 1.2- and 1.3 increase in RAS rates, respectively.

Discussion

The present study aimed to determine the prevalence of RAS and its association with anxiety among

the dentistry students of Guilan University. The frequency percent of RAS in dentistry students was 40.2%, while it was reported to be 78.1%, 21.8%, 19.4%, and 54% in the studies of Kalewara Rao, Shiva, Chamani, and Ziaei, respectively [9-12]. The difference in the results can be attributed to genetic differences, socio-cultural issues, different nutritional styles, differences in the studied society, and study methodology. It has been reported that the prevalence of RAS among dentistry, medicine, and pharmacy students is higher than in the general population due to their stressful academic conditions [13].

In the present study, the prevalence of RAS was higher among females, which is consistent with the results of previous studies [1-3]. One of the reasons for the higher prevalence of RAS among females is alteration in the level of hormones, especially estrogen, and its effect on the keratinization of the oral mucosa epithelium so that there is an inverse relationship between the level of plasma estrogen and the incidence of RAS [14]. Moreover, higher levels of anxiety and depression have been reported among females, especially among dentistry students [15], which could justify the higher prevalence of RAS among females. This is due to the higher sensitivity of the hypothalamus-pituitary-adrenal (HPA) axis to stressful stimuli in women, which causes them to produce more cortisol when exposed to the same stressor [16].

In the present study, RAS was more common in the lips, buccal mucosa, and soft palate, respectively, which was consistent with previous studies [12,17,18]. In their research, Chamani et al. reported vestibular mucosa on both sides, lower lip, and dorsal tongue, respectively, as the most commonly affected areas [9]. RAS is more common in non-keratinized mucosa than in keratinized mucosa (e.g., tongue surface) [1]. Considering that in Chamani et al.'s study, medical and pharmacy students also participated along with dentistry students, and taking into account that dentistry students are more knowledgeable than other students in distinguishing aphthous ulcers from other similar oral ulcers, it can be concluded that the difference in the results reported for the prevalence of oral ulcers is primarily due to the different study population and their knowledge about the types of oral ulcers. Although some previous studies have reported a higher prevalence of RAS in summer [9,18], in the present study, its prevalence was highest and lowest in winter and autumn, respectively, and this difference may be due to the populations' social situations, responsibilities, food items, and anxiety caused by climate changes. Also, anxiety caused by the

exams of dentistry students in the winter could justify the higher prevalence of RAS among the participants of this study in this season. In the present study, a significant relationship was observed between the incidence of RAS and the presence of a family history of this condition ($p=0.01$), which was in line with previous studies [3,12,18]. Various DNA polymorphisms and changes in the metabolism of cytokines, including ILs, IFN- γ , and TNF- α , are among the genetic risk factors that can effectively determine people's susceptibility to RAS [19]. Moreover, the relationship between RAS and systemic diseases was significant in this study. Some systemic diseases, such as gastrointestinal diseases, can provide the basis for the development of RAS, which justifies the results of this study [3].

Food allergy has been reported as a potential cause of ROS [2,11]. However, some studies contradict this [9,20]. In our study, a significant relationship was observed between the occurrence of RAS and food allergy. The relationship between exercise and the reduction of RAS incidence was significant, which could be due to the effect of exercise on reducing anxiety and strengthening the immune system [21]. In addition, regular exercise can reduce anxiety in the area of ego strength (C) by increasing a person's self-confidence [22] and thereby reducing the incidence of RAS.

In this study, those who answered positively to the question about RAS lesion aggravation being simultaneous with the onset of their menstruation had more anxiety, which was consistent with the results of Chamani et al. and Hutajulu & Lubis studies [9,14]. This can be due to increased irritability, fatigue, or pain caused by the menstrual cycle and the consequent hormonal and physiological alterations. Furthermore, during menstruation, the progesterone level decreases by about 80%, which facilitates bacterial attacks on the oral mucosa and increases the likelihood of RAS by affecting the production of prostaglandins and vascular permeability [14].

Smoking has been reported to reduce the incidence of aphthous ulcers by increasing mucosal keratin thickness [3]. However, in this study, no significant difference was observed between the two groups in terms of smoking. Also, the place of residence and marital status had no significant effect on the occurrence of RAS. In Cattell's questionnaire, five general individual factors of anxiety have been included as follows: Lack of ego strength (emotional instability) (C), paranoid trend (protension; suspiciousness) (L), poor self-sentiment integration (lack of integration) (Q3), superego suscep-

tibility (guilt proneness), and ergic tension or id pressures (tension) (O) [23]. Besides, this questionnaire includes questions such as the presence of physical disorders like indigestion, hidden anxiety, and a history of feeling restless or experiencing sleep disorders related to overt anxiety [24]. In this study, in patients with a history of RAS, not only the overall level of anxiety but also the intensity of anxiety in all areas was higher than in the control group, which was consistent with the results of most related studies [9,14,17,25]. However, Karaer et al. reported no significant difference in depression and anxiety between the two groups with and without RAS [26]. Mirzaie et al. used the Beck anxiety and depression inventory to measure the level of anxiety and reported no significant difference between the two groups with and without RAS in terms of anxiety and depression [7]. These contradictory results could be due to differences in the study population or the type of anxiety assessment tool. Also, cultural factors, lack of motivation to answer the questions, etc. in the studied population can lead to wrong answers and finally contradictory results.

According to the findings of the present study, despite the greater intensity of anxiety in the subjects of the case group, the increase in anxiety in the areas of lack of ego strength (C) and ergic tension (Q4) was more associated with the incidence of RAS, which caused an increase in its incidence by 2.1 and 3.1 times, respectively. This finding is in line with Maredpour et al., who reported ego strength as the area most closely associated with behavioral and physical components [27]. The higher level of anxiety in the area of lack of ego strength and emotional instability indicates a person's inability to quickly control stressful factors in a realistic way [27]. Consequently, the more anxious the ego, the more physical manifestations such as RAS will occur. On the other hand, higher anxiety in the area of ergic tension (Q4) manifests as an impatient, irritable individual who works beyond capacity [28] with physical manifestations such as diseases like cardiac ischemia and Bell's palsy [29,30]. Considering the effect of these areas in increasing the incidence of RAS and their different treatment methods, correct diagnosis and timely treatment can prevent their impact on increasing anxiety and consequent RAS incidence.

Table 1. Frequency distribution of anxiety level among dentistry students of Guillan University according to anxiety areas.

Anxiety areas		Normal	Mild	Moderate	Severe	Total
Poor self-sentiment integration	N	26	113	97	5	241
	%	10.8	46.9	40.2	2.1	100
Lack of ego strength	N	35	13	49	27	241
	%	14.5	53.9	20.2	11.2	100
Superego susceptibility	N	50	124	43	24	241
	%	20.7	51.5	17.8	10	100
Ergic tension	N	73	115	27	26	241
	%	30.3	47.7	11.2	10.8	100

Conclusion

According to the findings of the present study, the incidence rate of RAS among dentistry students of Guillan University was higher than the average reported in communities, and those with a history of RAS had a higher level and intensity of anxiety. Despite the higher level and intensity of anxiety in people with a history of RAS in all areas, higher anxiety scores in the two areas of lack of ego strength (C) and ergic tension (Q4) were associated with the incidence of RAS; hence, they could be considered as predictors of RAS. Therefore, teaching life skills such as anxiety management and timely diagnosis and treatment of it can play an essential role in the prevention and treatment of RAS.

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Conflict of Interest

There is no conflict of interest to declare.

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