

Association of Recurrent Aphthous Stomatitis Types with Body Mass Index Among Pakistani Population

Recurrent
Aphthous
Stomatitis Types
with BMI

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ABSTRACT

Objective: to determine association of BMI in RAS development.

Study Design: Analytic study

Place and Duration of Study: This study was conducted at the Outpatient Department of Punjab Dental Hospital, Lahore from January 2019 to December 2019.

Materials and Methods: Total of 172 RAS patients were enrolled in this study. After taking consent, a self-structured questionnaire was filled out to determine demographic variables, types of RAS and BMI. Data was analyzed by SPSS version 22 for percentage and frequency of variables including age, gender, RAS types and BMI. For association, Chi-square test was used and p -value <0.05 was considered significant.

Results: Our data showed that the mean age was 29.82 (SD=13.19) and female gender was $>64\%$. Minor RAS was the more common type (69.8%), followed by major (24.4%) and herpetiform (5.8%). Among RAS patients, BMI was recorded as 44.2% high, 39.5% normal and 16.3% low. Significant association was observed at 0.008 in RAS types and BMI.

Conclusions: BMI is an important risk factor for RAS. Minor RAS was more common than major and herpetiform.

Key Words: Recurrent Aphthous Stomatitis (RAS), Body Mass Index (BMI)

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INTRODUCTION

Oral cavity is a landscape of many different elements and variables working together or in opposition. It is composed of mucosa, stratified squamous keratinized and non-keratinized, teeth, gingiva and prone to certain injuries, chemical insults, pathogens, ulcers and autoimmune diseases. However, body's protective and defensive system keep it healthy like salivary immunoglobulins.^(1,2)

Recurrent aphthous stomatitis (RAS), a benign ulcerative condition, affected 25% of population worldwide.⁽³⁾ It is defined as the recurrent formation of non-contagious ulcers in otherwise healthy individuals.

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On the basis of ulcer size, location and healing pattern, it is categorized into three types: minor, major, and herpetiform. The exact pathogenesis of RAS has not been determined yet. It has been shown that RAS developed by imbalance of T-cell mediated immune response in which T-cells attacked oral epithelium and disrupt epithelium cells directly or indirectly by inflammatory cytokines.⁽⁴⁾ This leads to formation of mouth ulcers. Many factors can trigger the ulcer formation including stress, nutritional deficiencies, hormonal aberrations, certain foods/additives, allergic and genetic propensities and dehydration.⁽⁵⁾

Minor aphthous present ulcers to five in number having $<10\text{mm}$ in size and involving non-keratinizing mucosa mainly on lips, cheeks, on and floor of the mouth. Morphologically, they are round to oval in shape with grey white pseudo-membrane and an erythematous halo. They heal completely in couple of days to a fortnight but no scarring is observed. Major aphthous ulcers are $>10\text{mm}$ in size and more in number with healing time upto a month or more and with high risk of scarring. Morphologically, it is similar to minor aphthous in presentation but involves more keratinized sites. Herpetiform type presents as small ulcers (2-3mm) with numbers ranging up to hundred and involving both keratinized and non-keratinized sites.

Morphologically, they are deep and have irregular contours. They heal in less than a month with no risk of scarring. These three types represent spectrum of same disease but different inciting factors with a broad range of manifestations. ⁽³⁾

RAS present a diagnostic and therapeutic challenge because of highly individualized ability to develop after specific stimulus. This variability transcribes into broad range of demographics resulting in varied patients response to different treatment modalities. ⁽⁵⁾

Among the various indicators used to determine body health over the years, Body Mass Index (BMI) is the one that has stood the test of time. Although its is a subjective measurement, it is still used as the change in reference value for specific person and used to classify a body as underweight, normal weight, overweight and obese. ⁽⁶⁾ Stress is one of the key factor in developing ulceration and aberrant BMI values may induce body stress, consequently leading to deranged functions of T-cells and ultimately RAS developed. Therefore, it is beneficial to find out the distinctive variables resulting the RAS and may help to establish the responsiveness of different treatments used.

MATERIALS AND METHODS

This study was approved by Ethical Review Committee of King Edward Medical University, Lahore. Sample size of 172 RAS subjects was calculated ⁽⁷⁾ and collected by convenient sampling technique from the Outdoor Patient department of Punjab Dental Hospital, Lahore. After taking consent, data was collected using a structured, self-administered questionnaire (Table 1). Briefly, the questionnaire had four parts: (1) Demographic information such as age and gender (2) Inclusion criteria for RAS type identification with four questions in major and ten in minor criteria (3) Types of RAS (minor, major, and herpetiform) (4) Information regarding BMI. Responses were gathered in the form of yes and no. Known cases of COPD, asthma, acute infection, inflammatory bowel disease and patients taking steroids were excluded from the study. Participants’ weight and height were calculated by the principal investigators. BMI was calculated using Quetelet’s Index with normal (18.5-24.9), below (<18.5) and high (>25). ⁽⁸⁾

Data were analyzed by SPSS version 22. Qualitative variables were reported as frequencies and percentages while quantitative variables like age and BMI were reported in mean and SD. Chi-square test was used to evaluate the association between types of ulcers and BMI. *p*-value <0.05 was considered significant.

RESULTS

In study, total of 172 RAS patients was analyzed. The mean age of the respondents was 29.82 (SD 13.19) and the female gender was more than 64%. Minor RAS was

more common type 69.8%, major 24.4%, and 5.8% herpetiform. The majority of respondents have a high BMI 44.2%, while 39.5% have a normal BMI and 16.3 % have a low BMI. The detailed results are given in Table 2.

Table No.1: Self-Structured Questionnaire for RAS used in this study ⁽⁹⁾

Variables	Sub-categories
Age (Years)	<18
	>18
Gender	Male
	Female
Criteria of RAS Diagnosis	
Major criteria	Single or multiple round/oval ulcers shallow, regular margins, yellow grey base surrounded by erythematous margins never preceded by vesicles <1cm in diameter.
	At least three attacks of RAS within past three years, ulcers do not appear on same focal site.
	Painful lesions exacerbated by movement of ulcer affected area.
	Ulcers heals spontaneously without sequelae with/without treatment.
Minor Criteria	Family history.
	First attack below 40 years age.
	Non-keratinized oral mucosa involved.
	Ulcer last for few days to few week.
	Irregular recurrence pattern.
	Non-specific information in histology.
	Triggered by hormonal changes, specific foods, drugs, infection or local trauma.
	Documented deficiency of Ferritin, Iron, Folate B12 or Zinc.
	Non-smoker or RAS developed after quitting smoking.
Heals with oral or systemic steroid	
Type of Ulcer	Minor
	Major
	Herpetiform
BMI	Normal (18.5-24.9)
	Low (<18.5)
	High (>25)

A significant association was found between types of ulcer and BMI (*p*-value=0.008). However, the association was not statistically significant between ulcer types and age (*p*-value=0.06). Similarly between types of RAS and gender (*p*-value=0.8).

When BMI was analyzed in minor, major, and herpetiform, among 120 cases of minor RAS 58 (48.3%) cases showed high BMI (>25), 38 (31.7%) normal BMI, and 24 (20.0%) low BMI. Similarly, out of 120 cases, 92 (76.7%) were adults (> 18 years of age) and 28 (23.3%) were minors (< 18 years of age). Out of 120 cases of minor RAS, females were slightly more than 70 (58.3%) as compared to males 50 (41.7%). The detailed results are given in Table 3.

Table No.2: Descriptive Statistics (Frequency & Percentage) of RAS and BMI (n=172)

Variables	Sub-groups	Frequency (n)	%age
Age (Years)	<18	38	22.1
	>18	134	77.9
	Total	172	100.0
Gender	Male	62	36.0
	Female	110	64.0
	Total	172	100.0
Ulcer Types	Minor	120	69.8
	Major	42	24.4
	Herpetiform	10	5.8
	Total	172	100.0
BMI	Normal (18.5-24.9)	68	39.5
	Low (<18.5)	28	16.3
	High (>25)	76	44.2
	Total	172	100

Table No.3: Association analysis of BMI and RAS

	BMI	Types of RAS				P-Value
		Minor	Major	Herpetiform	Total	
BMI	Normal	38(31.7%)	24(57.1%)	6(60.0%)	68(39.5%)	0.008
	Low BMI	24(20.0%)	2(4.8%)	2(20.0%)	28(16.3%)	
	High BMI	58(48.3%)	16(38.1%)	2(20.0%)	76(44.2%)	
	Total	120(100%)	42(100.0%)	10(100%)	172(100%)	
Age	<18 year	28(23.3%)	8(19.0%)	2(20%)	38(22.1%)	0.836
	>18 year	92(76.7%)	34(81.0%)	8(80.0%)	134(77.9%)	
	Total	120(100%)	42(100%)	10(100%)	172(100%)	
Gender	Male	50(41.7%)	10(23.8%)	2(20.0%)	62(36.0%)	0.064
	Female	70(58.3%)	32(76.2%)	8(80.0%)	110(64.0%)	
	Total	120(100%)	42(100%)	10(100%)	172(100%)	

DISCUSSION

It is acknowledged fact that aphthous ulcers are multifactorial with varied etiology while BMI was originated to categorize person into its respective categorical weight group. BMI showed an association with metabolic diseases mainly diabetes and hypertension. Due to this profound association, it is not inimical for other diseases to be referenced against BMI. Here, the BMI are compared to three main RAS types. It has been reported that Minor aphthous ulceration were more prevalent in patients with high BMI in comparison to low BMI indicating that metabolic syndrome is associated with aphthous ulceration. Although it can be associated with either environmental factors or decreased immunity due to underlying metabolic diseases. ⁽¹⁰⁾⁽¹¹⁾ One thing to keep insight is that people with normal BMI fall below the overweight and above the underweight group. It would neither be judicial to say that being underweight is a protective factor against ulcerations nor is an exclusive association of this disease with the overweight group. The extrapolation of these findings would be to state that “the occurrence of minor aphthous ulcerations and BMI are directly proportional. An increase in BMI causes a proportional increase in susceptibility of minor aphthous ulcerations.”

Major type is 8 times more common in overweight group as compared to underweight group. While in comparison to underweight and overweight group, it is 12 and 1.5 times more common in the normal-weight group respectively. This data is ambivalent; giving the impression of uncertain and idiopathic nature and also portraying the voluminous association of disease with an increased BMI. To extrapolate the overall association of major aphthous with BMI, we can say that the severity increases with an increase in BMI until the upper range of the normal BMI group and after that, it starts to fall. ⁽¹²⁾ However, in the current study, the total cases of major RAS were 24.4% out of which most respondents have a normal BMI (57.1%) followed by a high BMI (38.1%) and low BMI (4.8%).

On the other hand, herpetiform aphthous ulcerations were observed equally in underweight and overweight group, and 3 times more common in normal-weight group. These can be attributed first to small proportion of people in this group and secondly, after some time these ulcerations merge to form larger ulcers and often not categorized as herpetiform aphthous ulcerations anymore. ⁽¹²⁾ Furthermore, as the procedure of data collection in this study is cross-sectional, so the presentation of herpetiform aphthous ulceration, overlapping with many other diseases most commonly herpes, can result in its categorization as some other disease.

Therefore, the expression of herpeticiform with BMI has been arbitrary; having equal expression in overweight and underweight groups and thrice the incidence in normal-weight group.

In the current study, BMI is highly significant with the type of ulcers (p -value=0.008) while another study reported that BMI is not a significant factor (p -value=0.579) however they did not categorize it in types of ulcers. In our study, BMI was categorized as normal (39.5%), low (16.3%) while high (44.2%) with sample size of 172. However, sample size of RAS patients in previous study was smaller ($n=98$) with BMI low (12.2%), normal (69.3%) and high (18.4%). In both studies, the female gender is more common (64% in our study and 61.2%).⁽¹³⁾ Mean age of respondents in our study is 29.82 which is slightly high as previously⁽¹³⁾ In another study, RAS-positive cases were more prevalent in low-BMI group with the age of the respondents was 20-40 years.⁽¹⁴⁾

We reported that RAS and BMI were significantly associated among cases (p -value=0.008). However, another study found no significant association among control and RAS group (p -value=0.178). No significant association was observed between age, gender and RAS.⁽¹⁵⁾ In our study, the mean BMI was 25.0 with mean age 29.82 while different studies reported varied BMI such as 26.0⁽¹⁵⁾, 23.76 with mean age 29.73⁽¹⁶⁾, 21.1 with mean age of 16 years⁽¹⁷⁾ and 23 with mean age of 28.76 \pm 9.14 years⁽¹⁸⁾. Dajani et al reported no significant difference in BMI <25 and >25 in lifetime prevalence of RAS 8.1 and 8.3 % respectively. In the current study, 44.2% of respondents have high BMI while in their study it was 72.6%.⁽¹⁹⁾ RAS cases were reported to be more common among female^(16, 17, 19). A case and control study conducted in Pakistan showed that RAS was more common in female (65.7%)⁽¹⁸⁾. Similar pattern was observed in our study.

CONCLUSION

Minor RAS was more common type of ulceration with predoimance of female gender, high BMI and adult population (>18 years).

Author's Contribution:

Concept & Design of Study:	Zainab Rizvi, Nakhshab Choudhry, Aamir Jamal Gondal, Nighat Yasmin
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