

RESEARCH ARTICLE

## The correlation between trauma and poor diet in oral ulceration: an online-based survey

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### ABSTRACT

The most common oral ulceration in the community might be as recurrent as aphthous stomatitis (RAS) or traumatic ulcer. The aim of this study was to report and analyze the characteristics of oral ulceration and risk factors based on an online survey. A questionnaire using Google forms containing a total of 34 questions. Four questions were about personal details, whereas 30 questions related to oral ulceration were recorded and presented descriptively. The chi square test was carried out to determine the relationship between several questionnaire variables. A total of 208 respondents were involved, consisting of 162 female and 46 male. Respondents were in the age range of 0–50 year old with >23 year old as the age group with the highest number of respondents (53%). Oral ulceration data showed no recurrence in 157 respondents (75%), rare recurrence/ once in a year (52%), frequent recurrence in the labial mucosa in 121 respondents, single ulcer (86%), round shape (75%), risk factor due to trauma (biting/ friction) in 165 respondents, ulcer untreated (64 %), and ulcer recovery of less than 7 days (70%). The respondents had no symptoms of anemia (73%), and were not on a vegan diet (98%). Chi square test indicated that there was a significant correlation between trauma and the poor diet ( $p= 0.001$ ). The data in this present study indicate that the characteristics of oral ulceration might lead to RAS or traumatic ulcers and this might be attributed to local (trauma) and systemic (diet) factors.

**Keywords:** online survey; oral ulceration; risk factors

### INTRODUCTION

Online survey tools or web-based survey tools have been used for data collection in a simpler way. Currently most people in the community have become web users, especially to get information and social needs. Online surveys have many advantages including cost-effective, less paper, less transportation costs, and efficient time for both researchers and respondents.<sup>1</sup> The number of internet users in Indonesia reached 171.17 million throughout 2018. In other words, 64.8% of the Indonesian population has accessed the internet.<sup>2</sup> However, online surveys in oral and dental health are still rare to find.

This study focused on the prevalence of oral ulceration by involving patients from

several institutions, including dental hospitals or universities as the research population. Common oral ulceration in the community includes recurrent aphthous stomatitis (RAS) or also known as recurrent aphthous ulcer (RAU),<sup>3,4,5</sup> traumatic ulcer,<sup>6,7</sup> and oral ulceration due to herpes simplex virus (HSV) type 1 infection.<sup>8,9</sup> Prevalence of RAS has been reported as affecting 20% of the general population at any time.<sup>10</sup> A research in Iraq showed that the prevalence of RAU was 28.2%,<sup>11</sup> the prevalence in India was 21.7%,<sup>10</sup> and in China it was 23.30%.<sup>12</sup> A slightly different result was found in Indonesia, in which the prevalence of RAS varied in different places: 14% in dental hospital University Jember,<sup>13</sup> 35.6% in Universitas Padjadjaran Bandung,<sup>14</sup> and 100% in Universitas

Sam Ratulangi Manado.<sup>15</sup> There were only few studies to address the prevalence of traumatic ulcers, some of which are found as case reports study regarding the management of traumatic ulcers.<sup>16–19</sup>

Some oral ulceration has special characteristics, such as traumatic ulcers, which appears as a solitary shallow, or deep ulcer with irregular border. Chronic traumatic ulcer can be found in varying degrees of peripheral keratosis, while RAS have a round or oval shape with a distinct red border (halo erythem), similar to herpes ulcers, except when the multiple ulcer found in a small size and accompanied by gingivitis. This condition tends to be a herpes ulcer.<sup>7,20–22</sup> It is important to know about the oral ulceration characteristics because it can determine diagnosis and also the therapeutic plan. Widespread use of the internet can benefit the public in providing information about diseases, including oral ulcerations, but different interpretations can cause problems such as underestimating complaints or otherwise overreacting to a complaint. Patients sometimes did not know the relationship between a cause with the onset of their disease until a medical explanation is given by the doctor. Many factors may associate with oral ulceration, such as trauma, stress, hormonal imbalance, allergy, genetic, or infection.<sup>20</sup> The aim of this study is to conduct a survey of people's experience with oral ulceration and to analyze the correlation of risk factors with characteristics of oral ulceration.

## MATERIAL DAN METHODS

This research was a cross sectional study. Sampling was selected in accordance with the length of the study (consecutive sampling), which started from August to October 2018.

The sample size was based on the following Bernoulli formula:<sup>23</sup>

$$n \geq \frac{(Z_{\alpha/2})^2 pq}{e^2}$$

Z= 1.96, p= 0.5, q= 0.5, and e= 0.1, then the sample size is 96.04. The formula for the rapid

survey is multiplied by two, which becomes 192.08, and the minimum sample size is rounded to 200. Inclusion criteria for respondents were Indonesians, aged ≤ 50 years, have had oral ulceration and a positive family history of oral ulceration, and were willing to fill out a questionnaire form. Respondents who have systemic diseases or were currently on medication, and provide incomplete answers will be excluded. We created a questionnaire on the Google form which has been tested for its validity and reliability. The questionnaire contains 30 questions related to oral ulceration, and 4 more questions about personal details, including age, gender, occupation and marital information. All data were presented descriptively, and we also do the correlation test to analyze the risk factors with several characteristics of oral ulceration. In this study, we excluded the questions about ulceration caused by herpes simplex virus (HSV) type 1 infection due to invalid and unreliable questions. This investigation was approved by the Health Research Ethics Committee of Universitas Padjadjaran with Registry Number 977/UN6.KEP/EC/2018.

**Table 1.** Characteristic of respondents

Characteristic	n (%)
Gender	
Female	162 (78)
Male	46 (22)
Age* (year)	
< 23	98 (47)
> 23	110 (53)
Occupation	
Student	1 (1)
College Student	111 (53)
Workers	90 (43)
House Wife	6 (3)
Marital status	
Single	107 (51)
Married	101 (49)

\*age grouped by median value

## RESULTS

A total number of 208 respondents consisting of 162 females and 46 males were involved as the

**Table 2.** Questionnaire data of oral ulceration

Answer	Recurrency		Frequency			Number			
	n (%)	Once a year	2-3 times a year	> 3 times a year	1	2	3	>3	
Yes	51 (24.5)	108 (52)	60 (29)	40 (19)	178 (86)	24 (11.5)	3 (1.4)	3 (1.4)	
No	157 (75.5)	100 (48)	148 (71)	168 (81)	30 (14)	184 (88.5)	205 (98.6)	205 (98.6)	

  

Answer	Ulcer form			Duration				Treatment
	Round	Oval	Asymmetric	< 7 days	7 days	7-10 days	> 10 days	
Yes	156 (75)	27 (13)	25 (12)	146 (70)	1 (0.5)	55 (26)	6 (3)	133 (64)
No	52 (25)	181 (87)	183 (88)	62 (30)	207 (99.5)	153 (74)	202 (97)	75 (36)

  

Answer	Location*					
	Buccal	Labial	Gingiva	Palatum	Dorsum of the tongue	Ventral of the tongue
Yes	80	121	20	11	39	10
No	128	87	188	197	169	198

  

Answer	Trigger*							Anemia symptoms	Vegan diet
	Trauma	Menstruation	Physical stress	Poor Diet	Psychological stress	Allergy of food/drink			
Yes	165	20	24	41	19	10	56 (27)	203 (97)	
No	43	188	184	167	189	18	152 (73)	5 (3)	

\*The subject can choose more than one option

research respondents. Most respondents were in the group age above 23 years (53%), most of whom were college students (53%), who were single (51%) (Table 1). Oral ulceration characteristics showed no occurrence of recurrency (75%), rarely/once a year (52%), recurrence located at in the labial mucosa in 121 respondents, in single ulcer (86%), having round shape (75%), trigger of ulcer due to trauma in 165 respondents, untreated ulcer (64%), and ulcer recovery less than 7 days (70%). Two conditions related with oral ulceration showed that almost all respondents had no symptoms of anemia (73%) and had no vegan diet (98%). (Table 2)

The correlation test did not show significant results between trauma and several characteristics of oral ulcers including frequency, location, number, shape, and duration of oral ulcers, but the test showed significant results with poor diet ( $p = 0.001$ ). (Table 3)

## DISCUSSION

Most respondents selected trauma as the local factor of oral ulceration and the number of ulcers were mostly as single ulcers. This result corresponds to the theory that most single ulcers may be caused by direct physical/mechanical, thermal, or chemical trauma.<sup>20,22</sup> Daily routine activities, such as brushing teeth or eating, also can trigger trauma.<sup>21</sup> Other factors in this study showed that poor diet as the second highest factor was chosen by respondents related to the occurrence of ulcers due to systemic disturbance. Poor diet serves as a means that there is a considerable lack of supply of vitamins, minerals, and other nutrients needed to support healthy tissues. Deficiencies particularly relevant to the dental practice are those in folate and other B complex, A, C, and D vitamins, calcium, fluoride and protein. A lack of these nutrients affects nearly every structure in the oral cavity, including oral ulceration.<sup>24</sup> Other questions related to poor diet

**Table 3.** Correlation analysis of questionnaire variables

Variable	Trauma		Total	p-value
	No n (%)	Yes n (%)		
Poor diet				0.001
Yes	21 (10.1%)	24 (11.5%)	45 (21.6%)	
No	15 (7.2%)	148 (71.2%)	163 (78.4%)	
Frequency once in a year				0.39
Yes	16 (7.7%)	90 (43.3%)	106 (51.0%)	
No	20 (9.6%)	82 (39.4%)	102 (49.0%)	
Buccal mucosa				0.825
Yes	16 (7.7%)	73 (35.1%)	89 (42.8%)	
No	20 (9.6%)	99 (47.6%)	119 (57.2%)	
Labial mucosa				0.614
Yes	24 (11.5%)	107 (51.4%)	131 (63.0%)	
No	12 (5.8%)	65 (31.3%)	77 (37.0%)	
Round shape				0.564
Yes	26 (12.5%)	132 (63.5%)	158 (76.0%)	
No	10 (4.8%)	40 (80.0%)	50 (24.0%)	
Single ulcer				0.295
Yes	29 (13.9%)	150 (72.1%)	179 (86.1%)	
No	7 (3.4%)	22 (10.6%)	29 (13.9%)	
Duration < 7 days				0.822
Yes	26 (12.5%)	121 (58.2%)	147 (70.7%)	
No	10 (4.8%)	51 (83.6%)	61 (29.3%)	

p-value based on the chi square test

are symptoms of anemia and vegan diet, but most respondents did not have a vegan dietary habit nor have symptoms of anemia. These two questions cannot support the factors of poor diet. We need to further research on this matter to find out the dietary deficiencies, be it the lack of macronutrients or micronutrients.

Both the physical and psychological factors might influence the immunity. Psychological well-being was proven to increase human body immune response.<sup>25</sup> Physical activity has been shown to induce considerable physiological changes on

the immune system.<sup>26</sup> Both types of the immune response: natural and acquired (humoral and cellular) may be disturbed in patients with oral ulceration such as RAS.<sup>27</sup> The other respondent's choice of their predisposing oral ulceration factors were menstrual cycle and allergic factors, both of which were associated with RAS.<sup>20</sup>

The consideration to the diagnosis of recurrent aphthous stomatitis (RAS) is based on the information about the trigger factor and the shape of ulcer. In particular, it refers to the trauma factor selected by most respondents and round ulceration which also served as the most common choice (75%). The major factors which are currently linked to RAS include local factors, such as trauma.<sup>20</sup> The traumatic ulcers usually heal within 7–10 days when the cause is removed. The healing period of minor RAS occurs within the same duration. Seventy-five percent to 85% of patients who suffer from RAS have minor ulcers.<sup>20</sup> The result of the question about ulcer recovery is less than 7 days for 70.2%. This means that respondents experienced minor type ulcer that can be as RAS or traumatic ulcer.

There is a relationship between ulceration due to trauma and poor diet in this study, which is in line with the theory that nutritional factors play a role in maintaining the integrity of the oral mucosal epithelium. Thus, unbalanced diet can cause the rupture of epithelium. Even though it is only exposed to a mild friction, it eventually can cause an ulcer. There is a relationship between trauma as a trigger factor of oral ulceration and poor diet in this study, which is in line with the theory that nutritional factors play a role in maintaining the integrity of the oral mucosal epithelium. Hence, unbalanced diet can cause the epithelium to rupture or vice versa. Traumatic ulcers will disrupt the process of mastication, resulting in nutrient intake disorders.<sup>28</sup>

## CONCLUSION

The data in this study suggest that characteristics of oral ulcerations experienced by respondents might lead to RAS or traumatic ulcers. In addition,

a significant correlations were found among the most common risk factors chosen by respondents, namely trauma and poor diet.

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