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Role of Dietary Habit in Recurrences of Recurrent Aphthous Stomatitis − A pilot study

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ABSTRACT
Recurrent aphthous stomatitis (RAS) is the most common oral mucosal disease characterized by oral inflammation with a variety of recurrences (≥2 episodes) a year. The therapeutic goal includes the prevention of recurrences. Despite uncertain exact etiology of RAS, the decisive factors comprise nutritional deficiency and principal immunopathogenesis. These factors are related to nutritional intake adequacy which is reflected through dietary habits. Therefore, this study aimed to determine the relationship between dietary habits and recurrences of RAS patients at the Installation of Oral Medicine, Dental and Oral Hospital Universitas Sumatera Utara. An analytical survey was performed with a cross-sectional approach through a questionnaire. The population was 78 patients diagnosed between January 2018 and December 2019, based on the clinical medical record journal. In this study, analysis was conducted using the Chi-square test. The results showed that food intake (P=0.001) and dietary habits (P= 0.042) were significant, compared to food preferences (p = 0.064). In conclusion, a positive relationship existed between dietary habits and recurrences of RAS patients.

Keywords: Nutritional Deficiency, Immunopathogenesis, Dietary Habits, Recurrent Aphthous Stomatitis.

ABSTRAK
Stomatitis Aftosa Rekuren (SAR) merupakan salah satu penyakit mukosa mulut yang ditandai dengan peradangan mulut dengan tingkat rekurensi yang bervariasi (≥2 episode) dalam setahun. Tujuan terapeutiknya meliputi pencegahan rekurensi. Meskipun etiologi pasti SAR belum diketahui secara pasti, ada beberapa faktor predisposisi yaitu antara lain faktor defisiensi nutrisi dan dasar imunopatogenesis. Faktor-faktor tersebut berkaitan dengan kecukupan asupan gizi yang tercermin melalui kebiasaan makan. Oleh karena itu, penelitian deskriptif ini bertujuan untuk mengetahui hubungan pola makan dengan rekurensi SAR pasien di Instalasi Penyakit Mulut Rumah Sakit Gigi dan Mulut Universitas Sumatera Utara. Survei analitik dilakukan dengan pendekatan *cross-sectional* dengan menggunakan kuesioner. Populasinya adalah 78 pasien SAR yang terdiagnosis pada jurnal rekam medis klinis sejak Januari 2018 – Desember 2019. Uji *chi-square* digunakan dalam penelitian ini. Hasil analisis statistik menunjukkan bahwa asupan makanan (*P*= 0,001) dan kebiasaan makan (*P* = 0,042) hasil yang signifikan, dibandingkan preferensi makanan (*P*= 0,064) menunjukkan hasil yang tidak signifikan. Oleh karena itu, penelitian ini menemukan kesimpulan hubungan antara kebiasaan makan dengan kekambuhan pasien SAR memiliki hubungan yang positif.

Kata Kunci: Defisiensi Nutrisi, Imunopatogenesis, Kebiasaan Makan, Stomatitis Aftosa Rekuren.

1. Introduction

Recurrent aphthous stomatitis (RAS) or canker sores, commonly known in Indonesia as 'sariawan' [1], is a painful recurring ulcer in the oral cavity [2,3]. Epidemiologic investigations have shown that the prevalence of RAS is influenced by the population studied, diagnostic criteria, and environmental factors. The prevalence is registered at approximately 5-25% of the general population [3,4,5].

Based on data from Riset Kesehatan Dasar (Riskesdas) in 2018, the prevalence of RAS is 8.0% and higher in the second and third-decade age groups [4]. The definitive etiology is unclear to date and the interest of several studies is to reduce the number of recurrences [5].

Among the several predisposing factors for RAS, deficiency factors and immunological disorders are associated with diet which is a primary way of meeting nutritional needs [6,7]. The recommendation for a good diet in Indonesia is in accordance with the General Guidelines for Balanced Nutrition (PUGS) health [8].

Poor diet can affect nutritional intake and further interfere with physiological functions [9]. This is capable of disturbing the normal function of the epithelium [10,11]. Oral epithelial cells will experience atrophy which increases the risk of experiencing RAS [9,10,11]. Furthermore, nutritional deficiency affects the immunity body associated with the increased production of tumor necrosis factor-alpha (TNF-α) cytokine. The inflammatory process and the pathogenesis of RAS are essentially influenced by this cytokine [11,12]. As a result, this study aims to determine the relationship between "dietary habits and recurrences of RAS.

2. Materials and methods

This study was conducted using an analytic survey method. The population comprised 345 RAS patients recorded in clinical medical record journals between January 2018 and December 2019. Inclusion criteria were RAS patients recorded in the clinical medical journals, medical histories aged over 17, and clinical diagnosis with either minor or major RAS, at the Installation of Oral Medicine, Dental and Oral Hospital Universitas Sumatera Utara for the period January 2018–December 2019. The exclusion criteria included systemic disease, pregnancy, and orthodontic appliances or dentures usage. Pat ients who could not be contacted using the information recorded in the clinical medical record journals and those that are uncooperative were also excluded. Based on the study criteria, 78 samples were obtained. Additionally, ethical clearance was approved by the Health Research Ethics Committee Universitas Sumatra Utara No. 1206/KEP/USU/2021.

This study was conducted using an adapted and validated questionnaire in the form of a Google form equipped with the objectives and an informed consent form. The questionnaire was divided into three parts. These included General information data from the sample, history of recurrence of RAS at ≥2 and <2 times in the last 1 year, and sample diet information. The questions were adapted from Du et al. (2018) and adjusted based on the diet in Indonesia [7,8,14].

Dietary information consisted of 14 questions which included an assessment based on the amount of food (questions 1-8). Each correct or appropriate response was given a score of 1 and the unsuitable score was 0. A score of 7 accumulated from questions 1-8, was considered ideal. This was in line with the recommended frequency intake and "Isi Piringku" based on Riskesdas guidelines (dietary score = 1). Meanwhile, a score <7 was not ideal, signifying the food frequency consumption was less than the recommended amounts (diet score = 0).

Using a separate food habit questionnaire, an assessment for the selection of food types was conducted. This questionnaire correlated food preferences and habits with intake that could lead to RAS (questions 9-14). Inquiries were made regarding preferences such as carbonated beverage intake, kind of oil intake and spices used, tea or coffee consumption, and frequency intake. Each question on the questionnaire is scored on a five-point scale, namely (1) always (every day), (2) almost always (5-6 times per week), (3) sometimes (3-4 times per week), (4) rarely (1-2 times per week), (5) never. A range of 25 to 39 accumulated points from questions 9-14 of 25-30 signified a low risk of RAS occurrence based on the type of food preferences intake (diet score = 1). Points between 6 and 24, represented a greater risk of RAS occurrences such as a high free radical diet (diet score = 0).

Based on the assessment of the amount and selection of food types, the eating pattern was categorized as good at a registered score of 2 (ideal - no risk). However, it was considered not good when other scores were recorded.

3. Results

Results were obtained from data in the clinical clerkship journal for the period January 2018 to December 2019, and characteristics of 78 samples are shown in Table 1. Furthermore, frequencies of 75.6% and 24.4%, were observed among the 17-25 and 26-35-year age groups, respectively. It was important to acknowledge that the frequencies based on women and men, were 66.7% and 33.3%.

Table 1. Frequency distribution of the number of study samples based on age and sex

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Characteristics	Frequency (n)	Percentage (%)
Age (Year)		
17 – 25	59	75.6%
26 – 35	19	24.4%
Sex		
Female	52	66.7%
Male	26	33.3%
Total	78	100%

Table 2 shows that 61.5 and 38.5% of the sample had RAS recurrence 2 times and <2 times, respectively. The results of the statistical tabulation test in this study obtained a *P* value of 0.00, signifying (*P* <0.05) (Table 3). A significant relationship existed between the amount of food and the recurrence of RAS.

Table 2. Distribution of RAS recurrence frequency in the study sample.

Recurrency of RAS	Frequency (n)	Percentage (%)
(≥2 times)	48	61.5%
(<2 times)	30	38.5%
Total	78	100%

Table 3. The relationship between the amount of food and the recurrence of RAS in patients.

Food Quantity	History of RAS Recurrence						*p* value
	Recurrence of RAS <2 times		Recurrence of RAS ≥2 times		Total		
	n	%	n	%	n	%	
Ideal	17	70.8%	7	29.2%	24	30.8%	
Not-Ideal	13	24.1%	41	75.9%	54	69.2%	0.001
Total	30	38.5%	48	61.5%	78	100%	(a)

Table 4 obtained a *P* value of 0.064 which signified (*P* > 0.05) (Table 4). Therefore, there was no significant relationship between the type of food and the recurrence of RAS.

Table 4. The relationship between the type of food and the recurrence of RAS in patients.

Food Risk	History of RAS Recurrence				Total		p value
	Recurrence of RAS <2 times		Recurrence of RAS ≥2 times				
	n	%	n	%	n	%	
Risky	12	28.6%	30	71.4%	42	53.8%	0.064 (a)
Not-Risky	18	50.0%	18	50.0%	36	46.2%	
Total	30	38.5%	48	61.5%	78	100%	

The results of the analysis for diet obtained *P* value = 0.042 or (*P* <0.05) (Table 5). Based on the result, a significant relationship existed between diet and recurrence of RAS.

Table 5. Relationship between diet and recurrence of RAS in patients.

Dietary Habit	History of Recurrence of SAR				Total		*p* value
	Recurrence of RAS <2 times		Recurrence of RAS ≥2 times				
	n	%	n	%	n	%	
Good	10	62.5%	6	37.5%	16	20.5%	0.042 (a)
Not Good	20	32.3%	42	67.7%	62	79.5%	
Total	30	38.5%	48	61.5%	78	100%	

4. Discussion

The primary data in this study showed that the prevalence of RAS was higher in the age group of 20-24 by 61.53%, as presented in Table 1. According to Kumar et al. (2014), the occurrence at 80% tended to increase before the age of 30 [15]. Riskesdas data in 2018 showed the experience of RAS in a high percentage of 9.6% among the young adult group, namely 19-24 years [4]. The increased risk of recurrence in this age group was attributed to workload, such as academic activities, which were considered to trigger a person to experience stress [14,16].

RAS has a higher predilection in the female group than the male. Based on the results, the prevalence in women was 66.7%. Queiroz et al. (2018) stated that out of 68 cases, 40 (59.2%) and 28 (40.8%) were women and men, respectively [15]. This is significantly attributed to hormonal factors [16].

Hormonal factors correlated with RAS influenced by estrogen and progesterone in the menstrual cycle are subject to fluctuation. The progesterone levels decreased significantly to 80% which led to the reduction of immune response, polymorphonuclear cells (PMN), and self-limiting factors [17]. This condition makes receptors in the oral cavity susceptible to RAS with a longer healing duration [16,18]. Based on the number of RAS recurrences, 61.5% had 2 in the last year [3,15].

RAS patients had recurrences 2 times a year [3,12] and were thought to be triggered by poor diet. This is associated with a lack of nutritional intake to support tissue health, leading to a high potential occurrence of ulceration [9].

Chi-square analysis for the amount of food had a *P* value of 0.00. This signified that there is a relationship between the amount of food and the recurrence of RAS. According to Emanuella (2020), 20% of patients with the disease had a non-ideal amount of food including the frequency of eating, as well as consumption of fruit and water below the recommended standards [20]. This was related to non-ideal or unbalanced nutrition intake and played a role in the rupture of the epithelium, facilitating the risk of ulceration [14].

Statistical test analysis for the type of food obtained a P value of 0.064. This signified that there is no significant relationship between the type of food and the recurrence of SAR. According to Tarakji et al. (2012), the choice of several types of food did not play a significant role in the occurrence of RAS (P > 0.05). It is important to acknowledge that certain types of food can trigger RAS recurrence in only some patients, due to food hypersensitivity [7,10,17].

Chi-square analysis was used to analyze the diet associated with RAS recurrence and a P value of 0.042 was obtained. This result shows an association between diet and recurrence of RAS in patients. The data obtained are supported by the report of Xu et al. (2021) that unhealthy eating pattern was a trigger for the occurrence of the disease at 85% [19].

Nur'aeny et al. (2020) reported that a bad diet was significantly associated with RAS (P = 0.001). A study by Helmy (P = 0.00) identified a significant correlation between dietary behavior and RAS [18].

Diet can impact a person's nutritional status, which plays a role in maintaining systemic health and function, including the integrity of oral mucosal epithelial cells [9,14]. A poor diet can cause a low intake of nutrition for supporting the needs of the physiological processes of the body, including erythropoiesis, ensuring adequate Hb levels, and producing red blood cells to optimally carry oxygen to tissues [12,21]. This situation has an impact on disrupting cell growth and maturation, leading to epithelium atrophy. The disruption is believed to be a factor in the pathogenesis of RAS, correlating with nutritional deficiency [21,22].

Correlation based on immunological aspects and the relation to poor diet is thought to suppress the ability of the immune system [18,22]. The condition can affect the stimulation of the release of proinflammatory cytokines by monocytes and macrophages, while TNF- plays a role in the inflammatory process [23]. This is attributed to the failure of the immune system to suppress the inflammatory reaction of the oral mucosa.

Poor diet, such as high intake of free radicals, plays a role in RAS recurrence [24]. The condition is associated with oxidative stress where free radicals make oxidants and antioxidants unbalanced [18]. This can lead to the failure of antioxidant functions in inhibiting cell damage [25]. Darwis et al. (2016) showed a relationship between free radicals and the occurrence of RAS. In this case, a high intake of antioxidants was effective in accelerating healing with a significant reduction in the size of the ulcer diameter and pain [25].

5. Conclusion

The conclusions of this study obtained analysis of 78 samples that : even though there was no significant relationship between the type of food and the recurrence of RAS shown by *P* value = 0.064, but there was a relationship between the amount of food and the recurrence of RAS with *P* value = 0.00, also diet and the recurrence of RAS as signified by *P* value = 0.042. Generally, this initial study described a role how the association between dietary habits and recurrences of RAS.

6. Acknowledgments

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7. Conflict of Interest

The authors declared no conflict of interest.

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