Tabari Biomedical Student Research Journal

OPEN ACCESS

ORIGINAL: Prevalence of Recurrent Aphthous Stomatitis among Children Studying at Public Elementary Schools in Sari County in 2019

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ARTICLE INFO

Submitted: 17 Feb 2023
Accepted: 10 May 2023
Published: 01 Jun 2023

Keywords:
Children;
Prevalence;
Recurrent aphthous stomatitis

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Citation:
Hali H, Salehi Sarookollaei M, Molania T, Gohardehi S, Moosazadeh M, Mollaei M. Prevalence of recurrent aphthous stomatitis among children studying at public elementary schools in Sari County in 2019. Tabari Biomed Stu Res J. 2023;5(1):11-16.

10.32598/tbsrj.v5i1.10525

ABSTRACT

Introduction: Recurrent aphthous stomatitis (RAS) is a painful condition regarded as one of the most prevalent oral mucosal lesions. Few studies have been conducted to investigate the prevalence of this disease in Iranian children. Therefore, this study aimed to assess the prevalence as well as the risk factors of RAS among children attending public elementary schools in Sari County.

Material and Methods: In the current descriptive-analytical cross-sectional study, a total number of 2399 elementary students attending public schools in Sari were examined. Of which 1780 of them completed the procedure and filled out a questionnaire about to their demographic and RAS related features. Data were analyzed using SPSS 24.

Results: Although 32.8% of the population reported a previous history of RAS, the prevalence of this disease was 9.2% at the time of examination. RAS was significantly more frequent in boys compared to girls; however, the history of RAS was reported more in girls. In the present study, the prevalence of RAS was not significantly associated with age, social status, and economic status of the samples.

Conclusion: Based on these findings, RAS appears to be a relatively common disease. As a result, providing families with appropriate training and basic healthcare seems to be effective.

Introduction

Recurrent aphthous stomatitis (RAS) is a chronic inflammatory oral mucosal disease, characterized by the presence of painful ulcers (1). These recurrent ulcers are self-limiting, superficial, solitary or multiple, in round or oval forms. Prior to the development of such ulcers, a burning sensation can be felt 2 to 48 hours in advance (2). The nonkeratinized oral mucosa of the lips, cheeks, and tongue is where these lesions are most frequently observed. However, they can also be seen on keratinized palatal and gingival mucosa. The aforementioned lesions are encircled by an erythematous halo that is slightly protruding and are covered in a yellow-grayish pseudomembrane (3).

[DOI: 10.32598/tbsrj.v5i1.10525]

RAS can be categorized into three types based on its clinical features: minor, major, and herpetiform. The minor aphthous ulcers, with a diameter of less than 1 cm, contribute to 75-90% of cases and disappears within 4 to 14 days without leaving any scars. In the major type of RAS, which is less common, oval and erratic ulcers with a diameter of more than 1 cm are the primary symptom. These ulcers persist for longer than six weeks and frequently scar after healing (4, 5). The herpetiform is very rare and characterized by a large number of small and painful clustered ulcers. These ulcers can develop in different locations of the oral cavity. Although they theoretically fuse to form larger irregular ulcers, the number of these ulcers may reach 100 (6).

The cause of RAS has not been identified yet. Despite the assumption that RAS is caused by the herpes simplex virus, several studies have confirmed that this virus is not the causative agent. However, genetics, viral and bacterial infections, food allergies, nutritional deficiencies, immune deficiency, gastrointestinal diseases, hormonal defects, mechanical injuries, anxiety, depression, and stress, are among the potential precipitating factors (7, 8).

RAS is the most prevalent oral mucosal disease leading to ulcers, affecting from 5% to 25% of the general population (1). An examination of the general population in Iran revealed that its prevalence was approximately 20.7% (9). RAS is more common in people with a high social status, according to epidemiological studies, and children are no exception. RAS is five times more common in children with high socioeconomic status (8). Additionally, studies have reported that women and non-smoker samples are more susceptible to RAS (10, 11).

Studies have suggested a strong correlation between the prevalence of RAS in children and the history of RAS in either one or both parents. RAS is 90% more likely to occur in children whose parents have a history of the disease (2, 11).

Oral ulcer pain can negatively impact children's quality of life. Difficulties in swallowing and speaking are among the negative effects that can prevent children from attending school and participating in daily (12). Regarding these undeniable effects on children's quality of life, few studies have investigated the prevalence of RAS among Iranian children, as far as the authors know. Therefore, this study aimed to evaluate the prevalence of RAS among children, studying at public elementary schools in Sari County, Iran.

Methods

This cross-sectional descriptive-analytical study was conducted from March to June 2019. The study population was selected from all students studying at public elementary schools in Sari County, Iran. The sample size was determined according to Majorana et al.'s (13) study, as well as the confidence level of 95% and a precision of 0.01.

Stratify sampling method was used for population selection. Sari County was divided into 5 regions of north, south, east, west, and center to increase the accuracy of the study and reduce the possibility of neglecting a stratum of the society. Three schools were randomly selected from each of these regions. Finally, out of 182 public elementary schools, with a total number of 21298 students, 2399 subjects were selected.

After explaining the main objectives of the investigation, consent was obtained from the subjects. The authors were committed to keep their information confidential. Intra-oral examinations were carried out on the samples using disposable mirrors and sterilizing gases under a flashlight in order to diagnose the presence or absence of RAS. Subjects who had lesions associated with dental caries and periodontal diseases were excluded.

The samples were then asked to fill out a questionnaire. This questionnaire included demographic items (such as age, gender, social status, place of residence, economic status, and parents' levels of education), and RAS related items. A brief explanation about RAS was written, and a website (www.ras.blogfa.com) was introduced on the

[DOI: 10.32598/tbsrj.v5i1.10525]

top of the questionnaire to avoid errors while filling out the questionnaire. Out of 2399 samples, 1780 students completed the procedure.

Data were analyzed using SPSS software (version 24, SPSS Inc., Chicago, IL, USA) To describe the data, descriptive statistics (including percentages, means, standard deviations), as well as the inferential statistic (including chi-square test, Levene's test, and independent t-test) were used. The significance level was less than 0.05.

Results

Out of 2399 samples, 1780 of them filled out the questionnaire. The study population consisted of 837 boys (47%) and 943 girls (53%) with a mean age of 10.5 ± 1.79 (ranging from 7 to 14). Of which, 163 students (9.2%) were diagnosed with RAS during the examination.

The association between the samples' gender, level of education, economic status, and previous history of RAS with the presence of RAS at the time of examination was determined by using Levene's test, independent t-test, and chi-square test.

As demonstrated in Table 1, the presence of RAS was higher among boys (10.9%) compared to girls (7.6%). Findings of the chi-square test suggested a significant association between the samples' gender and the presence of RAS (P=0.018). Moreover, subjects whose fathers and mothers had lower levels of education, as well as those who lived in rural areas had higher potential of RAS diagnosis; however, the difference was not significant (P= 0.301, P=0.192, and P= 0.126, respectively). Furthermore, RAS was observed more in participants who had a weaker economic status. Nevertheless, the difference was not statistically significant (P = 0.437).

The presence of RAS was higher in those who reported a previous history of developing RAS. The results of the chi-square test represented that there was a significant relationship between the history of RAS and its diagnosis during the examination (P <0.05) (***Table 1***).

Discussion

In the present study, Prevalence of RAS among primary school children was assessed. Out of 1780 final samples, 32.8% of them reported a previous history of RAS, while 9.2% of them were diagnosed with this illness during the examination period. The latter finding was similar to Akande et al. which reported a prevalence of oral lesions to be 13.7% in children aged 9-10 (14).

Nonetheless, these findings were not in line with some previously conducted studies investigating the prevalence of oral mucosal lesions. Among these studies, Hussein et al. stated the prevalence of RAS to be 1.2% among children aged 6-12 years old (15). Moreover, Yao et al. suggested the frequency of oral mucosal lesions to be 1.8% among children in China (16). The difference between the results of the present study and the abovementioned studies may be due to having different objectives; we only concentrated on the prevalence of RAS while the other studies considered the overall prevalence of oral mucosal lesions. Therefore, since oral mucosal lesions include a wide range of lesions, it is possible to neglect or misdiagnose RAS.

In addition, Patil et al. reported a prevalence rate of 21.7% for RAS (17). The difference between their finding and the one obtained from the present study is due to the variations in the age group. They examined various age groups ranging from 1 to over 60 years old; however, in the present investigation children aged 7 to 14 years old were considered. As previously mentioned, the prevalence of RAS is higher in the second and third decades of life compared to other decades (18).

Findings of the current study found no significant relationship between the diagnosis of RAS and the subjects' age. However, Ünür et al. studied two age groups of 0-6 years and 7-13 years and discovered that the prevalence of RAS was remarkably higher in the second group (19). Moreover, Yao et al. also suggested that age is associated with the occ-

[DOI: 10.32598/tbsrj.v5i1.10525]

Table 1. The association between the samples' variables with the presence of RAS

Variable		No N (%)	Yes N (%)	Total N (%)	P value
Sex	Boy	746 (41.9)	91 (5.1)	837 (47)	0.018
	Girls	871 (48.9)	72 (4.0)	943 (53)	
	Total	1617 (90.8)	163 (9.2)	1780 (100)	
Fathers' levels of education	Diploma and lower than the diploma	874 (49.1)	95 (5.3)	969 (54.4)	0.301
	Higher than the diploma	743 (41.7)	68 (3.8)	811 (45.6)	
	Total	1617 (90.8)	163 (9.2)	1780 (100)	
Mothers' levels of education	Diploma and lower than the diploma	906 (50.9)	100 (5.6)	1006 (56.5)	0.192
	Higher than the diploma	711 (39.9)	63 (3.5)	774 (43.5)	
	Total	1617 (90.8)	163 (9.2)	1780 (100)	
Place of residence	Rural areas	398 (22.4)	49 (2.8)	447 (25.1)	0.126
	Urban areas	1219 (68.5)	114 (6.4)	1333 (74.9)	
	Total	1617 (90.8)	163 (9.2)	1780 (100)	
Economic status	An income lower than the living expenses	551 (31)	63 (3.5)	614 (34.5)	0.437
	An income in proportion to the living expenses	986 (55.4)	94 (5.3)	1080 (60.7)	
	An income higher than the living expenses	80 (4.5)	6 (0.3)	86 (4.8)	
	Total	1617 (90.8)	163 (9.2)	1780 (100)	
Previous history of RAS	Rural areas	1112 (62.5)	84 (4.7)	1196 (67.2)	0.000
	Urban areas	505 (28.4)	79 (4.4)	584 (32.8)	
	Total	1617 (90.8)	163 (9.2)	1780 (100)	

-urrence of oral mucosal lesions (16). On the other hand, Wang et al. and Fitzpatrick et al. suggested that the prevalence of RAS decreases by age (20, 21). This study's findings contradict the studies above. This difference may be due to the fact that the current investigation was conducted on a small age group.

Based on our findings, the prevalence of RAS was significantly higher in boys compared to girls. In contrast, girls had reported the history of RAS more frequently than boys. This can be due to girls' lower pain perception threshold, sensitivity, and the physiology of their bodies. In contrast, Rajmane et al. reported a higher prevalence in girls (18), while Yao et al. and Koparal et al. found no significant difference (16, 22). This controversy in various studies might be explained by the differences in the sample sizes.

Most studies that assessed the impact of social and economic status on the prevalence of RAS, considered these two components together as a general parameter, while in the present study the prevalence of RAS in terms of the samples' social status and economic status was assessed separately. Findings revealed that the prevalence of RAS was slightly higher among children whose parents had low levels of education, those who lived in rural areas, as well as those with lower economic status, but the difference was not significant. Similarly, Patil et al. suggested that RAS was more frequent in samples with lower socioeconomic status (17). On the contrary, some studies found a higher prevalence in families with better socioeconomic status (23, 24).

As Suryanata et al. mentioned, stress can be one of the risk factors of developing RAS; Since these families impose mental pressure on their kids to do their best in order not to harm the family's good name, children with better socioeconomic status are at higher risk of developing RAS (23). On the other hand, people with lower socioeconomic status are less likely to have proper access to primary healthcare and might not be very concerned about their oral health.

According to these findings, it can be deduced that RAS is a relatively common disease among children. Hence, providing necessary training at schools, especially public schools with more students with low socioeconomic status, seems vital. On the other hand, some parents cannot differentiate RAS from dental abscesses, fistulas, and other problems which are more serious than RAS and require interventions, due to lack of

[DOI: 10.32598/tbsrj.v5i1.10525]

appropriate training. Therefore, they refer to a dentist when the patient has endured a lot of pain and the prognosis of the tooth or the nonodontogenic-related diseases becomes poor.

Conclusion

This study demonstrated that RAS is a common disease in children which is significantly developed more in boys compared to girls. Previous history of having RAS is also related to its recurrence in the future. Although the current investigation found that children from families with lower socioeconomic status are more likely to be diagnosed with RAS, the association was not significant. Moreover, the frequency of RAS is not related to the subjects' age. Overall, considering the high rate of RAS in schoolchildren, it is vital to provide their families with the required information about this disease and the modalities of preventing it.

Ethical standards statement

The authors would like to sincerely thank all the people, especially the staff of the Education Department of Sari County, the students, and their parents, who helped them in carrying out the present study.

Conflicts of interest

There are no conflicts of interest

Authors' contributions

All authors have participated in the design, implementation, and writing of all sections of the present study.

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[DOI: 10.32598/tbsrj.v5i1.10525]