

Median Rhomboid Glossitis: A Clinical and Microbiological Study

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ABSTRACT

Objectives: The purpose of this study was to investigate the relationship between median rhomboid glossitis (MRG) and *Candida* and bacteria species, prevalence and possible association with age, gender, smoking, denture wearing, and diabetes mellitus.

Methods: Tongue examinations were performed on 4244 consecutive patients. Of all the examined patients, 30 diagnosed with MRG were selected as the study group and another 30 patients were selected as the control group, and these 2 groups were compared in terms of age and gender. Tongue cultures from these 60 patients were subjected to bacterial and mycological examinations.

Results: MRG frequency was detected to be 0.7%. In mycological examination, *Candida* species were determined in 90.0% of the MRG patients and in 46.6% of the control group. This difference was statistically significant. Multivariate logistic regression indicated that diabetes mellitus and 20–39 years of age were significantly related to MRG. However, the association between MRG, gender, smoking, and 40–69 years of age was not statistically significant.

Conclusions: It was determined that although there was a significant association between MRG, *Candida* and diabetes mellitus, the possible risk factors such as gender, smoking, and denture wearing for oral candidiasis were invalid for MRG. [Eur J Dent 2011;5:367-372]

Key words: *Candida*; Median rhomboid glossitis; Diabetes mellitus.

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INTRODUCTION

Median rhomboid glossitis (MRG) is defined as the central papillary atrophy of the tongue and it affects 0.01%–1.0% of the population.¹ MRG is typically located around the midline of the dorsum of the tongue. It occurs as a well-demarcated, symmetric, depapillated area arising anterior to the circumvallate papillae (Figure 1). However, it sometimes appears in the paramedial location.² The surface of the lesion can be smooth or lobulated.¹ While most of the cases are asymptomatic, some patients complain of persistent pain, irritation, or pruritus.^{1,3} When MRG is concomitant with

a palatal inflammation, which is called the *kissing* lesion (Figure 2), immunosuppression should be suspected and investigated in these patients. This has been considered a marker of AIDS.^{4,5}

Despite the relative frequency of MRG, little is known about its etiology.³ There are several predisposing factors associated with MRG such as smoking, denture wearing, diabetes mellitus, as well as candidal infections.^{6,7} In the present study, we investigated the relationship between MRG and both *Candida* and bacteria species, prevalence and possible association with age, gender, smoking, denture wearing, and diabetes mellitus.

MATERIALS AND METHODS

This study was performed on 4244 patients (between 4 and 69 years of age) consecutively recruited from the Department of Oral Diagnosis and Oral Radiology, Faculty of Dentistry, Ataturk University, Erzurum, Turkey.

The inspection was carried out by 2 examiners in the Department of Oral Diagnosis and Oral Radiology. Clinical protocol was applied according to the Samaranayake⁸ classification. Throughout the study, the examinations were carried out together, but in situations when either examiner failed to reach a decisive opinion, the 2 examiners discussed the particular case and either established a consensus and included it in the study or discarded the case (n=2). In the questionnaire, we asked for information about age, gender, smoking habits, diabetes mellitus, and denture wearing (total or partial). Subjects were divided into 3 groups based on their age: 4–19, 20–49, 49–69. The data were analyzed according to these categories.

Of all the examined patients, 30 diagnosed with MRG were assigned as the study group, and another 30 patients were selected as the control group. These 2 groups were compared in terms of age, gender, and smoking habits. Patients were informed about the study. Samples were collected with their agreement. Tongue cultures from these 60 patients were subjected to bacterial and mycological examinations. Additionally, we looked for the presence of kissing lesions in the MRG patients. All patients with kissing lesions were checked for HIV by the Enzyme-Linked Immunosorbent Assay (ELISA) method at the hospital.

For mycological examination, the samples were collected by a scratch on the site of the le-

sion surface. Each swab was then transferred into 1 ml sterile phosphate-buffered saline solution and inoculated on Sabouraud dextrose agar (SDA) supplemented with 1% chloramphenicol. Plates were incubated at 37°C for 48 hours. To identify the yeasts, the microorganisms were subcultured on SDA to obtain a pure culture. Identification to the species level was based on the performance of corn meal agar development of blastospores and chlamydospores, as well as on the assessment of utilization of carbon and nitrogen sources by the API 20C AUX system (bioMérieux, France).

With regard to bacteriological examination, each swab taken from the patients was streaked onto 5% sheep blood agar and eosin methylene blue agar (EMB), and then incubated for 24–48 hours at 37°C in an atmosphere with 5%–10% CO₂. To identify isolates, colony morphology, pigmentation, catalase and coagulase activity, and Gram-staining characteristics were examined.

Statistical analysis

The variables were analyzed using the Statistical Package for the Social Sciences (SPSS 10.0) software (SPSS Inc, Chicago, Ill, USA). Firstly, statistical analysis of univariate categorical data was performed using the chi-square test. Secondly, we determined the relationship between the covariates (age, gender, smoking, denture wearing, and diabetes mellitus), whose P value was below 0.20, according to the univariate analyses and MRG, by fitting a multivariate logistic regression model using enter selection. In addition, the odds ratios (ORs) and the 95% confidence intervals (CIs) were calculated. A P value of <.05 was considered statistically significant.

RESULTS

In this study, 4244 patients who presented with diverse dental problems, between the ages of 4 and 69 years, were evaluated. MRG was present in 0.7% of patients. MRG prevalence was lower among females (0.43%) than among males (0.97%). The prevalence increased steadily from 23% in the age group of 4–19 years (0.23%) to 40–69 years (0.95%). Ten of the MRG patients were smokers (33.3%). Of all the MRG patients, only 1 had diabetes mellitus. None of the MRG patients wore dentures (Table 1). The presence of kissing lesions was also observed in 3 of the MRG patients.

Table 2 demonstrates that age group of 20–39 years (OR: 4.54, 95% CI: 1.05–19.68) and diabetes mellitus (OR: 12.24; CI: 1.19–125.92) were significantly related to the occurrence of MRG.

In mycological examination, *Candida* species were diagnosed in 90.0% of the MRG patients and in 46.6% of the control group. This difference between the MRG patients and the control group was statistically significant ($P=0.003$) (Table 3).

Candida species determined in both the MRG and kissing lesions and in the control group are shown in Table 4. In bacteriological examination, normal oral microbial flora species such as *Streptococcus spp.*, *Corynebacterium spp.*, and *Neisseria spp.* were isolated from MRG lesions and control patients.

DISCUSSION

Although the prevalence of MRG in earlier studies ranged between 0.9% and 5.4%,^{9–11} in a previous study¹² carried out in our country was de-

termined a prevalence rate of 0.2%. Our 0.7% is higher than this previous observation in the Turkish population. Rogers and Bruce⁴ stated that men are affected 3 times more often than women. However, Wright¹³ showed a 4:1 female predominance in 28 MRG patients. Avcu and Kanli¹² also found that the female to male ratio of 12 MRG patients in Turkish dental outpatients was 11:1. Both rates are remarkably different from our result (1:2). We are unable to explain why MRG is more prevalent in males in light of the literature.

Tapper-Jones et al¹⁴ showed that smoking increased the candidal carrier rate in both diabetic and healthy subjects. But, Willis et al¹⁵ found that diabetic patients with oral candidiasis who were smokers had significantly higher candidal load than diabetic patients with oral candidiasis who were exsmokers or who did not smoke. Joseph and Savage¹ stated that the prevalence of MRG is higher in immunosuppressed patients, diabetics, and in patients on broad-spectrum antibiotics.



Figure 1. The appearance of median rhomboid glossitis (MRG).



Figure 2. The concomitant lesion of MRG which is called "kissing lesion".

Table 1. MRG group, control group and selected covariates: sample size, number of lesions, point prevalence, crude odds ratio (OR), 95 % confidence intervals (CI).

		n	Control	MRG	Prevalence (%)	Crude OR	95% CI	P
Gender	Female	2083	10	9	0.43	r.c.	1.03-4.95	0.04
	Male	2161	20	21	0.97	2.29		
Age Groups	4-19	1283	3	3	0.23	r.c.		
	20-39	2012	18	18	0.90	3.86	1.08-16.48	0.02
	40-69	949	9	9	0.95	4.09	1.02-19.09	0.02
Smoking	Yes	1981	10	10	0.51	r.c.	0.78-4.03	0.14
	No	2263	20	20	0.89	1.76		
Diabetes Mellitus	Yes	30	0	1	3.33	4.96		
	No	4214	30	29	0.70	r.c.	0.65-37.65	0.19
Denture Wearing	Yes	77	0	0	0.00	-	-	1.00

-. Chi-square statistic and odds ratio cannot be computed because of zero cell.

r.c.: Reference category.

Also, Guggenheimer et al¹⁶ pointed out that MRG is one of the most observed oral candidal infections in insulin-dependent diabetes mellitus patients. This knowledge is compatible with the result of our report that diabetes is important to the risk of MRG.

Some studies showed that smoking, dental prosthesis, and small traumas, alone or in combination with each other, appear to be important predisposing factors for oral candidiasis.^{2,17} Gumru et al¹⁸ stated that denture stomatitis is commonly related with MRG. However, Farman and Nutt¹⁹ revealed that neither the association between MRG and denture stomatitis nor the association between MRG and denture wearing was statistically significant. Since none of our MRG patients had removable denture prosthesis, we are in agreement with Farman and Nutt.¹⁹ The importance of tobacco smoking and denture wearing in the etiology of MRG in 39 patients was evaluated by Arendorf and Walker.²⁰ Most of the MRG patients (85%) smoked tobacco compared with

the 39 healthy, age and gender-matched controls (41%). The number of MRG patients who were both tobacco smokers and denture wearers was significantly high, suggesting that these local factors may play a role in the development of MRG. In contrast to Arendorf and Walker,²⁰ a rate of 33.3% for smoking in MRG patients was observed in our study.

There have been many studies on MRG, all of which appear to very strongly implicate *Candida albicans* as a probable cause.²¹ Previously, Cooke²² published a report of 10 cases of MRG, all of which showed fungal hyphae in the keratin layer in histological sections. Farman and Nutt¹⁹ stated that there was a highly significant statistical correlation between MRG and *Candida* species. Cernea and colleagues,²³ and Farman²⁴ were able to culture *Candida* species from MRG. Ullman and Hoffman²⁵ found *Candida albicans* in 18 out of 22 MRG lesions examined mycologically. We found higher a candidal growth rate in MRG patients than in the controls. Our findings were consistent with earlier

Table 2. Multivariate logistic regressions, adjusted odds ratios (OR), 95% confidence intervals (CI) for variables associated with MRG.

		OR	95% CI	P
Gender	Female	r.c.		0.09
	Male	4.97	0.78-31.66	
Age Groups	4-19 years	r.c.		0.04
	20-39 years	4.54	1.05-19.68	
	40-69 years	4.72	0.85-26.07	
Smoking	Yes	r.c.		0.09
	No	4.64	0.78-27.55	
Diabetes Mellitus	Yes	12.24		0.04
	No	r.c.	1.19-125.92	

r.c.: Reference category.

Table 3. The presence of *Candida* in MRG and control groups.

		MRG	Control	χ ²	P
Candida	Positive	27	14	13.02	0.003
	Negative	3	16		

Table 4. Distribution of the candida species in MRG and control groups.

Candida Species	MRG	Control	Kissing lesion
<i>C. albicans</i>	18	7	-
<i>C. kefyr</i>	3	-	2
<i>C. tropicalis</i>	2	2	-
<i>C. krusei</i>	2	-	1
<i>C. glabrata</i>	2	2	-
<i>C. parapsilosis</i>	-	2	-
<i>C. lipolytica</i>	-	1	-

data and apparently demonstrated the relation between MRG and *Candida*. We also investigated the presence of *Candida* and bacteria species in MRG in this study. While there was no data about both *Candida* and bacteria species in previous reports, we isolated *C. albicans*, *C. kefyr*, *C. tropicalis*, *C. krusei*, and *C. glabrata* from 18, 3, 2, 2, and 2 patients with MRG, respectively. In addition, normal oral microbial flora species such as *Streptococcus spp.*, *Corynebacterium spp.*, and *Neisseria spp.* were isolated from MRG lesions and control patients in bacteriological examination.

Arendorf and Walker²⁰ reported that 44% of the population harbor candidal organisms as part of their normal oral flora, and they also stated that the tongue is the primary oral reservoir for *Candida*. In particular, the midline of the tongue is suitable for intense overgrowth of *Candida* organisms. Whitaker and Singh²⁶ suggested that since the tongue maintains close contact with the palatal mucosa during swallowing and at rest, the area of the tongue contacting the palate corresponds well to the area in which MRG develops. Also Farman²⁴ suggested that an impaired blood supply to the mid-dorsal surface of the tongue might predispose it to the development of candidiasis and, presumably, to the consequent loss of filiform papillae.

When MRG is found in association with palatal inflammation corresponding to contact with the involved area on the tongue, it is called *kissing* lesion; immunosuppression should be suspected and it has been considered a marker of AIDS.⁴ In our current study, only 3 of the MRG patients had kissing lesions in the palatal region. The *Candida* species of kissing lesions were the same as those of MRG. Therefore, this finding may suggest that these lesions occur as a result of prolonged contact between the *Candida*-infected midline dorsum of the tongue and the hard palate.

MRG is often an asymptomatic lesion. Likewise, all of our cases were asymptomatic. Thus, they did not need any treatment; however, these patients have been kept under observation. Since the presence of kissing lesions on the hard palate may be a cause for concern about HIV, all patients with kissing lesions were checked for HIV in the hospital, and it was observed that there was no HIV in our subjects. Although Delemarre and van der Wall²⁷ have stated that there is no clear relation-

ship between MRG and cancer, there have been 3 previous reports of malignant transformation of MRG.^{28,29} In our opinion, especially if the lesion represents ulceration or if it is solid to palpation, the possibility of malign transformation should be considered and biopsy performed.

CONCLUSIONS

MRG still gives rise to questions concerning its importance and etiology. We believe that MRG is a form of oral candidiasis. The etiologic factors for oral candidiasis suggested are almost the same as the MRG. Our results revealed that although there was a significant association between MRG and *Candida* and diabetes mellitus, possible risk factors such as smoking and denture wearing for oral candidiasis were invalid for MRG. Further study is required to be studied to uncover the possible risk factors of MRG in association with *Candida* and diabetes mellitus.

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