



## **Geographic Tongue and Associated Risk Factors among Iranian Dental Patients**

***Marieh HONARMAND, \*Leila FARHAD MOLLASHAHI, Masomeh SHIRZAIY, Marziye SEHHATPOUR***

*Dept. of Oral Medicine, Dental School, Zahedan University of Medical Sciences, Zahedan, Iran*

**\*Corresponding Author:** Tel: +989151423019 Email: lm\_farhad.zaums@yahoo.com

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### **Abstract**

**Background:** Geographic Tongue is a benign disorder involving the dorsal surface of the tongue characterized by depapillated areas with leading and folded edges in yellowish or grayish white color and sometimes with unclear borders. Many studies have reported a relationship between such condition and different risk factors. This study aimed to investigate the prevalence rate and the risk factors of geographic tongue in the patients referring to the Department of Oral Medicine of Zahedan Dental School, in 2012.

**Methods:** Using Poisson regression model, 2000 patients referred to the Department were selected for this cross-sectional study. Data collection method included an investigation into the medical history as well as doing intraoral examinations. Using SPSS 17 software and Chi-square statistical test, the collected data were analyzed.

**Result:** Among the 2000 patients selected, 7.8% (156 persons) suffered from geographic tongue. The results of our study show that there is a significant relationship between the occurrence of geographic tongue and a history of allergy and fissured tongue ( $P < 0.001$ ). There was no significant statistical relationship between the occurrence of geographic tongue and gender, smoking and medication.

**Conclusion:** The geographic tongue is more frequently in the patients suffering from atopy or allergy as well as the patients with fissured tongue.

**Keywords:** Epidemiology, Risk factor, Geographic tongue

### **Introduction**

The geographic tongue is a benign disorder involving dorsal surface of the tongue which appears as depapillated areas with leading and folded edges in yellowish or grayish white color and sometimes with unclear borders (1). This lesion is rarely created in buccal vestibule and labial mucosa which is introduced as geographic stomatitis. The lesions are recovered in one area and are appeared in other areas very quickly; thus, it is also called benign migratory glossitis (2).

The geographic tongue is usually asymptomatic, but sometimes a burning sensation is reported as an effect of using the spicy and salty foods as well

as the alcoholic drinks (1, 3). The severity of symptoms varies at different times, depending on the disease activity (4).

The etiology and pathogenesis of geographic tongue are still unknown (1, 2, 5). There may be a relationship between the geographic tongue and psoriasis (1, 6), diabetes mellitus (7), Reiter's syndrome (8), Down's syndrome, pregnancy, psychological factors (1, 8), family history (1) and consumption of some medicines such as oral contraceptive pills (8) and lithium carbonate (9).

Allergy has been suggested as a major etiologic factor in geographic tongue. A relationship has

been also reported between the geographic tongue and the asthma, eczema, hay fever, elevated serum immunoglobulin E (IgE) and atopic patients (1, 5, 10).

Some other studies have also demonstrated a relationship between the geographic tongue and the fissured tongue (1, 5, 8). The fissured tongue is an asymptomatic condition which appears as some grooves on dorsal surface of the tongue (1).

The symptomatic treatment includes using the mouthwashes containing anesthetics, the topical corticosteroids such as betamethasone gel, antihistamine and the zinc supplements (1, 8). These lesions may be recovered using such medicines, but it is impossible to predict the exact time of recovery (1).

The purpose of this study was to determine the prevalence of geographic tongue in an Iranian population and to assess the risk factors associated with it.

## Materials & Methods

This cross-sectional study was conducted on the patients referred to the Department of Oral Medicine of Zahedan Dental School between September 2011 and May 2012.

With regard to the pilot study conducted in September 2011 (5 out of 63 patients examined in the Department of Oral Medicine had geographic tongue) and considering  $P=5\%$  for 99% level of confidence and 1% tolerated error and using the  $N = \frac{p(1-p)z^2}{d^2}$  formula, 1985 people were specified and finally 2000 samples participated in the study. Using the sequential Poisson sampling method, the patients referred to the Department of oral diseases between September 2011 and March 2012 entered into the study until the required sample size was reached.

The required data were collected through observation and completing a questionnaire. After taking a complete history of the patient (including the information related to individual characteristics, medical history, medication and smoking), the

clinical examinations (by means of a disposable mirror under a unit lighting) were performed by oral medicine specialist. In this investigation, the diagnostic criteria of geographic tongue were based on the clinical examination as well as the history and characteristics of the disorder (1).

All individuals participated in the study after obtaining the informed consent from them.

The data collected were analyzed using SPSS 17 software. To describe the quantitative data, the mean and standard deviation were used and to describe the qualitative data, the prevalence distribution tables were used. To analyze the collected data, the Chi-Square analysis test was applied. The  $P$ -value less than 0.01 was considered as significant.

## Results

In this investigation, 2000 patients referred to the Department of Oral Medicine of Zahedan Dental School were evaluated. The prevalence of the geographic tongue was 7.8% ( $n=156$ ).

The prevalence was 3.7% ( $n=74$ ) in males and 4.1% ( $n=82$ ) in females. However, this difference was not statically significant based on the Chi-Square test ( $P=0.36$ ).

The average age of the persons under study was  $32.13 \pm 11.94$  yr. The highest incidence (about 3.1%) of geographic tongue occurred in the age range of 20-29 years. According to Chi-square statistical test ( $P=0.49$ ), there was no significant statistical difference between different age groups regarding the occurrence of geographic tongue (Table 1). Only 30 patients (1.5%) with geographic tongue were smokers, while 126 patients (6.3%) were no smokers. According to the Chi-Square statistical test ( $P=0.93$ ), there was statistically no significant relationship between the geographic tongue and non-smoking.

The overall prevalence of the fissured tongue was 13.9% (277 patients).

**Table1:** Distribution of BMG by age

Age (yr)	Benign Migratory Glossitis
10-19	(n=10) 0.5%
20-29	(n=62) 3.1%
30-39	(n=48) 2.3%
40-49	(n=25) 1.35
50-59	(n=9) 0.5%
60-69	(n=2) 0.1%
70-79	(n=0)

$P= 0.49$

A number of 45 patients (2.3%) suffered from the fissured tongue and geographic tongue at the same time. According to the Chi-Square statistical test ( $P<0.001$ ), there was a statistically significant relationship between fissured tongue and geographic tongue. The simultaneity of the geographic tongue with a systematic disease was found in some cases (Table 2).

**Table2:** Distribution of BMG by systemic disorder

Disease	Count	BMG	Prevalence	<i>P</i>
Cardiovascular disease	103	6	5.8	0.44
Diabetes	65	2	3.1	0.15
Atopy and Allergy	27	9	33.3	<0.001
Gastrointestinal disorder	7	2	28.6	0.06
Kidney disease	21	0		0.18
Psychological disease	66	5	7.6	0.95
Pregnancy	28	3	10.7	0.56

According to the Chi-Square statistical test ( $P<0.001$ ), there was a statistically significant relationship between incidence of geographic tongue and suffering from allergy, while based on the same statistical test, no statistical relationship exists between the geographic tongue and all other studied diseases. Totally 129 persons suffering from geographic tongue were systematically healthy. Among the patients with the geographic tongue, 5 patients (3.2%) took antidepressants, 2 patients (1.2%) took medicines for diabetes, 6 patients (3.8%) took antihypertensive drugs, 1 pa-

tient (0.6%) took antihypertensive and antidepressant medicines simultaneously, 2 patients (1.2%) took antihistaminic nasal spray and 140 patients took no medicine. There was no significant relationship between geographic tongue and the medicines used.

## Discussion

In this study, the prevalence of geographic tongue was 7.8% which is relatively consistent with the results of the investigations carried out earlier (6.2%) (11), (7.9%) (7), and (6.5%) (12). It is whilst the prevalence rates reported as 12.8% (13), 12.4% (4), 1.5% (5) and 1.8% (2) are more considerable as compared to the results of this investigation. It is noteworthy that the difference between such results is probably due to a difference between the sample size and the population under study.

In the present study, the geographic tongue is seen more in females; however, this relationship was not statistically significant. These results are correspondent with the studies conducted earlier (2, 5, 13). Although in the investigations performed by Mumcu (14) and Jankittivong (15), this condition was more prevalent in females than males which can be attributed to the inference of female hormones which may help this condition to develop or intensify (4). However, such relationship was not found in our study.

In this investigation, the geographic tongue was more prevalent in people under 30 years. The results of the present study are consistent with the findings achieved earlier (5, 15, 16) where the geographic tongue has been reported more in people under 30 years old.

Our examinations showed that the geographic tongue is less prevalent in the smokers. Some studies (2, 5, 16) have also revealed that the geographic tongue is statistically less prevalent in the smokers. These investigations suggest the protective effects of cigarette on incidence of geographic tongue.

The protective mechanism of cigarette on incidence of geographic tongue can be considered similar to those on incidence of recurrent aphth-

ous stomatitis. Making cytological changes on the epithelium of oral mucosa such as increasing the cellular proliferation and keratinization index, the tobacco products protect the mouth tissue against the irritants. Furthermore, nicotine reduces TNF $\alpha$ , Interleukin-1 and Interleukin-6 production by activating the nicotinic receptors on the macrophages. It also leads to the reduction of inflammation by affecting the CNS through the activation of hypothalamic-pituitary-adrenal (HPA) axis and the autonomic nervous system and production of glucocorticoids (2).

In this study, 45 patients (28.8%) with the geographic tongue suffered from the fissured tongue at the same time. This relationship was statistically significant. The relationship between these two disorders has been also presented in the studies performed by Miloglu and Shulman (2, 5).

In the present study, there was significant relationship between the geographic tongue and the allergic diseases. In an investigation, 11.9% of patients with the geographic tongue had a history of allergic and atopic diseases and a significant relationship between the geographic tongue and their history of allergy, while there was no significant relationship between the geographic tongue and any other systematic diseases (5). In his study, Gorgen showed that allergy is more prevalent in the patients with the geographic tongue than those in the control group (10). There was a significant positive relationship between the geographic tongue and allergy (17). The authors also stated that geographic tongue may act as an indicator for the tendency of body to develop the allergic reactions in case of exposing to the environmental irritants (17).

Although this study indicated relationship between the geographic tongue and the allergic disease, in order to prove the existence of such relationship, it is recommended to take the allergic tests such as patch-test on the patients with the geographic tongue in the future studies.

One of the weaknesses of the present study is its reliance on the patients' medical history based on their remarks and their history of referrals to physician for the systematic diseases. Since the etiology of geographic tongue is unknown and its

relationship with the systematic diseases and medication is reported in different studies, it is recommended to design further studies focused on a specific systematic disease and its relationship with the geographic tongue and to perform all required clinical examinations, paraclinical tests and medical advices in order to demonstrate the existence of a specific systematic disease.

It may be argued that the existing difference between different studies about the relationship between the geographic tongue and the systematic diseases is due to the lack of a systematic diagnostic approach in those studies.

## Conclusion

There is a statistically significant relationship between the geographic tongue with the fissured tongue and the allergy.

## Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

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