



## Comparison of the prevalence of geographic tongue in asthmatic patients and healthy subjects in Masih Daneshvari hospital in 2014

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### ABSTRACT

**Background and aim:** Geographic tongue is a recurrent disorder with several associated etiologies. It is believed to be a common occurrence in the patients suffering from recurrent, acute inflammatory diseases. The purpose of this study was to compare the prevalence of geographic tongue between asthmatic patients and healthy subjects.

**Materials and Methods:** This descriptive-analytic study was conducted on 80 asthmatic patients and 80 healthy controls. The asthmatics were selected from among the patients presenting to Masih Daneshvari hospital with a confirmed diagnosis of asthma, while the healthy controls were selected from among patients' companions. The case and control subjects were matched according to age, sex and cigarette smoking status. The presence of geographic tongue was evaluated in the subjects by clinical examination and also by using a questionnaire. The data were entered into SPSS software version 22 and were evaluated using Chi-Square test.

**Results:** The prevalence of geographic tongue was 21.2% (n=17) in the asthmatic patients and 5% (n=4) in the healthy controls. A significant association was found between asthma and occurrence of geographic tongue (P<0.002). The incidence of geographic tongue in the asthmatics was 4.2 times greater than that in the healthy individuals with a relative risk (RR) equal to 4.2 and an attributable risk (AR) of 16%. In both groups, the dorsal and lateral surfaces of the tongue were more commonly affected than the ventral surface. No significant association was found between the involvement of a specific tongue surface and asthma (P=0.748).

**Conclusion:** According to the results, the asthmatic patients showed a significant higher prevalence of geographic tongue compared with the healthy controls.

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## Introduction:

Geographic tongue also known as benign migratory glossitis or erythema migrans is a recurrent disorder of the tongue. It is characterized by atrophy of the tongue epithelium and particularly the filiform papillae. It manifests as erythematous patches with yellowish-white prominent borders, commonly affecting the anterior two-thirds of the dorsal surface of the tongue.<sup>(1,2,3)</sup> Geographic tongue rarely involves the ventral surface or other parts of the tongue. In the latter case, it is referred to as geographic stomatitis. The prevalence of geographic tongue has reported to be 2.4 to 28% in adults.<sup>(2)</sup> Several factors such as hormonal changes, use of contraceptives, diabetes mellitus, allergic conditions i.e. atopy, hay fever, asthma and dermatological conditions such as psoriasis and Reiter's syndrome are believed to play a role in the occurrence of geographic tongue.<sup>(1,4,5)</sup> Also, the association between geographic tongue and fissured tongue has been confirmed with a prevalence of 6-45% .<sup>(6-11)</sup> Moreover, geographic tongue is a common sign in patients suffering from acute inflammatory diseases such as allergic rhinitis and asthma.<sup>(4,5,12)</sup>

Asthma is a chronic inflammatory disease of the airways, characterized by hyperresponsiveness of airways to different stimuli. Physiologically, it is characterized by narrowing of the airways against the airflow, which resolves spontaneously or with treatment. Clinically, it manifests with dyspnea attacks, cough and wheezing. It is a periodic disease with attacks lasting for a few minutes to a couple of hours. In rare cases, it may even result in death.<sup>(13-16)</sup>

Shulman et al assessed the prevalence and risk factors of geographic tongue among American adults and found no correlation between geographic tongue and age, sex, use of contraceptives, diabetes mellitus, allergy or dermatological conditions. They correlated the occurrence of geographic tongue to race.<sup>(2)</sup> Miloglu et al demonstrated that geographic tongue is more prevalent in young nonsmokers and in atopic or allergic subjects and that it has no significant correlation with gender, dermatological conditions or systemic diseases.<sup>(17)</sup> However, Marks et

al confirmed that geographic tongue was a sign of atopy.<sup>(1)</sup> Marks et al stated that patients with atopy were more likely to develop inflammation of the fungiform papillae of the tongue than the general population.<sup>(4)</sup> Also, in another study on 102 atopic patients, Marks et al reported a higher prevalence of geographic tongue associated with extrinsic asthma and/or rhinitis compared to healthy controls.<sup>(5)</sup> Goregen et al revealed the correlation between geographic tongue and allergy by using patch and prick tests.<sup>(18)</sup> Honarmand et al found a significant correlation between the incidence of geographic tongue and allergy in a group of Iranian population.<sup>(19)</sup> Ghapanchi et al showed that geographic tongue is one of the most prevalent oral lesions in asthmatic patients.<sup>(20)</sup> Based on the controversy regarding the prevalence of geographic tongue and its association with asthma as well as the high prevalence of geographic tongue in asthmatic patients reported in previous studies<sup>(5)</sup>, this study aimed to compare the prevalence of geographic tongue between asthmatic patients and healthy subjects.

## Materials and methods:

This cross-sectional study was conducted on 80 asthmatic patients and 80 healthy controls. A pilot study was conducted on 20 asthmatic patients to calculate the sample size, and the frequency of geographic tongue was found to be 35% (n=7) in the asthmatics and 5% in the healthy controls. Considering the 95% confidence interval, error of 5% and power of 90%, the sample size was calculated to be 80 subjects in each group. The asthmatic subjects were selected from among the patients presenting to Masih Daneshvari hospital, a referral center for respiratory diseases, while the healthy controls were selected from among patients' companions using targeted sampling. All the subjects signed written informed consent forms prior to participation in the study. The two groups of patients and controls were matched according to age, sex and cigarette smoking status.<sup>(2, 17)</sup> Cigarette smoking was defined as smoking over 20 cigarettes a day for at least 10 years.<sup>(21)</sup>

Asthmatic patients with a confirmed diagnosis of asthma recorded by a pulmonologist using

the standard method<sup>(22)</sup> at the asthma department of Masih Daneshvari hospital, were selected and the required data were extracted from patients' files. The patients were also interviewed. The examined asthmatic patients had allergic rhinitis (sneezing, congestion, rhinorrhea and itchy nose) and reported no drug intake except for asthma medications (eg: beta 2 receptor agonist, Anticholinergic, Steroid, and Theophylline). Other systemic diseases such as diabetes mellitus, psoriasis, Reiter's syndrome, anemia, seborrheic dermatitis, hormonal disorders, eczema and oral mucosal lesions (other than geographic tongue) such as fissured tongue, depapillated tongue, extensive erythema of the tongue and median rhomboid glossitis were among the exclusion criteria in both groups.

Clinical oral examination of both the case and control groups was carried out for detection of geographic tongue, according to the World Health Organization's guidelines.<sup>(23)</sup> Geographic tongue was defined as multiple erythematous patches with white serpiginous borders and an atrophic center mainly involving the dorsal surface of the tongue. An expert examiner evaluated the ventral, dorsal and lateral surfaces of the tongue using a dental mirror under flash light and recorded the data in a questionnaire.

The data were entered into SPSS software version 22 (Microsoft, IL, USA) and were analyzed using Chi-Square test. The level of statistical significance was set at  $P < 0.05$ .

### Result:

A total of 160 subjects including 80 asthmatic patients and 80 healthy controls were assessed. The case and control groups were matched according to age, sex and smoking status. (Table 1)

**Table 1- Demographic information of subjects in the case (asthmatic) and control (healthy) groups**

Group/ Demographics	Mean age	Sex		Smoking status	
		Male	Female	Non-smoker	Smoker
Control (n=80)	46.8±14.9	34 (42.5)	46 (57.5)	77 (96.2)	3 (3.8)
Case (n=80)	47.7±14.8	34 (42.5)	46 (57.5)	77 (96.2)	3 (3.8)
P value	NS	NS	NS	NS	NS

Table 2 shows the frequency distribution of geographic tongue based on asthma status. Accord-

ing to Chi-Square test, the difference was statistically significant ( $P < 0.002$ ).

**Table 2-The frequency of geographic tongue in the case (asthmatic) and control (healthy) groups**

Group/ Geographic tongue	No	Yes	Total
	Percentage/Number	Percentage/Number	Percentage/Number
Control (n=80)	95% (76)	5% (4)	80 (100)
Case (n=80)	78.8 (63)	21.2% (17)	80 (100)

The incidence of geographic tongue in the asthmatics was 4.2 times greater than that in the healthy individuals (relative risk,  $RR=4.2$ ) with an attributable risk (AR) of 16%.

The frequency of involvement was 60% in the dorsal, 40% in the lateral and 0% in the ventral surface of the tongue for the control group and 56% in the dorsal, 40% in the lateral and 4% in the ventral surface of the tongue for the case group. No significant association was found between the involvement of a particular surface of the tongue and asthma ( $P=0.748$ ).

### Discussion:

The etiology of geographic tongue has not been clearly understood. However, several factors such as stress, atopy, nutritional deficiency, candidiasis, diabetes mellitus, lichen planus and psoriasis are believed to play a role in its occurrence.<sup>(1,3,4,5)</sup> Geographic tongue is an inflammatory disorder of the tongue. It is often asymptomatic and is an incidental finding during routine dental examinations.<sup>(4,9)</sup> However, some patients complain of minor discomfort and burning sensation. Severe pain has been rarely reported.<sup>(24,25,26)</sup>

The current study evaluated the frequency of geographic tongue in two groups of asthmatic patients and healthy controls, matched for confounding factors such as age, sex and smoking status. The results revealed a significant association between asthma and occurrence of geographic tongue. This finding was in accord with the results of the studies by Marks et al<sup>(1)</sup> and Miloglu et al.<sup>(17)</sup> Also, Alikhani et al<sup>(27)</sup> revealed that

elevation of salivary levels of inflammatory cytokines was associated with the incidence of geographic tongue. However, the results of the present study were in contrast to the findings of Jainkittivong et al.<sup>(28)</sup> This difference between our results and the results achieved by Jainkittivong et al is probably due to the difference in the population under study. In the study by Jainkittivong et al, the subjects with geographic tongue were evaluated to determine the presence of possible etiologic factors such as asthma.<sup>(28)</sup>

In the present study, the prevalence of geographic tongue in the healthy controls was 5%. The prevalence of geographic tongue in the general population has been reported to be 6%<sup>(3,19)</sup>, which is in accordance with the value obtained in the current research. However, Shulman et al reported a prevalence rate of 1.8%. This difference in the obtained values can be probably attributed to the racial, ethnic and genetic differences of the populations under study.<sup>(2)</sup>

One of the strength points of the current study was the evaluation of asthmatic patients and exclusion of subjects with other systemic conditions such as psoriasis, dermatitis, anemia, Reiter's syndrome, eczema, fissured tongue, etc. The subjects that reported intake of drugs such as antibiotics or hormonal medications were also excluded. Therefore, asthma and allergic rhinitis were the only variables that their effects on the development of geographic tongue were evaluated. This may explain the lower prevalence rate of geographic tongue in our study compared to other studies.

Our findings, as well as those of the above-mentioned studies indicate that the prevalence of geographic tongue is significantly higher in asthmatic patients compared to healthy individuals. However, it cannot be stated with certainty that whether this higher prevalence is due to the nature of asthma and allergic rhinitis or is the result of the use of medications for controlling asthma such as bronchodilators and inhaled or systemic corticosteroids (which also affect the oral mucosa and tongue).<sup>(29)</sup> However, the higher prevalence of geographic

tongue in the patients suffering from other allergic conditions such as eczema, rash and hay fever compared to the healthy population elucidates this topic to some extent, since asthma medications are not prescribed for the above-mentioned conditions.

In the present study, the frequency of involvement of tongue surfaces was 56% in the dorsal, 40% in the lateral and 4% in the ventral surface of the tongue. These values were in line with the findings of Jainkittivong et al.<sup>(28)</sup> The dorsal and lateral surfaces of the tongue were more commonly involved, while involvement of the ventral surface was only detected in one patient. This pattern of involvement has also been mentioned in previous studies.<sup>(26)</sup> The current study found no association between the involved surface of the tongue and asthma ( $P=0.748$ ). This assessment was another strength point in our study, since no previous study has evaluated this correlation.

Further studies with larger sample sizes and in different geographical locations are required to better elucidate the correlation between asthma and geographic tongue. Also, assessment of the serum level of IgE in asthmatic patients with geographic tongue and in otherwise healthy controls may yield interesting findings.

## Conclusion

In the present study, the asthmatic patients showed a significant higher prevalence of geographic tongue than the healthy controls. Since the etiology of geographic tongue is yet unknown, this study can be considered as a scientific viewpoint.

## Conflicts of Interest:

The authors of this manuscript certify that they have no conflicts of interest regarding this research.

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