Original Research

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Epidemiological assessment of geographic tongue in undergraduate dental students (Iraqi observational study)

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Abstract

INTRODUCTION. Geographic Tongue is the most common abnormalities of the tongue that etiopathogenesis of them remains to be clarified. This disorder is strongly suspected to be influenced by genetic factors and other predisposition factors. Several studies have revealed that this lesion occur more frequently on women than on men.

AIM. The aim of this research is to determine the distribution of geographic tongue, based on the gender, burning sensation, sites of occurance and predisposing factors among the dental students.

MATERIALS AND METHODS. By distributing a questionnaire, 110 dental students participated in a cross-sectional study. A statistical study that was both descriptive and inferential was conducted.

RESULTS. Geographic tongue was mostly reported in female students (51.1%), most of the affected student was suffered from burning. The higher percentage was recorded in both dorsal and lateral tongue sites (77.0%). Stress showed the most common etiological factor for geographic tongue among dental students (48.6%).

CONCLUSION. Fifth grade dental students reported geographic tongue with female predilection and different etiological factors, stress was the most common one.

Keywords: geographic tongue, stress, dental students, burning, observational study

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Эпидемиологическая оценка географического языка у студентов стоматологического факультета (обсервационное исследование в Ираке)

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Резюме

ВВЕДЕНИЕ. Географический язык является наиболее распространенным нарушением структуры языка, однако его этиопатогенез до настоящего времени остается недостаточно изученным. Предполагается, что развитие данного состояния в значительной степени связано с генетическими факторами и другими предрасполагающими факторами. Ряд исследований показал, что данное поражение чаще встречается у женщин, чем у мужчин.

ЦЕЛЬ. Целью данного исследования являлось определение распространенности географического языка с учетом пола пациентов, наличия ощущения жжения, локализации поражений и предрасполагающих факторов среди студентов стоматологического факультета.

МАТЕРИАЛЫ И МЕТОДЫ. Путем анкетирования в поперечном исследовании приняли участие 110 студентов стоматологического факультета. Был проведен статистический анализ, включавший описательную и сравнительную (инференциальную) статистику.

РЕЗУЛЬТАТЫ. Географический язык чаще выявлялся у студенток (51,1%). Большинство студентов с данным состоянием предъявляли жалобы на ощущение жжения. Наиболее высокая частота поражений отмечалась одновременно на дорсальной и боковых поверхностях языка (77,0%). Стресс являлся наиболее распространенным предполагаемым этиологическим фактором развития географического языка среди студентов стоматологического факультета (48,6%).

ЗАКЛЮЧЕНИЕ. У студентов пятого курса стоматологического факультета географический язык характеризовался преимущественным распространением среди женщин и наличием различных этиологических факторов, среди которых наиболее часто отмечался стресс.

Ключевые слова: географический язык, стресс, студенты стоматологического факультета, жжение, обсервационное исследование

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INTRODUCTION

The tongue is an essential oral organ that plays a key part in mastication, speaking, breathing, and swallowing, among other processes. Tongue lesions make up a sizable portion of oral mucosal lesions [1; 2]. In 1831, Rayer published the first description of the Geographic Tongue (GT). There are a number of names for this condition, including Benign Migratory Glossitis (BMG) and immigrant GT [3; 4].

GT is typified by an erythematous region with atrophy of the tongue's filiform papillae, giving it an uneven surface texture with hazy boundaries that can occasionally be uncomfortable and burn [1; 4–13].

It is still unclear what specifically causes the papillae of the tongue to atrophy in GT patients. However, it has been demonstrated that the processes of maturation, apoptosis, and proliferation – all of which are partially regulated by the epidermal growth factor (EGF) – renew the tongue epithelium continuously [12–14]. As primary symptoms, some people occasionally describe pain, burning, and discomfort. The lesion is completely benign, however the precise etiopathogenesis is still unknown. It has been proposed that stress, environmental factors, medications, hot food consumption, allergies, and inheritance are the predisposing factors for this lesion. Additionally, a GT with conditions like HIV infection, diabetes, and burning mouth syndrome is regarded as a sequela [5]. There is a familial history of geographic tongue in certain persons. Thus, the risk may be increased by hereditary factors [9; 10].

Among the psychological variables linked to GT, anxiety is notably prevalent in patients [15]. According to studies, the appearance of the lesions is influenced by anxiety and depression [16; 17]. This study sought to ascertain the geographic tongue lesion prevalence among a sample of dentistry students at University of Al-Kafeel in Annajaf, Iraq, as well as the potential contributing factors to the development of lesions in this population.

MATERIALS AND METHODS

In order to represent the total number of fifth-class dental students for the academic year 2025–2026 at the college of dentistry at Al-Kafeel University in Annajaf, Iraq, a descriptive cross-sectional survey was conducted on 110 out of 140 students.

Participants in this study were fifth-class dental students who had developing geographic tongue. The project was approved by the ethics committee of Al-Kafeel University (ECD-202501).

The researcher developed a questionnaire after carefully reviewing the literature. The questionnaire is divided into three pieces. The first component asks about the participants' demographic information, such as their age and gender. The third section asked about the origin of the geographic tongue lesion (diet, stress, and family history), while the second section's questions concentrated on the tongue site and clinical history of the lesion.

All participants who answered the study's questionnaire were included, regardless of whether GT was present or not (Fig. 1). The excluded participants were students who failed to give their informed permission.

Statistical Analysis

The distribution of geographic tongue was processed and represented by Python 3 program. The data were analyzed by using SPSS version 28. Chi-square test was applied to find the level of association of the number of dental students and gender type with geographic tongue, along with Fisher's exact test and Odds ratio.

Chi-square test was also used to show the level of differences among the five different factors that are related to geographic tongue, as well as among different sites of occurrence on the tongue, and between students who have burning and those who do not.

A **B**

Fig. 1. Participants the study's: *A* – with geographic tongue; *B* – without geographic tongue

Рис. 1. Участники исследования:
A – с наличием географического языка;
B – с отсутствием географического языка

RESULTS

Geographic tongue was found in 35 out of 110 dentistry students in the current investigation, with an overall percentage of 31.8%. There were 110 participants in all, with 65 males (59.1%) and 45 females (40.9%) making up the study population (Table 1, Fig. 2).

The presence of GT was significantly correlated with gender. 51.1% (23/45) of females and 18.5% (12/65) of males showed GT. A statistically significant association was found; $\chi^2 = 13.07$, $p < 0.001$; Fisher's exact $p \approx 0.0002$. The odds of having GT were almost 4.6 times higher in females than in males: OR = 4.62 (Table 2, Fig. 3).

The majority of GT patients reported having a burning feeling. This difference was verified by the chi-square test: $\chi^2 = 15.12$, $p < 0.05$ (Table 3, Fig. 4).

There was a significant difference in the distribution of GT lesions among the various tongue sites: $\chi^2 = 30.39$, $p < 0.05$. 77% of patients (27/35) had lesions on both dorsal and lateral surfaces, while lesions limited to either surface were less common (Table 4, Fig. 5).

Table 1. Distribution of cases according to the presence of geographic tongue with total gender distribution

Таблица 1. Распределение случаев в зависимости от наличия географического языка с учетом общего распределения по полу

Gender	n	%
Male	65	59.1
Female	45	40.9
Total participants	110	100.0
GT cases	35	31.8

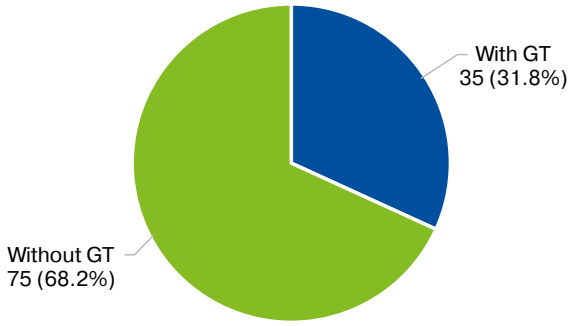

Fig. 2. Distribution of cases according to the presence of geographic tongue

Рис. 2. Распределение случаев в зависимости от наличия географического языка

Table 2. Distribution of geographic tongue according to gender

Таблица 2. Распределение случаев географического языка в зависимости от пола пациентов

Gender	GT (+)	GT (–)	Total
Male	12	53	65
Female	23	22	45
Total	35	75	110

$\chi^2 = 13.07$, $p < 0.001$, $p(F) \approx 0.0002$, OR ≈ 4.62

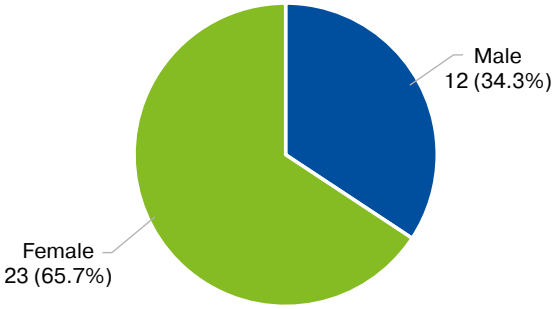

Fig. 3. Distribution of geographic tongue according to gender

Рис. 3. Распределение случаев географического языка в зависимости от пола пациентов

Table 3. Distribution of geographic tongue in relation to burning

Таблица 3. Распределение случаев географического языка в зависимости от наличия жжения

GT	n
With Burning	29
Without Burning	6
Total	35

$\chi^2 = 15.12$, $p < 0.05$

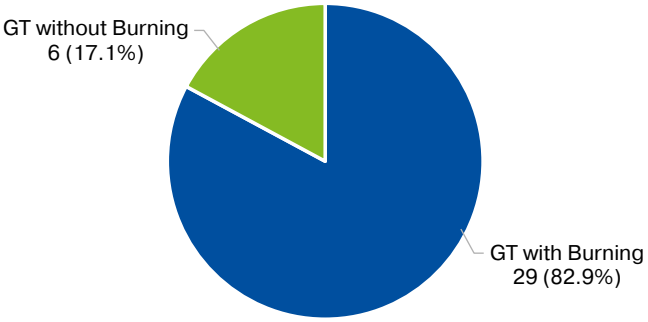

Fig. 4. Distribution of geographic tongue in relation to burning

Рис. 4. Распределение случаев географического языка в зависимости от наличия жжения

Table 4. Distribution of geographic tongue among tongue sites

Таблица 4. Распределение случаев географического языка в зависимости от локализации на языке

Sites	n	%
Dorsal & Lateral	27	77.1
Lateral	5	14.3
Dorsal	3	8.6
Total	35	100

$\chi^2 = 30.39$, $p < 0.05$

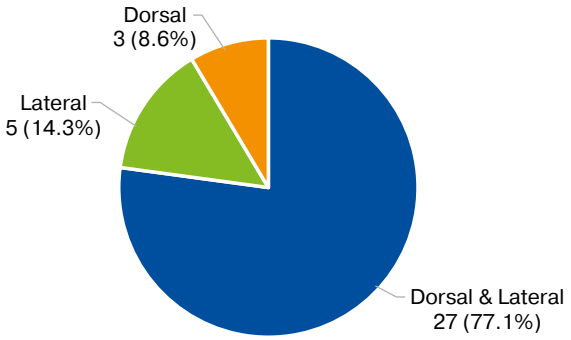

Fig. 5. Distribution of geographic tongue among tongue sites

Рис. 5. Распределение случаев географического языка в зависимости от локализации на языке

Table 5. Distribution of factors related to geographic tongue

Таблица 5. Распределение факторов, связанных с географическим языком

Factors	n	%
Family history	3	8.6
Stress	17	48.6
Hormonal	7	20.0
Systemic diseases	6	17.1
Diet	2	5.7
Total	35	100.0

$\chi^2 = 20.29$, $p < 0.05$

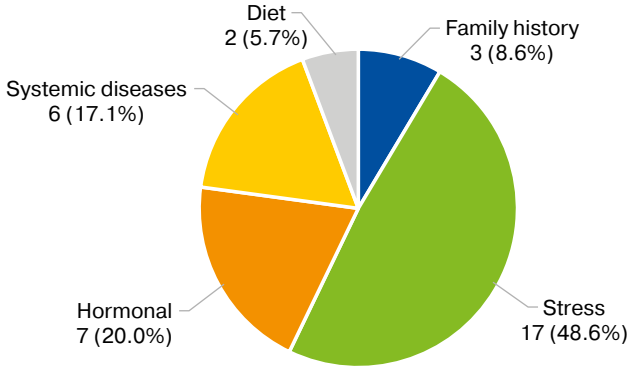

Fig. 6. Distribution of factors related to geographic tongue

Рис. 6. Распределение факторов, связанных с географическим языком

A chi-square test was used to examine the distribution of potential contributing factors among GT patients. The results showed a significant difference: $\chi^2 = 20.29$, $p < 0.05$, indicating that stress was the most commonly reported factor, affecting 17 out of 35 patients (48.6%), followed by hormonal influences (20.0%), systemic diseases (17.1%), family history (8.6%), and diet (5.7%) (Table 5, Fig. 6).

DISCUSSION

An inflammatory condition of unclear etiology, GT affects the dorsum of the tongue but can also occasionally affect its lateral borders or both. The clinical presentation of GT was defined by erythematous patches with a pale, somewhat elevated edge because of filiform papillae atrophy [1; 4]. The lesion is frequently observed in individuals with immunological diseases, such as psoriasis, when stress and/or anxiety are present, and it may be connected to atopic or allergic illnesses [18].

The irregular appearance of a map is caused by the pattern of red, map-like regions with white borders that occasionally move over the tongue and may affect the buccal mucosa [19]. Numerous variables, including hormonal imbalances, systemic illnesses, psychological factors, and local conditions, have been suggested as potential causes of geographic tongue.

The study's afflicted group was in the second decade, which is consistent with studies showing that the highest frequency of geographic tongue occurs in those under 29 [20–23].

In line with other earlier studies, female in the current research exhibited a higher percentage of GT (51.1%) because they were more emotionally affected. Hormonal factors and the menstrual cycle may possibly be significant contributors which is in line with earlier findings that indicate hormonal disruption may play a part in the onset or aggravation of GT lesions [21; 24–26].

The look, symptomatology, and clinical presentation of geographic tongue vary greatly, ranging from asymptomatic to ulceration that is painful and this come with the current results that supposed the most of students had burning sensation [17].

According to earlier research, a large number of patients had varying degrees of pain, burning, and discomfort, which are indicative of the lesion's activity [21; 27].

Geographic tongue lesions were found to be more common on the tongue's dorsal and lateral borders in this study with a percentage (77%), which is consistent with findings from earlier investigations [2; 22; 26–28).

Although stress has been identified as a significant etiologic factor in GT [9], it may also be a result of GT. Stress may be a potentially modifiable risk factor that could influence the prevalence of GT among adults, according to previous research that demonstrated a statistically significant association between GT and psychological factors [22; 29]. This was in agreement with the current results that reported the stress as the most common etiological factor with a percentage (48.6%).

Stress and GT did not significantly correlate, according to another study [28]. This disparity could be explained by the fact that neither physiological stress measures nor stress-specific questionnaires were used by the researchers.

Comparisons between the current findings and those from previous studies should be made with caution because of differences in study methodology, sample size, and location.

Compared to other etiological factors, the percentage of dental students who had GT during training and study periods that were related to stress was higher. This is consistent with numerous studies that suggested the primary cause of mucosal ulcers in dental students was stress related to exams and work deadlines. It has been demonstrated that dentistry students' fear of failing, increased workload, and exam stress are significant factors [17; 26; 30; 31].

In addition to GT, stress was linked to various oral diseases [32; 33]. 50 patients with Recurrent Aphthous Stomatitis (RAS), one of the most common ulcerated lesions in the oral cavity, participated in a study by Gallo et al. [32]. They came to the conclusion that psychological stress was a major contributing factor to the development of these lesions in their patients. Stress increases the number of leucocytes at the site of inflammation, which triggers an immunoregulatory response [34].

The study's findings only represent the GT rate among dentistry students at University of Al-Kafeel in Annajaf, Iraq. That being said, there is no reason to think that this particular cohort of students is different from other Iraqi dental students. Dental students who passed through the courses in their program who have GT served as the study's subjects. As a result, they were sufficiently aware of the condition's symptoms. They were therefore the ideal participants for this research and its design.

Nonetheless, the current investigation demonstrated that among dental students, the frequency of GT was noted in Class 5 (35/110). These findings can be explained by the stress that students experience when they have to complete numerous assignments in various subjects and worry about the time limit.

In addition, our study found that family history was a related factor, which is consistent with prior findings [34]. These findings were in line with the current findings, which show that family history accounted for the registered percentage of GT's etiological components.

CONCLUSION

A common ailment affecting the oral cavity is geographic tongue. A sizable portion of the sample of dentistry students under study with female inclination that affected by GT. The majority of dental students with GT experienced burning sensation. The lateral and dorsal tongues altogether were commonly affected. According to the current study, the stress was reported significantly in fifth-grade dental students with GT.

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