

# INCIDENCE OF IRON-DEFICIENCY ANEMIA IN PATIENTS WITH GEOGRAPHIC TONGUE

## ИНЦИДЕНЦА НА СИДЕРОПЕНИЧНА АНЕМИЈА КАЈ ПАЦИЕНТИ СО ГЕОГРАФСКИ ЈАЗИК

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### Abstract

**Aim:** To detect the incidence of iron deficiency anemia in patients with geographic tongue and patients with healthy oral mucosa, as well as its frequency in terms of sex and age and smoking-related association. **Material and method:** The study involved 25 subjects (13 women and 12 men) with satisfactory criteria for geographic tongue diagnosis, with an average age of 49 years. The control group consisted of 26 subjects with completely healthy oral mucosa (14 women and 11 men), with an average age of 52 years. The levels of hemoglobin, hematocrit, erythrocyte count, MCV, MCH, MCHC, and serum iron were determined for all subjects, to evaluate if there were any differences in the incidence of iron deficiency anemia among the subjects. **Results:** The collected data were analyzed using descriptive statistics. Our results indicated a statistically significant association between the finding of iron deficiency anemia and geographic tongue ( $p = 0.007661$ ), as well as a statistically higher prevalence of this condition among female subjects, ( $p = 0.013328$ ). There was no statistically significant difference ( $p = 1.00$ ) in the subjects with geographic tongue and iron deficiency anemia in relation to smoking. **Conclusion:** Iron deficiency anemia is more common among subjects with geographic tongue than those with healthy oral mucosa, with female predominance, which suggests that geographic tongue is one of the possible oral manifestations of this condition. **Key words:** Iron deficiency anemia, geographic tongue, oral mucosa.

### Апстракт

**Цел:** Да се детектира инциденцата на сидеропеничната анемија кај пациенти со географски јазик во однос на пациенти со здрава орална слузница, како и нејзината зачестеност во врска со полот и возраста и поврзаноста во зависност со пушењето. **Материјал и метод:** Во студијата партиципираа 25 испитаници (13 жени и 12 мажи) со задоволителни критериуми за дијагноза географски јазик, со просечна возраст од 49 години. Контролната група ја сочинуваа 26 испитаници со потполно здрава орална слузница, (14 жени и 11 мажи), со просечна возраст од 52 години. Кај сите испитаници беа одредени нивоата на хемоглобин, хематокрит, број на еритроцитите, MCV, MCH, MCHC и серумско железо, како би утврдиле дали постои разлика во инциденцата на феродефицитната анемија помеѓу испитаниците. **Резултати:** Собраните податоци беа анализирани со помош на дескриптивните статистички методи. Нашите резултати укажаа на статистички значајна поврзаност помеѓу наодот на сидеропенична анемија и географски јазик ( $p = 0,007661$ ), како и на статистички поголема зачестеност на оваа состојба кај испитаниците од женскиот пол ( $p = 0,013328$ ). Во однос на поврзаноста на сидеропеничната анемија кај испитаниците со географски јазик во однос на пушењето, не добивме статистички значајна разлика ( $p = 1,00$ ). **Заклучок:** Сидеропеничната анемија е почеста кај испитаниците со географски јазик во однос на оние со здрава орална слузница, со преодминантност кај женскиот пол, со што би можеле да заклучиме дека географскиот јазик е една од можните орални манифестации на оваа состојба. **Клучни зборови:** сидеропенична анемија, географски јазик, орална слузница.

### Introduction

The vast majority of systemic diseases oftentimes manifest themselves in the oral cavity, the tongue being the organ upon which these disease-related changes most frequently occur.

One of such conditions is the geographic tongue which happens to be among the most common. Geographic tongue is an inflammatory, benign condition which predominantly occurs on the dorsal lingual surface and is characterized by depapillated areas surrounded by

white keratotic lesions. The lesions are distinctly separated from the surrounding healthy mucosa and can vary from a few millimeters to a few centimeters in size<sup>1,2</sup>.

The atrophic changes on the lingual surface, which are frequently accompanied by glossitis, are characterized by a partial or total loss of the filiform papillae and sometimes, the fungiform papillae. The anatomic structure of the filiform papillae, which by itself integrates the keratinized layer of the squamous epithelium, also protects the tongue from mechanical, chemical, thermic and similar other extrinsic factors. Consequently, these

changes are generally registered by patients as asymptomatic and do not necessitate treatment<sup>3</sup>.

However, in patients where the filiform papillae are absent, sensitivity changes on the tongue's surface have been registered as well as sensations such as burning and stinging. A dysfunction in the taste has frequently been reported especially after consumption of a specific type of food and alcoholic beverages<sup>4,5</sup>.

Numerous studies have found the percentage of this condition amongst the population to be between 1% and 5.2% regardless of gender. The incidence of this condition varies around 2% in the American population, while in the rest of the world, it varies between 11 and 16%. Alternatively, some studies put forward data suggesting a larger presence of geographic tongue in women; 1:1.5 regardless of age<sup>6,7,8</sup>.

Different etiopathogenetic causes contribute to the occurrence of geographic tongue such as genetic factors<sup>9</sup>, systemic diseases, psoriasis<sup>10,11,12</sup>, atopy, diabetes, coeliac disease, avitaminosis (pernicious and iron deficiency anemia), psychosomatic conditions, lichen planus, Down syndrome, mental illnesses, and a tight association to a fissured tongue<sup>13,14,15</sup>.

Iron-deficiency anemia is a hypochromic, microcytic anemia caused by insufficient iron level in the body mostly due to an insufficient intake of iron and is often-times associated with the occurrence of geographic tongue. Contributors to this condition in women are menstruations, pregnancy and breastfeeding, whereas chronic bleeding from the digestive tract is a common contributor in men<sup>16,17,18</sup>.

Atrophic glossitis may be present in certain nutritional deficiencies, such as riboflavin deficiency, niacin, pyridoxine, folic acid, iron, zinc, B12, Vitamin E<sup>19,20</sup>.

Nevertheless, the true etiology of this condition remains unclear.

## Aim

The aim of this study is to detect the incidence of iron-deficiency anemia in patients with geographic tongue compared to patients with a healthy oral mucosa, relative to gender, age and associative to smoking.

## Material and method

Our survey included 25 patients (13 women and 12 men) with diagnosed iron-deficiency anemia, which averaged 49 years of age and made up the examined group, and another 25 patients with a healthy oral mucosa (14 women and 11 men) which averaged 52 years of age and made up the control group. A blood analysis was done for each of the examined patients with

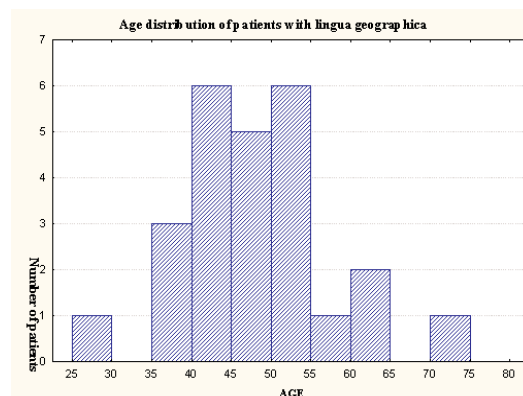
the aim of detecting iron-deficiency anemia, considering the following parameters: hemoglobin, serum iron, hematocrit, RBC, MCV, MCH, MCHC. General anamnestic data was also registered relative to the general systemic health of the patients and smoking habits. The registered data was statistically analyzed using descriptive statistical methods such as the Fischer, exact test and the Mann-Whitney test.

## Results

A total number of 50 patients participated in the study, 25 in each group, 13 women and 12 men in the examined group of patients with clinically diagnosed geographic tongue, whilst 14 women and 11 men took part in the control group with a healthy oral mucosa. The average age of the surveyed patients with a healthy oral mucosa was 49, whereas the average age for surveyed patients with geographic tongue was 52 (Table 1, Graph 1, 2).

**Table.1** Comparison between the surveyed group and the control group relative to age

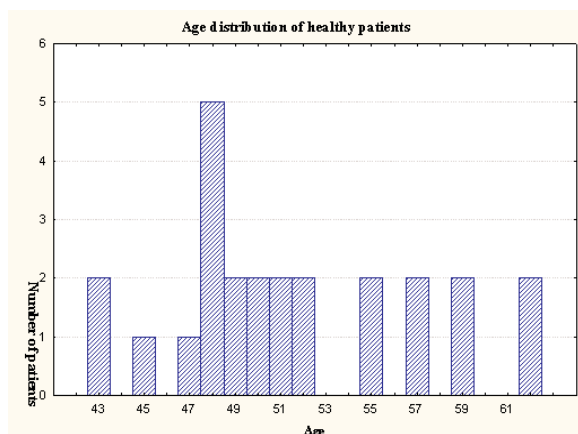
|                                   | Number of patients | Mean  | Min. | Max. | Std Dev |
|-----------------------------------|--------------------|-------|------|------|---------|
| Patients with geographic tongue   | 25                 | 51,52 | 43   | 62   | 5,41    |
| Patients with healthy oral mucosa | 25                 | 48,96 | 30   | 72   | 9,25    |



**Graph 1.** Age distribution of patients with geographic tongue

Three patients in the examined group had a systemic illness (2 men with diabetes, 1 woman with Hashimoto thyroiditis), whilst in the control group 1 man had diabetes and 2 women had cardiac-related issues.

Patients with iron-deficiency anemia were identified through a blood analysis test where lower results were



**Graph 2.** Age distribution of patients with healthy oral mucosa

detected for the specific reference-parameters of iron-deficiency anemia (hemoglobin, serum iron, hematocrit, RBC, MCV, MCH, MCHC), (Table 2, 3, 4).

**Table.2** Referent levels (values) for blood parameters

|             | FEMALE                         | MALE                           |
|-------------|--------------------------------|--------------------------------|
| <b>RBC</b>  | 3,86-5,08 X 10 <sup>12</sup> L | 4,34-5,72 X 10 <sup>12</sup> L |
| <b>HGB</b>  | 119-157 (g/l)                  | 138-175(g/l)                   |
| <b>HCT</b>  | 0,356-0, 470(L/L)              | 0,415-0,530(L/L)               |
| <b>MCV</b>  | 83,0-97,2 (fl)                 | 83,0-97,2 (fl)                 |
| <b>MCH</b>  | 27,4-33,9 (g/dl)               | 27,4-33,9 (g/dl)               |
| <b>MCHC</b> | 320-345pq                      | 320-345pq                      |
| <b>Fe</b>   | 8-30 (µmol/l)                  | 11-32                          |

**Table 3.** Average results of blood analysis parameters in the control group (healthy oral mucosa)

| Patients with healthy oral mucosa (control group) | Mean  | Std Dev | N  | Std Err | t      | p &Fe    |
|---|-------|---------|----|---------|--------|----------|
| <b>RBC</b>  | 4,90  | 0,71    | 25 | 0,14    | 34,47  | 0,000002 |
| <b>HGB</b>  | 13,39 | 2,09    | 25 | 0,41    | 31,97  | 0,83     |
| <b>HCT</b>  | 40,26 | 5,70    | 25 | 1,14    | 35,30  | 0,000002 |
| <b>MCV</b>  | 85,24 | 7,19    | 25 | 1,43    | 59,23  | 0,000002 |
| <b>MCH</b>  | 28,78 | 2,36    | 25 | 0,47    | 60,73  | 0,000002 |
| <b>MCHC</b>                                       | 32,10 | 1,58    | 25 | 0,31    | 101,22 | 0,000002 |
| <b>Fe</b>   | 15,20 | 5,46    | 25 | 1,09    | 13,89  | 0,000002 |

**Table 4.** Average results of blood analysis parameters in the surveyed group (geographic tongue)

| Patients with geographic tongue (surveyed group) | Mean  | Std Dev | N  | Std Err | t     | p &Fe    |
|--|-------|---------|----|---------|-------|----------|
| <b>RBC</b>                                       | 4,81  | 0,63    | 25 | 0,12    | 37,82 | 0,000002 |
| <b>HGB</b>                                       | 13,63 | 1,34    | 25 | 0,26    | 50,56 | 0,003    |
| <b>HCT</b>                                       | 42,12 | 5,28    | 25 | 1,05    | 39,83 | 0,000002 |
| <b>MCV</b>                                       | 87,88 | 5,22    | 25 | 1,044   | 84,16 | 0,000002 |
| <b>MCH</b>                                       | 28,69 | 2,02    | 25 | 0,40    | 70,79 | 0,000002 |
| <b>MCHC</b>                                      | 32,58 | 3,04    | 25 | 0,60    | 53,43 | 0,000002 |
| <b>Fe</b>  | 13,34 | 2,52    | 25 | 0,50    | 26,37 | 0,000002 |

**Table 5.** Comparison of occurrence of iron-deficiency anemia in surveyed and control group

|   | Iron deficiency anemia<br><b>NO</b> | Iron deficiency anemia<br><b>YES</b> | Total |
|---|-------------------------------------|--------------------------------------|-------|
| Patients with geographic tongue (examined group)  | 16                                  | 9                                    | 25    |
| %   | 64%                                 | <b>36%</b>                           |       |
| Patients with healthy oral mucosa (control group) | 22                                  | 3                                    | 25    |
| %   | 88%                                 | <b>12%</b>                           |       |

**Table 6.** Comparison of occurrence of iron-deficiency anemia in patients with geographic tongue relative to gender

|                                | Female        | Male   | Total |
|--------------------------------|---------------|--------|-------|
| Without Iron deficiency anemia | 5             | 11     | 16    |
| %                              | 31,25%        | 68,75% |       |
| With Iron deficiency anemia    | 8             | 1      | 9     |
| %                              | <b>88,88%</b> | 11,11% |       |
| Total                          | 13            | 12     | 25    |

**Table 7.** Comparison of occurrence of iron-deficiency anemia in patients with geographic tongue relative to smoking

|  | Smoking<br><b>YES</b> | Smoking<br><b>NO</b> | Total |
|--|-----------------------|----------------------|-------|
| Geographic tongue without Iron deficiency anemia | 2                     | 14                   | 16    |
| %  | 12,5%                 | <b>87,5%</b>         |       |
| Geographic tongue with Iron deficiency anemia    | 3                     | 6                    | 9     |
| %  | 33,3%                 | <b>66,6%</b>         |       |

When comparing two variables through a Fischer test, a statistically significant link was established between iron-deficiency anemia and geographic tongue,  $p=0,007661$ . Similar significance was not detected between the same two variables in patients with healthy oral mucosa,  $p=0,248$  (Table 5).

According to the results from the Fischer test, a conclusion could be drawn that there is a statistical significance ( $p=0,013328$ ) for the frequency of iron-deficiency anemia in female patients with geographic tongue (Table 6).

Considering the Mann-Whitney test ( $p=1,00$ ), no statistically significant relation could be detected between the frequency of iron-deficiency anemia in patients with geographic tongue and smoking (Table 7).

## Discussion

One of the most occurring types of anemia is the iron-deficiency anemia, which occurs due to iron deficiency. The World Health Organization (WHO) defines anemia as a condition in which the concentration of hemoglobin falls below 130g/l in adult men, under 120 g/l in adult women and under 110g/l in pregnant women<sup>21</sup>.

Hypochromic blood analysis shows lower coefficients for serum iron and red blood cell index (MCV), average red blood cell volume (MCH), average weight of hemoglobin in red blood cells, MCHC, hemoglobin and others<sup>22</sup>.

The aim of our study was establishing whether the occurrence of iron-deficiency anemia is higher in patients with geographic tongue relative to those with healthy oral mucosa. The results of our study present the fact that iron-deficiency anemia is more frequent in patients with geographic tongue (36%) in relation to those with healthy oral mucosa (12%). The discrepancy between the examined groups showed a statistically significant difference ( $p= 0,007661$ ).

Although the available data in academic literature suggests that the incidence of geographic tongue is highest in patients at the age of 20-29 years<sup>4,9</sup>, our survey has found the highest incidence to be in patients between 43 and 62 years of age, or an average age of 52<sup>9,14</sup>.

Geographic tongue was detected in 88,88% of the surveyed female patients which, in turn, is in accordance with the academic data that suggests that geographic tongue is more prevalent in female population<sup>13,23</sup>.

The fact that iron-deficiency anemia is more frequent in women might be associated with heavy menstrual bleeding<sup>23</sup>, heightened physiological necessity of iron during pregnancy and higher blood volume<sup>24</sup>.

Many manifestations on the tongue occur due to poor oral hygiene as well as poor health habits such as smoking<sup>25</sup>.

During this survey we detected the association between iron-deficiency anemia and smoking in patients with a geographic tongue. 9 patients with a detected geographic tongue and iron-deficiency anemia were examined, 3 of whom were smokers (13,3%) and 6 were non-smokers (66,6%). The other 16 patients with geographic tongue but without iron-deficiency anemia included 2 smokers (12,5%) and 14 non-smokers (87,56%). We could not identify a significant association to smoking in the aforementioned group ( $p=1,00$ ).

Some studies point in the opposite direction, suggesting a reverse relationship between geographic tongue and smoking, or in other words, smokers have a lesser tendency to develop geographic tongue manifestations<sup>26, 27</sup>.

## Conclusion

Pathological changes that appear on the tongue may sometimes be the sole indicator of a systemic illness. For that reason, the tongue is considered to denote oral and general health.

Among the most common conditions is the geographic tongue, which happens to occur often and at any age in the human population. The goal of our study was to determine whether iron-deficiency anemia occurs more frequently in patients with geographic tongue relative to those with healthy oral mucosa.

The results corroborated the notion that iron-deficiency anemia is statistically more prevalent in patients with geographic tongue as opposed to those with healthy oral mucosa ( $p=0,007661$ ).

A higher percentage of geographic tongue was noted in female patients (88,88%) in comparison to male patients ( $p=0,013328$ ).

Regarding the association to smoking in patients with a geographic tongue and iron-deficiency anemia and those without iron-deficiency anemia, which posed as a lateral goal of ours, a statistically significant discrepancy was not established.

Based on the results from our survey, a conclusion could be made that geographic tongue is one of the possible oral manifestations of iron-deficiency anemia.

Considering the fact that geographic tongue might provoke symptoms such as pain and burning after consuming certain types of food and beverages, which consequently interferes with the quality of life, early detection and treatment is of crucial importance.

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