

FREQUENCY OF DEVELOPMENTAL ANOMALIES AND MUCOSAL INFLAMMATIONS OF THE TONGUE IN FOURTH-YEAR DENTAL STUDENTS AT THE FACULTY OF DENTISTRY IN SARAJEVO

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ABSTRACT

Introduction: Developmental anomalies and inflammations are common occurrences and are often associated with certain systemic conditions, such as diabetes, allergies, and anemia, as well as with harmful habits. The use of tobacco products and alcohol is frequently linked to changes on the tongue.

Objective: This study aims to present the frequency of developmental anomalies and tongue inflammations in the student population of the fourth year at the Faculty of Dentistry in Sarajevo.

Materials and Methods: The study was conducted on 50 participants, fourth-year students at the Faculty of Dentistry in Sarajevo. General anamnestic data were collected through a survey, including information on harmful habits such as cigarette smoking, hookah use, and alcohol consumption. A clinical examination of the oral cavity, focusing on the tongue, was performed for each participant, along with vitro-pressure, vitro-adhesion tests, and native findings on *Candida albicans*.

Results: The most common developmental anomaly was lingua plicata (4%). The most frequent tongue inflammation in our sample was lingua geographica (14%). Among the 6% of patients with developmental anomalies, 6% had a positive family history.

Conclusion: A significant etiological factor is genetic predisposition. In our sample, among 6 participants with developmental anomalies, 6% had a positive family history. The most common etiological factors for the occurrence of developmental abnormalities and tongue inflammations were harmful habits such as cigarette smoking (20%) for over 5 years (14%) and hookah smoking (12%) for over 5 years.

Keywords: tongue, developmental anomalies, inflammation, students

Introduction

Developmental anomalies and inflammations of the tongue are frequent physiological-pathological changes occur on the tongue's mucosa. In addition to genetic predisposition, systemic conditions such as diabetes, anemia, and allergies, along with harmful habits like the consumption of tobacco, alcohol, and smokeless products, are cited as common etiological factors [1]. The tongue is a complex organ involved in processes such as eating, speaking, and maintaining oral hygiene, making it susceptible to various pathological processes that can affect the quality of life and overall health [2, 3]. Some systemic diseases may manifest in their early stages on the tongue [1]. The frequency of developmental anomalies and inflammations of the tongue is an important topic in the field of dentistry and general patient health [3].

In the general population, tongue changes occur in 2.39% to 15.1% of cases. The most common etiological factors for the development of anomalies and inflammations of the oral mucosa include genetics, harmful habits such as the use of tobacco products, alcohol, smokeless products, and other detrimental practices. The most common changes that occur on the tongue are benign migratory glossitis (geographic tongue), *lingua plicata* (fissured tongue), coated tongue, *lingua villosa nigra* (hairy tongue), sublingual varicosities, and median rhomboid glossitis [2].

Fissured tongue (*lingua plicata*) is a condition that is transmitted from generation to generation and manifests as grooves on the dorsal surface of the tongue, ranging from 2 to 6 mm in depth [1, 4].

Literature data indicate a prevalence of 10-20%, although there is significant variation [5]. The condition is usually asymptomatic and, in most cases, does not require treatment. If symptoms occur, patients typically report burning and pain in the tongue, which can be caused by food retention in the grooves, leading to the development of inflammation [1, 6, 7].

Benign migratory glossitis or geographic tongue is a chronic, inflammatory, and immune-mediated lesion of unknown etiology. It is characterized by hypertrophic whitish areas surrounding atrophic mucosa, with alternating phases of activity,

remission, and reactivation at several sites on the tongue (4-6). It affects 1 to 3% of adults but can occur at any age and in both sexes [8, 9].

In addition to developmental anomalies and inflammations, changes such as leukoplakia and erythroplakia can also occur on the tongue. These may represent precancerous changes and increase the risk of squamous cell carcinoma.

Furthermore, research on these topics can provide a basis for developing targeted oral health education programs aimed at the student population [10].

Objective:

The objective of this study is to present the frequency of developmental anomalies and inflammations of the tongue in the student population of the fourth year at the Faculty of Dentistry in Sarajevo.

Materials and methods:

The study was conducted on 50 participants, fourth-year students at the Faculty of Dentistry with the Dental Clinical Center in Sarajevo. The study was approved by the Ethics Committee, approval number: 02-3-4-59-2-7/2020. All participants signed an informed consent form for voluntary participation in the research. The research was carried out based on a printed survey and clinical examination of all participants. The survey for this study was specifically designed. General anamnestic data, as well as information on harmful habits such as cigarette smoking, hookah use, and alcohol consumption, were collected through the survey.

Responses to the survey questions and the clinical examination were conducted during the practical exercises of fourth-year dental students. The clinical examination involved an inspection of the oral mucosa with a focus on the examination of the tongue. During the clinical examination, specific oral tests were used, including vitro-adhesion and vitro-pressure tests, as well as a native swab for *Candida albicans*.

Results

The results are presented descriptively in tables. Descriptive analysis was performed using the statistical program IBM SPSS Statistics, version 23, for the Windows operating system.

Table 1. Gender of Participants

Gender		
	Frequency (f)	Percentage (%)
Male	13 16	32.0
Female	19 34	68.0
V - Total	50	100.0

Table 1 shows the percentage distribution by gender. Of the total number of participants, 32% were male, and 68% were female.

Table 2. Age of Participants

Age of Participants				Female
Number of Participants	Range		Mean	Std. Deviation
	Minimum	Maximum		
50	21.00	30.00	22.8800	1.39445

All participants are between 21 and 30 years old. The average age of the participants is 22.88%.

Table 3. Percentage representation of developmental language anomalies and connections with genetic predisposition

Developmental anomalies of language			Positive family history			Existence of correlation
	f	%		f	%	Pearson coefficient
Yes	3	6.0		3	6.0	$r = 0.546$
No	47	94.0		47	94.0	$p = 0.01$
Total	50	100.0		50	100.0	

Of the 6% of patients with developmental anomalies, 6% had a positive family history.

Table 4. Percentage representation of language developmental anomalies according to anomalies

Macroglossia			Microglossia			Lingua plicata			Lingua acreta			Lingua bifida		
	F	%		F	%		F	%		F	%		F	%
Yes	1	2.0	Yes	0	0.0	Yes	2	4.0	Yes	0	0.0	Yes	0	0.0
No	49	98.0	No	50	100.0	No	48	96.0	No	50	100.0	No	50	100.0
Total	50	100.0	Total	50	100.0	Total	50	100.0	Total	50	100.0	Total	50	100.0

The most common developmental anomaly is lingua plicata 4%.

Table 5. Percentage representation of inflammation of the tongue and presentation of the most common inflammations

Inflammation of the tongue			Lingua geographica			Lingua villosa			Papilitis			Varicose veins		
	F	%		F	%		F	%		F	%		F	%
Yes	7	14.0	Yes	7	14.0	Yes	0	0.0	Yes	2	4.0	Yes	2	4.0
No	43	86.0	No	43	86.0	No	50	100.0	No	48	96.0	No	48	96.0
Total	50	100.0	Total	50	100.0	Total	50	100.0	Total	50	100.0	Total	50	100.0

The most common inflammation of the tongue in our sample is lingua geographic 14%.

Table 6. Frequency of symptoms especially for pain, burning, burning, dryness and bad breath

Pain			Burning			Burning sensation			Dryness			Bad breath		
	F	%		F	%		F	%		F	%		F	%
Yes	1	2.0	Yes	1	2.0	Yes	0	0.0	Yes	12	24.0	Yes	0	0.0
No	49	98.0	No	49	98.0	No	50	100.0	No	38	76.0	No	50	100.0
Total	50	100.0	Total	50	100.0	Total	50	100.0	Total	50	100.0	Total	50	100.0

Of all respondents, 26% had some symptoms. Dry mouth was reported by the largest number of respondents, 24.0%.

Table 7. How positive is the vitroadhesion test, with which inflammation and developmental anomalies

Vitroadhesion			Papilitisi			Varicose veins			Lingua geographical		
	F	%		F	%		F	%		F	%
Yes	18	36.0	Yes	1	2.0	Yes	1	2.0	Yes	1	2.0
No	32	64.0	No	49	98.0	No	49	98.0	No	49	98.0
Total	50	100.0	Total	50	100.0	Total	50	100.0	Total	50	100.0

The vitroadhesion test was positive in 36% of subjects.

Table 8. Percentage representation of bad habits together

Bas habits		
	F	%
Yes	16	32.0
No	34	68.0
Total	50	100.0

Out of the total number of respondents, 32% had a bad habit.

Table 9. Percentage representation of bad habits in particular: cigarette smoking, the most common period of duration of bad habits separately

Cigarette smoking			Duration		
	F	%		F	%
No	38	76.0	No	38	76.0
1 box per day	10	20.0	1 - 5 years	7	14.0
More than 1 box per day	2	4.0	5 - 10 years	5	10.0
Total	50	100.0	Total	50	100.0

Cigarette smoking is the most common bad habit, 20% in 1-5 years (14%).

Table 10. Percentage representation of bad habits in particular: hookah smoking, the most common duration of bad habits separately

Hookah smoking			Duration		
	F	%		F	%
No	44	88.0	No	44	88.0
Every day	2	4.0	1 - 2 years	2	4.0
1-2 per day	1	2.0	3 - 5 years	1	2.0
1-2 per week	1	2.0	more than 5 years	3	6.0
1 monthly	2	4.0			
Total	50	100.0	Total	50	100.0

Hookah smoking as one of the bad habits was confirmed by 12% of respondents, and 6% of respondents have been using hookah for more than 5 years.

Discussion

This study analyzed the frequency of developmental anomalies and inflammations of the tongue among students of the Faculty of Dentistry, aiming to assess the prevalence and association of these conditions with genetic predispositions and poor habits.

The sample included 50 participants, of whom 32% were male and 68% were female. The average age of the participants was 22.88 years, with a standard deviation of 1.39445, indicating a relatively homogeneous group in terms of age.

Analysis of tongue developmental anomalies

revealed that 6% of the participants had these anomalies, with the same percentage (6%) having a positive family history. The most common developmental anomaly was lingua plicata, consistent with the study by Feil and Filippi, which found that the prevalence of this anomaly increases with age [5].

The most common inflammation in our sample was lingua geographica, similar to the findings of Zargari, who identified a significant prevalence of this lesion in psoriatic patients. This data may suggest a possible immunological component in the

etiopathogenesis of lingua geographica, which can be further investigated in the context of the student population [4].

The results of our research are in agreement with findings from other studies. Al-Mawer and colleagues, in their research, reported that the most common tongue changes were lingua plicata (37.2%), lingua villosa nigra (15.9%), and tumors (9.8%). Notably, their study found that cigarette smoking statistically represents a risk factor for tongue changes. Their results show that quitting smoking leads to improved oral health and reduced tumor incidence, confirming that cigarette smoking is a significant etiological factor for inflammatory tongue changes and precancerous conditions [11].

Similarly, González-Álvarez and colleagues, in their study published in 2022, examined risk factors associated with tongue changes. The results showed that the most common tongue changes were lingua plicata (56.2%) and lingua geographica (10.7%). Additionally, 20.4% of the participants smoked tobacco, and 27.7% consumed alcohol. They concluded that poor habits are significant factors in the development of tongue changes, which our results also confirm [2]. Similar results were obtained by other authors.

Zahoor Bhat and colleagues, in a study involving 100 participants divided into age groups, examined the prevalence of tongue changes. In the age group of 21-40 years, 38% of participants had lingua geographica [12], which aligns with our findings as well as those of other authors [13-15].

Among the symptoms, the most frequently reported were dry mouth and tongue burning, consistent with the findings of Kullaa-Mikkonen and Tenovu, who identified changes in saliva composition in patients with lingua plicata [6], as well as with the results of Bhat and colleagues [12].

In our study, the positive result of the vital adhesion test was found in 36% of the participants, indicating the presence of specific oral pathogens or changes in the oral microflora, aligning with results from other studies [4, 6].

All participants were healthy, without systemic diseases, but we took into account age and poor habits.

Among the poor habits, cigarette smoking was the most prevalent (24%), with most smokers having smoked for 1-5 years (14%). Hookah smoking was confirmed in 12% of participants, with 6% smoking hookah for more than 5 years. Additionally, 10% of participants consumed alcohol, with 6% having done so for more than 5 years. These data are consistent with the study by Binmadi and colleagues, which found a connection between the use of tobacco products and oral lesions (16), as well as with the results of other authors [2, 11-16].

Conclusion

The results of this study indicate a significant prevalence of developmental anomalies and inflammations of the tongue among students of the Faculty of Dentistry. Identifying risk factors, such as genetic predisposition and poor habits, can aid in the early detection and prevention of these conditions. Further research with larger samples and a longitudinal approach is needed to confirm these findings and better understand the etiopathogenesis of these conditions.

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