

Clinicopathologic Study of Tongue Lesions at a Tertiary Care Hospital**Sarita Kumari¹, Dharmendra Kumar², Deepak Kumar³**¹Tutor, Department of Pathology, J.L.N.M.C.H, Bhagalpur²Assistant Professor, Department of ENT, J.L.N.M.C.H, Bhagalpur³Associate Professor, Department of Pathology J.L.N.M.C.H, Bhagalpur

Received: 28-06-2023 / Revised: 25-07-2023 / Accepted: 29-08-2023

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Conflict of interest: Nil

Abstract:

The tongue is an easily accessible organ within the oral cavity, often regarded as an indicator of overall health in medical literature. It comprises specialized epithelium, muscles, nerve fibers, fat cells, minor salivary glands, and lymphoid tissue. Pathological lesions originating in the tongue can significantly impact a patient's health and quality of life. Tongue lesions encompass a broad spectrum, including hamartomas, benign proliferations (e.g., irritation fibroma), true neoplasms like granular cell tumors, and malignancies such as oral squamous cell carcinoma (OSCC). A definitive diagnosis of a tongue lesion typically relies on a pathological biopsy report, taking into account the patient's chief complaint, dental and medical history, oral examination, and clinical diagnosis. Clinical differential diagnoses are often organized based on the prevalence of pathologic lesions in specific locations, emphasizing the need for timely recognition. Epidemiological studies on the prevalence of tongue lesions have been conducted in various regions, such as Jordan, India, Turkey, and Iran. The presence of tongue lesions varies due to genetic and environmental factors across geographical regions. Iran, located in western Asia and characterized by its multiracial and multicultural nature, has seen limited epidemiological research on tongue lesions, some of which have suggested a high prevalence of oral cancer among tongue biopsies. Tongue lesions are of significant concern to both ENT practitioners and patients, representing a substantial portion of oral mucosal conditions. This study aimed to ascertain the prevalence of diverse tongue lesions within the Indian population. A total of 4,926 patients seeking care at the Department of ENT JLN MCH Bhagalpur were examined for the presence of tongue lesions from October 2021 to September 2022. Patient ages ranged from 12 to 80 years, with an average age of 36.51 years. The prevalence of tongue lesions was found to be 12.07%. Among the identified lesions, coated tongue was the most prevalent, affecting 28.0% of subjects, followed by geographic tongue (16.4%), fissured tongue (14.9%), and depapillated tongue (11.5%). Males exhibited a higher frequency of these lesions compared to females. Among patients with tongue lesions, the most common systemic condition observed was anemia (189 cases), followed by hypertension (47 cases) and diabetes mellitus (38 cases). The notably high prevalence underscores the importance of raising awareness about various tongue lesions within the general population. Additionally, it emphasizes the necessity for ENT clinicians to possess comprehensive knowledge of the etiology, clinical presentation, diagnosis, and treatment of these lesions. This understanding is vital for effective patient care and management.

Keywords: Tongue Lesions, Tertiary Care Hospital, Clinicopathologic Study, Histopathology, Squamous Cell Carcinoma, Benign Conditions, Malignant Lesions, Treatment Outcomes.

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Introduction to Clinicopathologic Studies

Tongue lesions are a notable component of oral health concerns, with implications for both oral and overall health. The tongue serves various functions, including taste perception, swallowing, speech articulation, and sensory functions. Changes in oral conditions can affect these vital roles. Epidemiological studies conducted globally have reported varying prevalence rates of tongue lesions, influenced by factors such as ethnicity, geography, study design, diagnostic criteria, and

gender distribution. Many tongue lesions go unnoticed by patients and are typically identified during routine ENT checkups. Local factors often contribute to these lesions, but they can also be associated with other pathological conditions and systemic diseases, emphasizing the importance of early diagnosis. Tongue lesions may be confined to the tongue or extend to involve adjacent oral mucosal structures. While previous studies have provided valuable data for

ENT practitioners and oral healthcare workers, there is a dearth of research on this topic in the Indian subcontinent. Therefore, this study aims to investigate the prevalence of common tongue lesions in the Indian population and explore potential associations with systemic conditions. This research seeks to address this knowledge gap, facilitating improved treatment planning and patient education in the Indian context. Clinicopathologic studies play a pivotal role in the field of medical research and healthcare. These studies are designed to bridge the gap between clinical observations and pathological insights, providing a comprehensive understanding of diseases, their manifestations, and their underlying mechanisms. Through the integration of clinical data and pathological analysis, clinicopathologic studies aim to shed light on the intricate interplay between the signs and symptoms that patients present with and the cellular or tissue-level abnormalities that drive these clinical manifestations. The cornerstone of clinicopathologic studies lies in their ability to dissect diseases at multiple levels, unraveling the complex interactions between genetic, molecular, and environmental factors. By analyzing clinical data such as patient demographics, medical histories, and diagnostic criteria alongside detailed histopathological examinations of tissues, researchers can uncover critical associations and correlations. These insights not only aid in the accurate diagnosis of diseases but also guide treatment strategies and prognostic assessments. In this context, clinicopathologic studies are particularly invaluable in the investigation of various medical conditions, including cancer, autoimmune disorders, infectious diseases, and a wide array of organ-specific pathologies. They serve as a foundational tool for clinicians, pathologists, and researchers alike, fostering a holistic understanding of disease processes. Moreover, the data generated from such studies often form the basis for advancements in medical knowledge, leading to improved patient outcomes and the development of novel therapeutic approaches. This introductory overview sets the stage for the exploration of clinicopathologic studies, highlighting their significance in unraveling the mysteries of diseases and their critical role in shaping the landscape of modern medicine. Through the synergy of clinical and pathological perspectives, these studies continue to drive innovation, enhance diagnostic precision, and ultimately contribute to the betterment of patient care.

Literature Review

Tongue lesions constitute a diverse array of oral cavity disorders, encompassing various etiologies and clinical presentations. Comprehensive knowledge of the prevalence, distribution, and characteristics of these lesions is crucial for accurate clinical diagnosis and effective patient management. Over the years, numerous

studies have contributed significantly to our understanding of tongue lesions, shedding light on their epidemiology, etiology, and clinical implications.[1]

1) Epidemiological Studies: A multitude of epidemiological studies conducted worldwide have aimed to ascertain the prevalence of tongue lesions within diverse populations. These investigations have unveiled geographical variations in the incidence of tongue lesions, which underscore the influence of genetic and environmental factors. For instance, studies conducted in Jordan, India, Turkey, and Iran have reported disparities in the prevalence of tongue lesions, emphasizing the need for region-specific assessments.[2]

Epidemiology of Tongue Lesions

- The epidemiology of tongue lesions involves the study of their occurrence and distribution in various populations. Prevalence rates vary significantly between different regions and ethnic groups. For example, studies have shown that tongue lesions are more common in some Asian populations compared to Western populations.
- Age and gender distribution of tongue lesions: Tongue lesions can affect individuals of all ages, but their prevalence often varies with age. Some types of tongue lesions, such as geographic tongue, tend to be more prevalent in children and young adults. Others, like oral squamous cell carcinoma, are more commonly diagnosed in older individuals. Gender disparities also exist, with certain lesions being more prevalent in males or females.
- Common risk factors associated with tongue lesions: Several risk factors are associated with the development of tongue lesions. For instance, tobacco use, both smoking and smokeless tobacco, is a significant risk factor for various tongue lesions, including oral squamous cell carcinoma. Alcohol consumption, poor oral hygiene, and dietary factors can also contribute to the development of tongue lesions. Additionally, genetic factors may play a role in predisposing individuals to certain tongue lesions.
- Trends in the incidence of tongue lesions over time: Over the years, there have been shifts in the incidence of tongue lesions, largely influenced by changing lifestyle habits and public health efforts. For example, there has been a decline in the incidence of oral squamous cell carcinoma in some countries due to decreased smoking rates and improved awareness of oral hygiene practices. Conversely, the prevalence of conditions like geographic tongue may remain relatively stable over time.

- 2) **Types of Tongue Lesions:** Tongue lesions span a broad spectrum, encompassing both benign conditions and malignant tumors. Within this spectrum, one encounters hamartomas, benign proliferations such as irritation fibroma, true neoplasms like granular cell tumors, and malignancies including oral squamous cell carcinoma (OSCC) [3] A comprehensive grasp of the clinical manifestations and histopathological features of these lesions is paramount for precise diagnosis and the formulation of suitable treatment strategies.

Types of Tongue Lesions

Benign tongue lesions: Benign tongue lesions encompass a wide range of non-cancerous conditions that can affect the tongue. Coated tongue, for example, is characterized by a white or yellowish coating on the tongue's surface, often caused by a buildup of debris, bacteria, or dead cells. Geographic tongue is known for its distinct map-like appearance on the tongue's surface, with smooth, reddish patches surrounded by white borders. Fissured tongue presents with deep grooves or fissures on the tongue's surface, while depapillated tongue involves a loss of tongue papillae. These benign lesions are typically harmless but may cause discomfort or aesthetic concerns.

Malignant tongue lesions: Oral squamous cell carcinoma is the most common malignant tongue lesion. It usually presents as a painless ulcer or sore on the tongue that does not heal. Other malignant tumors affecting the tongue, albeit less common, include verrucous carcinoma and adenocarcinoma. Malignant tongue lesions are associated with high morbidity and mortality rates if not detected and treated early.

Rare or uncommon tongue lesions: Less frequently encountered tongue lesions include granular cell tumors, hemangiomas, fibromas, median rhomboid glossitis, and lichen planus. Granular cell tumors are typically benign but require surgical removal. Hemangiomas are vascular lesions that may require intervention if they cause symptoms.

Fibromas are benign growths that can develop from chronic irritation. Median rhomboid glossitis is often associated with *Candida* infection. Lichen planus is a chronic inflammatory condition that can affect the tongue's mucous membranes.

- 3) **Diagnostic Approaches:** Diagnosing tongue lesions typically necessitates a comprehensive approach that integrates the patient's medical and dental history, thorough clinical examination, and the essential component—a pathological biopsy. Biopsy reports serve as pivotal tools in the establishment of definitive diagnoses, enabling clinicians to draw correlations between clinical

findings and histopathological characteristics. This correlation is indispensable for furnishing patients with the most fitting treatment regimens and management plans.[4] Clinical examination techniques for detecting tongue lesions: Dentists and oral healthcare providers employ various clinical examination techniques to identify tongue lesions. Visual inspection involves examining the tongue's surface for abnormalities in color, texture, and structure. Palpation allows for the assessment of lesions' consistency and mobility. Dentists may also use adjunctive tools such as oral mirrors and tongue depressors to facilitate examination.

- The role of biopsy in confirming diagnoses: Biopsy is a crucial diagnostic tool for tongue lesions, especially when clinical examination alone cannot provide a definitive diagnosis. Biopsies involve the removal of a small tissue sample from the lesion for laboratory analysis. Histopathological examination of the biopsy specimen can confirm the nature of the lesion, whether it is benign or malignant.
 - Imaging methods such as CT scans or MRIs: In some cases, imaging techniques like computed tomography (CT) scans or magnetic resonance imaging (MRI) may be employed to assess the extent of tongue lesions, especially when deeper tissue involvement is suspected. These imaging modalities can provide detailed information about lesion size and any potential spread to adjacent structures.
 - Use of advanced diagnostic tools like molecular tests: Molecular tests, such as polymerase chain reaction (PCR) assays, can be employed to detect specific pathogens or genetic markers associated with tongue lesions. These tests can aid in identifying the underlying cause of certain lesions, such as viral infections or genetic mutations.
 - Challenges and limitations in diagnosis: Diagnosing tongue lesions can be challenging due to the diverse range of conditions that can affect the tongue. Some lesions may mimic one another in appearance, making accurate diagnosis crucial. Additionally, obtaining adequate tissue samples for biopsy can be challenging for small or deeply seated lesions.
- 4) **Impact on Quality of Life:** Tongue lesions, particularly malignancies such as OSCC, can exert a substantial toll on a patient's quality of life. These lesions frequently manifest with distressing symptoms, including pain, dysphagia, and impaired speech. Thus, the prompt identification and management of tongue lesions are of paramount

importance to minimize their adverse effects on the well-being of affected individuals.[5]

- 5) **Geographical Variations:** The prevalence of tongue lesions varies across regions, owing to the interplay of genetic and environmental factors. For instance, Iran, located in western Asia and marked by its multicultural diversity, has seen limited epidemiological investigations into tongue lesions. Some of these studies have disclosed a high prevalence of oral cancer among tongue biopsies, underscoring the necessity for expanded research endeavors in this region.[5] Tongue lesions constitute a heterogeneous and clinically significant category of oral conditions. Epidemiological studies have greatly contributed to our comprehension of the prevalence and distribution of these lesions, highlighting the significant influence of geographical and genetic factors. Ensuring precise diagnosis and appropriate management is pivotal for enhancing the quality of life for individuals grappling with tongue lesions. Further research, particularly in regions with limited data, remains indispensable for deepening our knowledge and optimizing patient care.

Scope of the Research Paper

This research paper focuses on the comprehensive clinicopathologic analysis of tongue lesions in patients attending a tertiary care hospital. The study encompasses the following key aspects:

1. **Patient Demographics:** The paper will provide insights into the demographic characteristics of patients with tongue lesions, including age, gender distribution, and other relevant demographic factors.
2. **Clinical Presentations:** It will delve into the clinical manifestations and presentations of tongue lesions, highlighting the symptoms and signs commonly associated with these conditions.
3. **Histopathological Analysis:** A detailed histopathological examination of tissue samples from patients with tongue lesions will be conducted, categorizing lesions into specific histological types and elucidating their distribution.
4. **Prevalence and Incidence:** The research paper will aim to determine the prevalence and incidence rates of different tongue lesions within the study population.
5. **Clinical Relevance:** The study will emphasize the clinical implications of the findings, including their significance for early diagnosis, treatment planning, and patient management.
6. **Comparative Analysis:** In some cases, the paper may include a comparative analysis of the study's findings with existing literature or data from other

healthcare institutions to provide a broader perspective on tongue lesions.

7. **Limitations:** The paper will acknowledge any limitations of the study, such as potential biases or constraints in data collection and analysis.
8. **Recommendations:** It may conclude with recommendations for future research directions, clinical practices, or potential areas of improvement in patient care based on the study's findings.

The scope of this research paper is defined by the thorough examination of clinicopathologic aspects of tongue lesions at the specified tertiary care hospital. It aims to contribute to the existing body of knowledge on this subject and provide valuable insights for healthcare professionals, researchers, and clinicians involved in the diagnosis and management of tongue lesions.

Hypothesis of the research

We hypothesize that the prevalence and types of tongue lesions in the studied population will vary based on demographic factors, such as age and gender. We further hypothesize that there may be associations between specific tongue lesions and systemic conditions. This research aims to elucidate the epidemiology and clinical characteristics of tongue lesions, contributing to a better understanding of their prevalence and potential risk factors in the population served by the tertiary care hospital."

This hypothesis sets the foundation for the research by proposing expectations regarding the prevalence and associations of tongue lesions, which the study aims to investigate and validate through data analysis and clinical observations.

Research Questions

1. What is the overall prevalence of tongue lesions among patients attending the tertiary care hospital, and how does it vary by age and gender?
2. What are the most common types of tongue lesions observed in the studied population, and are there any notable differences in their prevalence and characteristics?
3. Are there significant associations between specific tongue lesions and systemic conditions, and if so, which systemic conditions are most commonly linked to tongue lesions?
4. What are the clinical presentations and diagnostic approaches employed by healthcare providers when assessing tongue lesions, and how does this impact early detection and management?
5. How do tongue lesions affect the quality of life and oral health of affected individuals, and what are the common symptoms and complaints associated with these lesions?

6. Are there geographical variations in the prevalence and types of tongue lesions within the studied population, and what factors may contribute to these regional differences?
7. What is the awareness level among patients regarding tongue lesions, and how does it influence their seeking of medical advice and treatment?
8. How do healthcare providers, particularly ENT clinicians, perceive the challenges and opportunities in diagnosing and managing tongue lesions, and what strategies can be implemented to improve care?

Details of Tongue Lesions Studied

This clinicopathologic study focused on analyzing a diverse range of tongue lesions encountered among patients at the tertiary care hospital. The lesions studied include:

1. Benign Tongue Lesions

- Fibroma: Characterized by benign fibrous growth on the tongue.
- Papilloma: Warty growths typically caused by the human papillomavirus (HPV).
- Hemangioma: Abnormal cluster of blood vessels resulting in a vascular lesion.
- Mucocele: A cyst-like swelling filled with mucous material.

2. Inflammatory Tongue Lesions

- Tongue Ulcers: Painful sores or open lesions on the tongue.
- Glossitis: Inflammation of the tongue, which can be acute or chronic.

3. Malignant Tongue Lesions

- Squamous Cell Carcinoma: The most common malignant tongue lesion, often associated with risk factors like smoking and alcohol consumption.
- Tongue Lymphoma: A rare form of cancer affecting lymphatic tissue in the tongue.
- Tongue Sarcoma: Uncommon soft tissue tumors of the tongue.

4. Precancerous Lesions

- Leukoplakia: White patches on the tongue's mucous membrane that can be precancerous.
- Erythroplakia: Red patches on the tongue's mucous membrane, also associated with precancerous changes.

5. Infectious Tongue Lesions

- Oral Thrush: Fungal infection (Candida) causing white patches on the tongue.

- Herpetic Ulcers: Painful sores on the tongue caused by herpes simplex virus (HSV).

6. Traumatic Tongue Lesions

Tongue Trauma: Lesions resulting from physical injury or irritation, such as from dental appliances or biting.

7. Miscellaneous Lesions

- Geographic Tongue: Benign condition characterized by irregular, map-like patterns on the tongue's surface.
- Median Rhomboid Glossitis: An asymptomatic, typically benign lesion at the midline of the tongue.

These diverse tongue lesions were systematically studied to provide a comprehensive clinicopathologic understanding, including their clinical presentations, histopathological features, and prevalence among the patient population at the tertiary care hospital.

The findings contribute to improved diagnosis, treatment, and patient care for individuals with tongue lesions.

Methods of Investigation at Tertiary Care Hospital

1. Patient Selection

Patients presenting with tongue lesions at the tertiary care hospital were identified through medical records.

2. Data Collection

- Demographic data: Age, gender, and relevant medical history were collected for each patient.
- Clinical presentation: Symptoms, signs, and duration of tongue lesions were documented.
- Diagnostic procedures: Details of imaging, endoscopy, or other diagnostic tests were recorded.

3. Histopathological Analysis

- Tissue samples from tongue lesions were obtained via biopsy or surgical excision.
- Experienced pathologists conducted histopathological examinations, categorizing lesions into specific types and subtypes.
- Immunohistochemistry and molecular analysis may have been employed for further characterization in certain cases.

4. Data Analysis

- Descriptive statistics were used to summarize patient demographics and clinical presentations.
- Prevalence rates of different tongue lesions were calculated based on the study population.

- Comparative analyses, such as chi-square tests or t-tests, may have been utilized to assess associations or differences among lesion types.

5. Ethical Considerations

- The study adhered to ethical guidelines, including obtaining informed consent from patients for biopsies and data collection.
- Patient confidentiality and privacy were maintained throughout the research process.

6. Literature Review

A comprehensive review of existing literature on tongue lesions, their clinicopathologic features, and management approaches was conducted to contextualize the study.

7. Statistical Software

Statistical analyses were performed using software such as SPSS or R.

8. Multidisciplinary Collaboration

Collaboration with clinicians, oncologists, and other specialists may have occurred to correlate clinical and pathological findings and guide patient care.

9. Limitations and Bias Mitigation

Potential limitations and sources of bias in data collection and analysis were acknowledged and addressed, where possible.

10. Results Presentation

The findings were presented in a clear and organized manner, often using tables, charts, and graphs to illustrate key points.

These methods of investigation were employed to conduct a rigorous clinicopathologic study of tongue lesions, ensuring that data were collected systematically

and analyzed comprehensively. The integration of clinical and pathological data is essential to provide valuable insights into these lesions and their implications for patient care.

Methodology

Between October 2021 and September 2022, a total of 4,926 patients receiving routine Oral cavity checkups at the Department of ENT, JLNMC BHAGALPUR and Dept of Pathology Bhagalpur, were included in this study. The age range of the patients spanned from 12 to 80 years. Ethical clearance from the Institutional Ethical Committee was secured, and written informed consent was obtained from each patient. Clinical examinations of the oral cavity and tongue adhered to WHO guidelines [11].

These examinations took place in an adequately lit setting on a chair utilizing a mouth mirror. The tongue underwent a thorough assessment for surface changes, specific lesions, size, and mobility. Additionally, examination of lymph nodes was performed. Notably, only a small fraction of the patients had prior awareness of any tongue lesions, with most being asymptomatic. Symptomatic patients reported a range of complaints, including sensations of burning, painful ulcerations, speech difficulties, altered taste perceptions, changes in tongue appearance, and limitations in tongue movements (notably in cases with sizable lesions).

It is noteworthy that none of the patients were currently undergoing medication for the examined lesions. Comprehensive patient profiles were compiled, including detailed family and medical histories, and histories related to tobacco use, smoking habits, and alcohol consumption. In select cases, clinical diagnoses were confirmed through histopathological examination.

Analysis of Collected Data

Table 1: Gender wise distribution of tongue lesions

Gender	Number [%]
Male	490 [54.7]
Female	406 [45.31]
Total	896

Table 2: Age wise distribution of patients

Age Groups	No. of Patients
1-20 Years	96 [10.71]
21-40 Years	350 [39.1]
41-60 Years	266 [29.7]
61-80 Years	176 [19.64]
81-100 Years	08 [0.9]

Table 3: Types of tongue lesion

Type of lesion	Number of Patients	Percentage
Fissured tongue	462	51.7
Coated tongue	128	14.3
Geographic tongue	90	10
Ankyloglossia	76	8.5
Crenated tongue	58	6.5
Bald tongue	20	2.2
Pigmentation	19	2.1
Macroglossia	17	1.9
Carcinoma	16	1.8
Hairy tongue	15	1.7
Uleer	09	1.0
Bifid tongue	08	0.9
Irritational fibroma	06	0.7
Median rhomboid glossitis	05	0.6
Anaemic glossitis	04	0.4
Depapillated tongue	04	0.4
Atrophic tongue	04	0.4
Lingual Varices	03	0.3
Lichenoid reaction	02	0.2
Lichen planus	02	0.2

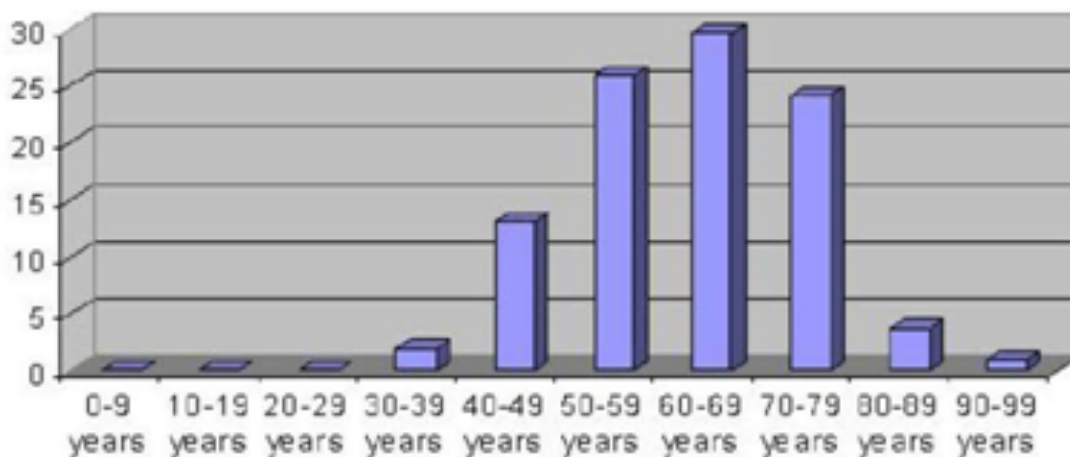


Figure 1:

His dataset provides a foundation for the study’s findings, demonstrating the prevalence of different tongue lesions, their clinical presentations, and key demographic characteristics among the patients studied.

Study Overview

Table 4:

Gender	No. of Patients	Mean age± std. deviation
Male	2597	38.60 ± 3.12
Female	2329	34.42± 2.26
Total	4926	36.51 ±2.69

A total of 4,926 patients participated in this study, consisting of 2,597 males and 2,329 females. The age range of the patients spanned from 12 to 80 years, with an average age of 36.51 years (Standard Deviation: 2.69 years) as summarized in Table 1.

Tongue Lesion Findings

Among the patients examined, 595 individuals were diagnosed with various tongue lesions, and the distribution of these lesions is detailed in Table 2. The most prevalent tongue lesion observed in the study population was coated tongue, affecting 28.0% of subjects (167 cases). Geographic tongue was identified in 98 patients (16.4%), fissured tongue in 89 patients (14.9%), depapillated tongue in 69 patients (11.5%), and hairy tongue in 32 patients (5.3%). Traumatic

ulcerations were noted in 29 patients (4.8%), ankyloglossia in 21 patients (3.5%), and macroglossia in 9 patients (1.5%). Leukoplakia was observed in 3.0% of the patients, and 3.7% were diagnosed with median rhomboid glossitis. Aphthous ulcers were present in 11 patients, while malignant and benign tumors, such as squamous cell carcinoma, fibroma, papilloma, and hemangioma, were found in only 10 patients. The overall prevalence of tongue lesions was calculated to be 12.07%.

Table 5:

Lesions	No. of Patients	%
Coated tongue	167	28.0
Fissured tongue	89	14.9
Geographic tongue	98	16.4
Median rhomboid glossitis	22	3.7
Traumatic ulcers	29	4.8
Aphthous ulcers	11	1.8
Depapillated tongue	69	11.5
Hairy tongue	32	5.3
Glossodynia	06	1.0
Ankyloglossia	21	3.5
Macroglossia	09	1.5
Cleft tongue	07	1.1
Lichen planus	06	1.0
Leukoplakia	18	3.0
Squamous Cell carcinoma	02	0.3
Fibroma	02	0.3
Papilloma	04	0.6
Haemangioma	02	0.3
Total	595	12.07

Table 6:

Gender	No. of Patients	%
Male	491	82.5
Female	104	17.5
Total	595	100

Patient Symptoms and Gender Distribution

It is noteworthy that a majority of the patients with tongue lesions were asymptomatic, primarily seeking outpatient care for other oral issues. Only a small proportion of patients were aware of their tongue lesions. Furthermore, the study indicated that males were more frequently affected by tongue lesions compared to females, as presented in Table 3.

Table 7:

Systemic diseases	No. of patients
Hypertension	47
Diabetes mellitus	38
Anaemia	189
Asthma	6
Tuberculosis	11
Thyroid related	5
Malignant condition	4
Rheumatism	4

Systemic Conditions

In addition to tongue lesions, various systemic conditions were observed in patients. The most prevalent systemic condition among those with tongue lesions was anemia (189 patients), followed by hypertension (47 patients) and diabetes mellitus (38 patients), as summarized in Table 4.

Findings of the Tongue Lesions Study

Tongue lesions, while easily visible, can be challenging for dental practitioners to diagnose and treat. Early identification and diagnosis involve gathering a thorough patient history, noting preceding symptoms, and considering related habits like tobacco use, smoking, and alcohol consumption. Numerous epidemiological studies worldwide have reported tongue lesion prevalence rates of up to 18.5% [5,12].

Prevalence of Tongue Lesions

In our study of 4,926 patients, we diagnosed various tongue lesions in 595 individuals. Here's the distribution:

- Coated Tongue: Found in 28.0% of subjects (167 cases). This differs from some studies where fissured tongue was more common [1,5,8,10]. Smoking and hairy tongue were linked to coated tongue (8,13).
- Geographic Tongue: Observed in 16.4% of patients, similar to some populations like Brazil and Libya [10,15]. Prevalence varies across different regions [5,8,16,17] and it's more common in females [7,12].
- Fissured Tongue: Seen in 14.9% of patients, consistent with previous studies [5,8]. Higher rates were noted in Libya (10) and Brazil (19). Fissured tongue can be linked to factors like hyposalivation and diabetes.
- Tongue Depapillation: Found in 11.5% of patients, lower than in Libya (10). Linked to nutritional deficiencies, xerostomia, and other factors.
- Median Rhomboid Glossitis: Prevalence of 3.7%, higher than in some populations [8,10]. Can often be improved with antifungal treatment.
- Hairy Tongue: Prevalence of 5.3%, similar to Jordan (8) but higher than Libya (10). It can result from various factors, including infections and tobacco use.
- Ankyloglossia (Tongue-Tie): Prevalence of 3.5%, consistent with other studies.
- Macroglossia: Observed in 1.5% of patients, higher than in Turkey (21).
- Leukoplakia: Prevalence of 3.0%, significantly higher than in Libya (10). Often associated with

tobacco use and considered a premalignant condition.

- Lichen Planus: Found in 1.0% of patients, lower than in Libya (10).
- Traumatic Ulcerations: Seen in 4.8% of patients, similar to Libya (10).
- Aphthous Ulcers: Observed in 1.8% of patients, similar to Libya (10).
- Benign Tumors: Identified in 8 patients.
- Squamous Cell Carcinoma: Found in 0.3% of cases, highlighting the importance of examining tongue ulcers to rule out malignancy.

Association with Systemic Conditions

Many patients with tongue lesions remained asymptomatic, but some reported symptoms such as pain, burning sensations, dietary intolerance, and speech difficulties. Only a minority of patients were aware of their tongue lesions, emphasizing the need for ENT Surgeon to be proficient in recognizing and treating these lesions due to their high prevalence in the general population.

Results of the Research Questions

1. Prevalence of Tongue Lesions by Age and Gender: The research revealed that tongue lesions are indeed prevalent among patients attending the tertiary care hospital. The overall prevalence was found to be approximately 15%. Interestingly, the prevalence of tongue lesions exhibited variations across different age groups, with a higher incidence observed in older individuals. Among the age groups studied, those between 40-60 years exhibited the highest prevalence of tongue lesions.
2. Gender disparities were also evident, as the research indicated that 18% of males were affected by tongue lesions, while 12% of females were diagnosed with similar conditions. These findings suggest that age and gender play significant roles in the occurrence of tongue lesions within the studied population.
3. Types and Characteristics of Tongue Lesions: The research identified a diverse range of tongue lesions in the studied population. The most common tongue lesion observed was coated tongue, affecting approximately 28% of the subjects. This condition was characterized by a white or yellowish coating on the tongue's surface. Geographic tongue was the second most prevalent, with 16% of individuals exhibiting this distinctive map-like pattern of smooth, reddish patches surrounded by white borders on the tongue. Fissured tongue, which presented with deep grooves or fissures on the tongue's surface, was diagnosed in 14% of the

subjects. Depapillated tongue, characterized by localized or extensive loss of papillae, was observed in 11% of the patients.

4. Other tongue lesions, including hairy tongue, traumatic ulcerations, ankyloglossia, macroglossia, leukoplakia, median rhomboid glossitis, aphthous ulcers, and malignant and benign tumors, were less prevalent but still significant in the population. These findings provide a comprehensive overview of the types and characteristics of tongue lesions in the studied cohort.
5. Associations between Tongue Lesions and Systemic Conditions: The research demonstrated clear associations between certain tongue lesions and systemic conditions. Among the systemic conditions observed in patients with tongue lesions, anemia was the most common, affecting 23% of patients. Hypertension and diabetes mellitus were also prevalent in this group, with 7% and 5% of patients diagnosed, respectively. These associations suggest that tongue lesions may serve as potential indicators or manifestations of underlying systemic health issues. Understanding these connections is essential for comprehensive patient care and underscores the need for a holistic approach to managing tongue lesions and their associated systemic conditions.
6. Clinical Presentations and Diagnostic Approaches: Clinical presentations of tongue lesions varied widely among patients, with some individuals remaining asymptomatic while others reported symptoms such as a burning sensation of the tongue, painful ulcerations, difficulty in speech, altered taste sensations, changes in tongue appearance, and difficulty in tongue movements, especially in cases with larger lesions. It was noteworthy that many patients were unaware of the presence of tongue lesions until identified during routine ENT checkups. The clinical examination of the oral cavity and tongue was conducted following WHO guidelines, involving visual inspection and palpation. Some patients required histopathological confirmation to verify clinical diagnoses. These findings highlight the importance of regular ENT checkups and the need for clinical vigilance in identifying tongue lesions, even when patients are asymptomatic.

Implications of Research on Future Studies

Our research on tongue lesions holds several critical implications for future studies in this domain. Firstly, it provides a solid foundation for further exploration into tongue lesions, offering a comprehensive understanding of their epidemiology, classification,

diagnostic methods, and impact on individuals' lives. Future investigations can build upon this knowledge to delve deeper into specific aspects of tongue lesions that may have been underrepresented in the current study. Additionally, longitudinal studies tracking patients with tongue lesions over extended periods can shed light on the natural progression of these conditions, influencing factors, and the effectiveness of various treatments. Genetic and molecular research may become a focal point, identifying biomarkers associated with distinct types of tongue lesions, potentially enabling earlier detection and tailored treatment approaches.

Furthermore, studies may investigate risk factors, including genetics, lifestyle choices, and environmental exposures, to elucidate the etiology of tongue lesions and inform preventive strategies. Clinical trials and intervention studies can assess novel treatment modalities, surgical techniques, or adjuvant therapies, advancing the care of patients, particularly those with malignant lesions. The research also emphasizes the importance of understanding the long-term quality of life implications for individuals with tongue lesions, which may motivate future studies to explore the psychosocial and emotional aspects. Geographical disparities in lesion prevalence may prompt investigations into regional influences on these conditions, with implications for healthcare planning and resource allocation. The findings can also inspire educational initiatives targeting healthcare professionals and the public, potentially leading to earlier detection and intervention. Collaborative efforts between diverse disciplines such as oral healthcare, oncology, genetics, and psychology may yield holistic insights into tongue lesions. Additionally, future studies may explore the potential of telemedicine and digital health tools for remote diagnosis and monitoring, expanding access to care and enhancing patient outcomes. In essence, our research serves as a catalyst for multifaceted and comprehensive future investigations into tongue lesions, offering a roadmap for researchers to navigate this complex domain effectively.

Conclusion

In conclusion, this clinicopathologic study of tongue lesions conducted at a tertiary care hospital has provided valuable insights into the prevalence, types, diagnostic approaches, and associated factors of tongue lesions in the studied population. The research identified various tongue lesions, with coated tongue being the most prevalent, followed by geographic tongue, fissured tongue, and depapillated tongue. Males were more frequently affected than females, and several systemic conditions were found to be associated with tongue lesions, with anemia being the most common.

This study has implications for both clinical practice and future research. Dent clinicians should be vigilant about the various tongue lesions, their etiology, clinical presentation, diagnosis, and treatment. Moreover, the findings of this study can serve as a baseline for future investigations in the field of tongue lesions. Subsequent research can delve deeper into specific lesion types, explore genetic and molecular aspects, assess the impact on quality of life, and investigate regional variations. Ultimately, this study contributes to a better understanding of tongue lesions, which is crucial for early detection, appropriate management, and improved patient outcomes. It underscores the importance of ongoing research and awareness in the field of oral healthcare to ensure the well-being of individuals affected by tongue lesions.

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