

## A Multi-Centre Evaluation of Tongue Lesions in Nigeria Tertiary Institutions

Olasunkanmi Funmilola Kuye<sup>1\*</sup>, Adetayo O. Aborisade<sup>2</sup>, Adeola Mofoluwake LADEJI<sup>3</sup>, Azuka Raphael Njokanma<sup>4</sup>

<sup>1</sup>Consultant and Lecturer, Faculty of Dentistry, Oral and Maxillofacial Surgery, Lagos State University College of Medicine, Ikeja, Lagos

<sup>2</sup>Consultant and Lecturer, Oral Maxillofacial Pathology, Aminu Kano Teaching Hospital Teaching Hospital/ Bayero University, Kano

<sup>3</sup>Faculty of Dentistry, Senior Lecturer & Consultant Oral Pathologist, Lagos State University College of Medicine, Ikeja, Lagos

<sup>4</sup>Consultant and Lecturer, Faculty of Dentistry, Oral and Maxillofacial Surgery, Obafemi Awolowo University Teaching Hospital Complex, Ile Ife

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\*Corresponding author: Olasunkanmi Funmilola Kuye

Consultant and Lecturer, Faculty of Dentistry, Oral and Maxillofacial Surgery, Lagos State University College of Medicine, Ikeja, Lagos

### Abstract

**Background:** The tongue is a muscular hydrostat that forms the floor of the mouth, perform functions like mastication, speech, taste and osculation. The tongue is relatively affected by both oral and systemic conditions in all ages and acts as a “mirror” for oral manifestations of systemic diseases. Prevalence of tongue lesions varies due to demographic and/or geographic differences of the sample studied, differences in the diagnostic criteria, methodological approaches, and sampling methods employed. **Objective:** To determine the socio-demographic distribution of different categories of tongue lesions and their oral presentations. **Methods:** Information were retrospectively retrieved from Maxillofacial Clinical and Surgical day cases registers. Data such as age, gender; duration of lesion and location of lesions on the tongue and category of lesion were also extracted using relevant descriptive and inference statistics All statistical significance was set at  $p < 0.05$ . **Results:** Ninety- two cases were recruited retrospectively from two tertiary centers with a male preponderance of 53.3% (n= 49). The mean age of presentation of tongue lesions in the study is 41.1years  $\pm$  22.4 years, dorsum of the tongue presented the highest number of occurrences of tongue lesions (52.2%). The most common lesions on the dorsum of the tongue in this study are squamous cell carcinoma (OSCC), benign migratory glossitis and irritation fibroma. The mean age of presentation for benign lesion is 23years, inflammatory/reactive lesion 44.9years and malignant lesions 51.6years respectively. The mean duration of tongue lesions in our study is 9.1 months (median = 6 months), mean duration of presentation of benign lesions (14.8 months) was longer than that of malignant lesions (6.4 months). The association between duration and category of lesion is statistically significant at  $p < 0.0001$ . **Conclusion:** Delayed clinical presentation by patients and patronage of unorthodox traditional doctors contribute to the overtly increased incidence of oral malignancies in Sub-Saharan Africa; this coupled with improper or lack of accurate record keeping may have also culminated in this increased prevalence of oral malignancies. All tongue surfaces can be affected, gender predilections for any of the surfaces is yet to be affirmed by any study however aging is related to malignant occurrences.

**Keywords:** Tongue, Reactive/Inflammatory Lesions, Benign Migratory Glossitis and OSCC.

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### INTRODUCTION

The tongue is a muscular hydrostat that forms the floor of the mouth, perform functions like mastication, speech, taste and osculation. Its developmental is also critical in the development of orofacial structures and growth of the gnathic bones [1]. Tongue consists principally of skeletal muscle, but it

also contains blood vessels, nerves, fat cells, minor salivary glands, and lymphoid tissues [2]. The tongue is relatively affected by both oral and systemic conditions in all ages and thus acts as a “mirror” for oral manifestations of systemic diseases [3]. Tongue is also involved in syndromic conditions such as Van der Woude and Melkersson Rosenthal syndromes to name a few [4]. Tongue lesions may be asymptomatic,

however, timely diagnosis of tongue lesions is imperative to prevent untoward complications of hemorrhage, airway obstruction and its detrimental effect in preventing normal orofacial growth [5]. The myriad of abnormalities bedeviling the tongue ranges from congenital abnormalities, benign tumors, inflammatory lesions to malignancies. These lesions also affect all the surfaces of the tongue with varying incidences and predilection for specific areas [5]. Prevalence of tongue lesions varies world-wide due to demographic and/or geographic differences of the sample studied, as well as differences in the diagnostic criteria, methodological approaches, and sampling methods; therefore conducting studies on the prevalence of tongue lesions in different geographic regions seems important [2]. There are few documented reports on tongue lesions prevalence in Sub-Saharan Africa and Nigeria to be exact, therefore this study aims to report the presentation of tongue lesions in two tertiary centers in the Southern and Northern axis of Nigeria across surfaces of the tongue, category of the tongue lesions and duration of presentation of individual tongue lesions.

## MATERIALS AND METHODOLOGY

Maxillofacial Clinical and Surgical day cases registers, biopsy day registers and oral diagnosis clinic registers at Lagos state University teaching hospital and Aminu Kano Teaching Hospital Complex, Kano were utilized to retrieve pertinent patients' information. These include sociodemographic data such as age, gender; duration of lesion and location of lesions on the tongue. Category of lesion and definitive diagnosis of affected lesion were also extracted, information's retrieved were imputed into a data proforma. The continuous variables of age and duration of lesion were recorded in years and months respectively. The site of the tongue was divided broadly into:

- I. Dorsum of the tongue which included both the anterior two-thirds of the dorsal surface as well as the posterior one third of the tongue's dorsum
- II. Ventral surface of the tongue
- III. The lateral surfaces of the tongue on both the right and left halves

### Category of lesions involving the tongue were also broadly divided into

- A. Inflammatory / reactive lesions of the tongue
- B. Benign tumors of the tongue (including vascular tumors)
- C. Malignancies

For lesions with histological diagnosis, tissue slides were reviewed and reconfirmed blindly by an oral pathologist before inclusion into the study. Patients with incomplete data and discordant histopathologic diagnosis were excluded from the data.

Descriptive statistics were utilized to analyze age, duration and the categorical variables and were expressed as means, frequencies and cumulative proportions. Following tests of normality using Shapiro wilk test and homogeneity of variances using Levene test, the means of ages and duration of lesions were analyzed across gender, sites of the tongue and categories of lesions using Student T-test and analysis of variance where appropriate. Relationships between categorical variables were also tabulated and analyzed through chi square statistics with fisher's approximation performed where appropriate. For significant association following ANOVA, Tukey post hoc analysis was conducted to determine pairwise comparisons while Dunn Test was utilized to conduct pairwise comparisons following significant Kruskal Wallis association tests. All statistical significance was set at  $p < 0.05$ . All analyses were performed using R.

## RESULTS

A total of ninety-two (92) cases were retrieved from the archives of both tertiary centers with a male preponderance of 53.3% ( $n = 49$ ) in a 1.1:1 male to female ratio.

### Age and Sex

The mean age of presentation of tongue lesions from our study is 41.1 years  $\pm$  22.4 years and a median age of 42.5 years. The mean age of presentation was higher in males with a mean age of 41.7 years (median = 43) relative to the mean age of presentation in female patients (mean = 40.4 years, median = 41 years) with no statistical significance.

### Site of Tongue Lesions

The dorsum of the tongue presented the highest number of occurrences of tongue lesions with a proportion of 52.2% ( $n = 48$ ), with 75% of these lesions confined to the anterior two-thirds of the tongue. There was equal proportion of lesions on both the ventral and lateral aspect of the tongue ( $n = 22$ , 23.9%). The most common lesions on the dorsum of the tongue in this study are squamous cell carcinoma (OSCC), benign migratory glossitis and irritation fibroma. The three common lesions comprise 40% of all dorsal tongue lesions. OSCC and recurrent aphthae present most common lesions on the lateral surface of the tongue (55%); OSCC singly represented 50% of all ventral tongue lesions followed by oral dermoid cyst.

The dorsum of the tongue also has the lowest mean age of presentation at 38.7 years with lateral tongue and ventral surface presenting with mean ages of 46.5 years and 40.6 years respectively. A male preponderance was observed in both tongue lesions on the dorsum and the ventral surface at 60.4% and 59.1% respectively (M:F ratio = 1.5:1, however, a female preponderance of lateral surface lesions was observed (68.2%, M:F ratio at 1:2.1). the association between site of tongue and patient was however not statistically

significant and with a low effect size (Cramer’s V = 0.24).

**Category of Lesions**

Inflammatory/reactive lesions accounted for 41.3% (n= 38) of all the tongue lesions in our study whilst non-malignant lesions constitute the least preponderance at 27.2% (n=25). Malignant lesions comprised 31.5% (n= 29) of the tongue lesions. Recurrent aphthae, benign migratory glossitis and irritation fibromas comprise greater than 50% of all inflammatory tongue lesions in this study. Oral squamous cell carcinoma of the tongue constitutes the most common malignancy involving the tongue with a preponderance of 90% followed by salivary adenocarcinomas. It is the single most common lesion in tongue lesions comprising 27.2% of all tongue lesions in this study. Squamous papilloma was observed to be the most common benign tumor of the tongue, accounting for 28% of all benign lesions; other observed benign lesion in this study are oral dermoid cysts and hemangiomas.

The mean age of presentation varies amongst the different categories ranging from 23 years for benign lesions, 44.9 years for inflammatory lesions and 51.6 years for tongue malignancies. This association between mean age of presentation and category of lesion is statistically significant (p < 0.00001) and a moderate effect of 0.261. Tukey post-hoc analyses revealed that the mean age varied significantly between mean ages of benign lesions and inflammatory lesions (p = 0.00009) and also between mean ages of benign lesions and malignant lesions (p = 0.000002).

There was a male predilection for both benign lesions and oral malignancies amongst tongue lesions with proportions of 56% and 58.6% respectively in a male to female ratio of 1.3:1 and 1.4:1. Female patient however presented a predilection for inflammatory

tongue lesions (52.3%, M: F = 1.1:1). As regards site of the tongue, benign lesions account for 64% of dorsal lesions but only 8% of lesions observed on the lateral surface, inflammatory lesions are also commonly found on the dorsum (60.5%) with only 7.9% occurring on the ventral surface of the tongue. Contrastingly, most ventral surface lesions are malignancies (41.4%) with about 27.6% of lateral surface of tongue lesions also malignant. The association between site of lesion and the category is statistically significant (p = 0.004).

**Duration of Presentation**

The mean duration of tongue lesions in our study is 9.1 months (median = 6 months) with ranges from 2 weeks to 48 months. Expectedly, the mean duration of presentation of benign lesions (14.8 months) is remotely longer than that of malignant lesions (6.4 months); inflammatory / reactive lesions have a mean duration of 6.6 months. The association between duration and category of lesion is statistically significant at p < 0.0001. Post-hoc Dunn Test analysis however, revealed only a statistically significant difference between mean duration in inflammatory lesions and benign lesions (p = 0.00002) and also between benign lesions and malignant lesions (p = 0.01). The mean duration of presentation also varies amongst surfaces of the tongue with the lateral surface presenting the least mean duration at 5.3 months (median = 3 months) compared to 10.2 months and 10.6 months of dorsal tongue lesions and ventral lesions (median = 7 months).

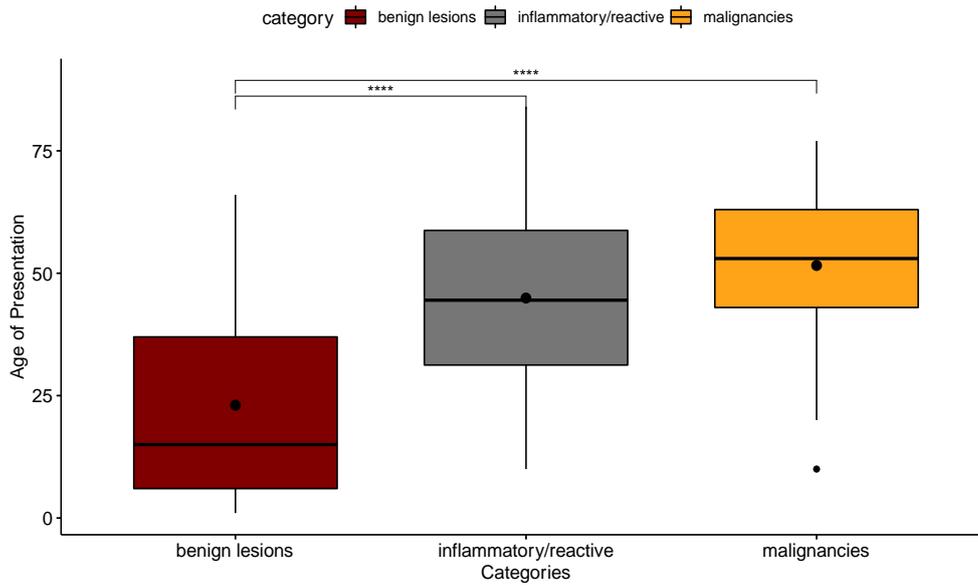
To evaluate the association between duration of presentation and interactions between the site of the lesion, the category of lesion and the gender of the patient, Mantel–Haenszel Test was utilized. A three-way interaction between these variables and duration was statistically significant at p < 0.00001 to reveal the interactions between gender, site and category in the duration of presentation of tongue lesions.

**Table 1: Characteristics of patients presenting with tongue lesions**

	Total	Female	Male	P-Value
	n = 92	n = 43	n = 49	
Age, years				0.793
	41.1 (22.4)	40.4 (21.1)	41.7 (23.6)	
Duration, months				0.349
	9.1 (9.3)	8.2 (8.2)	10.0 (10.2)	
Surface of Tongue				0.069
dorsal	48 (52.2%)	19 (44.2%)	29 (59.2%)	
lateral	22 (23.9%)	15 (34.9%)	7 (14.3%)	
ventral	22 (23.9%)	9 (20.9%)	13 (26.5%)	
Category of Lesion				0.625
benign lesions	25 (27.2%)	11 (25.6%)	14 (28.6%)	
inflammatory/reactive	38 (41.3%)	20 (46.5%)	18 (36.7%)	
malignancies	29 (31.5%)	12 (27.9%)	17 (34.7%)	

Boxplot of Categories of Tongue Lesions

Anova,  $F(2,89) = 15.72$ ,  $p = <0.0001$ ,  $h_g^2 = 0.26$



**Figure 1: Boxplot of age of presentation across categories of lesions**  
\*\*\*\* implies statistical significance



**Figure 2: A clinical picture of an ulcerative lesion on the anterior dorsal surface of the tongue**



**Figure 3: An exophytic malignant lesion on the posterior one-third surface of the tongue**

## DISCUSSION

Tongue is a diagnostic indicator of various systemic diseases and a true “mirror” of the body. The involvement of tongue in various disorders and diseases pose a diagnostic and therapeutic challenge to a general dental practitioner with limited knowledge about the relevant tongue disorders [4].

The gender distribution of this study showed that the tongue lesions were more prevalent among males. Men in our local settings are more involved in detrimental habits like smoking and drinking of alcohol which had been documented to be the leading cause of oral malignancies, this probably accounts for the male preponderance in the study. Avcu *et al.*, [6] also reported similar male predilection and attributed this pattern to alcohol consumption, black tea drinking and poor oral hygiene of the studied patients. It however differs from the study of Fouad *et al.*, [7] and Banoczy *et al.*, [8] who observed a female predilection with their study on tongue lesions. Byahatti *et al.*, [9] also reported a female predominance in their study. Discrepancies in varying studies may be due to geographical differences in tongue lesions and / or differences in dental awareness between both sexes. Gender predilections for site in tongue lesions has not been established nor widely reported in previous studies. A female predilection for the lateral surfaces of the tongue was also observed in our study but no obvious cause in this study could be adduced to this observation.

Inflammatory /reactive lesions are the most common category of tongue lesions in our study, this is in contrast with the previous Nigerian studies of Lasisi *et al.*, [10] and Fomete *et al.*, [11] who reported a preponderance of malignant lesions in their studies. It however agrees with documented studies of Avcu *et al.*, [6], Patil *et al.*, [12], and Darwazeh *et al.*, [13] who reported preponderance of inflammatory lesions. This disparity with previous Nigerian studies could possibly arise as the studies utilized biopsy reports as their main recruitment sources while we utilized both biopsy reports and clinical registers in this study. OSCC however, was the most commonly observed tongue lesion in our study, as was also observed by Nirala *et al.*, [14] and Hernández-Guerrero *et al.*, [15] in their studies. Within the reactive/inflammatory category, there is worldwide geographical variation in the prevalence of tongue lesions. Common inflammatory lesions that have been documented include fissured tongue [9], irritation fibroma [16], coated tongue [6] and benign migratory glossitis. Irritation fibroma and benign migratory glossitis were also the most common reactive lesions in our study in tandem with recurrent aphthae. This preponderance of recurrent is in contrast to other documented studies that reported a low incidence of aphthous ulcers [9]. The frequent movement of the tongue during oral activities (speech and eating) do predispose the mobile areas to trauma

either from sharp teeth or sharp edge of/non-fitting prosthesis [16]. Recurrent aphthous ulceration are considered the second most common oral ulcerative lesion after traumatic ulcers, and they can occur in any age with no gender predilection [17]. Recurrent ulcer could be painful and very disturbing thereby necessitating early and urgent presentation of patient in the clinic for treatment. Traumatic or irritational fibroma is a common benign exophytic and reactive oral lesion that develops secondary to injury. The most common sites of traumatic fibroma are the tongue, buccal mucosa and lower labial mucosa [18], In this study irritation fibroma is more common on the dorsum of the tongue; thus in agreement with the study of Dutra *et al.*, [19]. Female preponderance in reactive/inflammatory lesions have been observed in the studies of Fomete *et al.*, [20] and Dutra *et al.*, [19]. Advanced hormonal changes in puberty, pregnancy, menopause and the use of hormonal/ oral contraceptive are plausible reasons for this high female incidence [19, 20].

Different authors have documented preferred anatomic location for specific lesions [21], for example, mucus extravasation cyst (mucocele) are often encountered at the ventral surface of the tongue, while squamous cell carcinoma and epithelial dysplasia at the lateral border of the tongue [2, 21]. The tongue's dorsum was the most affected site (52.2%), out of which 75% of the lesions are located in anterior two-thirds. The dorsum of tongue with its complex morphology is usually the first part to come in contact with intra-orally ingested substances hence, it's more likely to be involved in harboring majority of the lesions [10]. Alaeddini *et al.*, [22] ranked dorsum of the tongue as the most common site for disease predilection (45.8%) in their study.

Ventral surface area is made up of salivary gland tissues or could have remnants of first branchial arch/ developmental tissues which when obstructed, traumatized or failed to resolve can result to cystic formation. In addition, Lederman hypothesis suggested that pooling of carcinogens in saliva at the ventral or floor of the mouth and lateral borders of the tongue called ‘gutter zones’ along with the anterior tonsillar pillar and lingual aspect of retromolar trigone could be responsible for the common occurrence of these lesions in this areas [23-25]. In accordance with the above hypothesis, 41.4% of ventral lesions in our study were malignant lesions.

Neoplasms of the tongue is regarded as a biologically different entity compared to cancer affecting other oral sites [10]. It is aggressive and are known to be associated with a higher rate of metastasis [26]. Tongue neoplasms can commonly involve the different surfaces and may arise de novo, from an existing tongue lesion or irritation from a sharp tooth/prosthesis [21]. These findings indicate that

neoplastic tongue lesions affected older age groups whereas non-neoplastic tongue lesions affected younger age groups. Old age is the most significant risk factor for cancer overall, and for several discrete cancer types [10]. The study also affirmed to the rapid progressive and aggressive nature of malignant neoplasm (mean duration of 6.4 months ) and the mean duration of the lateral surface 5.3months which recorded squamous cell carcinoma as the highest lesion involving the surface; this also is in agreement with some studies [10, 27].

In conclusion, the overall reduced prevalence of tongue lesions may arise due to most tongue lesions being asymptomatic, misdiagnosed, having reduced number of specialists “oral medicine physicians” managing this type of disease condition and inability of general dentists to accurately spot and treat these lesions. Delayed clinical presentation by patients and patronage of unorthodox traditional doctors also contribute to the overtly increased incidence of oral malignancies in Sub-Saharan Africa; this coupled with improper or lack of accurate record keeping may have also culminated in this increased prevalence of oral malignancies. It is thus imperative for general dentists, oral surgeons and pathologists that are acquainted with the plethora of tongue lesions and their pathognomonic manifestations to aid accurate diagnosis and appropriate management or referral to oral physicians for comprehensive management.

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