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Original Article

Epidemiological and Clinicopathological Characteristics of Oral Tumors among Libyan Patients.

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Abstract

Background: Oral tumors comprise a wide spectrum of lesions with variable biological behavior and represent a significant health concern worldwide. In Libya, epidemiological and clinicopathological data on oral tumors remain scarce and fragmented. **Methods:** A retrospective observational study was conducted using medical and histopathological records of 152 patients diagnosed with oral tumors between April 2024 and December 2025. Data on age, sex, anatomical site, histopathological diagnosis, tumor nature (benign or malignant), and treatment modalities were collected and analyzed descriptively. **Results:** The mean age of patients was 46.3 ± 15.8 years, with a male predominance (61.8%) and a male-to-female ratio of 1.6:1. The most affected age group was 41–60 years. The tongue was the most common anatomical site (34.2%), followed by the gingiva and buccal mucosa. Malignant tumors accounted for 64.5% of cases, with oral squamous cell carcinoma being the predominant histopathological type. Benign tumors constituted 35.5% of cases and were mainly odontogenic, particularly ameloblastoma and odontoma. Surgical treatment was the primary management approach, with adjuvant therapy applied in selected malignant cases. **Conclusion:** Malignant oral tumors, particularly oral squamous cell carcinoma, were predominant among middle-aged male patients, with the tongue as the most frequently involved site. These findings highlight the importance of early diagnosis, histopathological confirmation, and timely surgical intervention, and emphasize the need for improved awareness and preventive strategies to reduce the burden of oral tumors in Libya.

Keywords: Oral tumors; Oral squamous cell carcinoma; Clinicopathological characteristics; Libya.

Introduction:

Oral tumors represent a diverse group of pathological entities arising from the various tissues of the oral and maxillofacial region, including epithelial, mesenchymal, salivary gland, odontogenic, and hematopoietic origins. These lesions exhibit a wide range of biological behaviors, from indolent benign growths to highly aggressive malignant neoplasms with the potential for local invasion and distant metastasis. The complexity of oral tumors poses diagnostic and therapeutic challenges, particularly due to their variable clinical presentation and overlapping histopathological features [1].

From a global perspective, tumors of the oral cavity constitute a significant proportion of head and neck neoplasms and continue to represent a major cause of morbidity and mortality. Oral cancer ranks among the most prevalent malignancies worldwide, with higher incidence rates reported in developing and low-to-middle income countries. This increased burden has been attributed to delayed diagnosis, limited access to specialized healthcare services, and insufficient public awareness regarding early signs and symptoms of oral lesions [2].

Early-stage oral tumors are frequently asymptomatic or present with nonspecific clinical features, leading to diagnosis at advanced stages when prognosis is considerably poorer.

Histopathologically, oral squamous cell carcinoma remains the most common malignant tumor of the oral cavity, accounting for the majority of oral malignancies reported in the literature. In contrast, benign oral tumors, including odontogenic tumors and benign salivary gland neoplasms, are more frequently encountered in dental and maxillofacial clinical practice. Despite their benign nature, these lesions may cause significant functional impairment, facial deformity, and recurrence if inadequately managed, emphasizing the importance of accurate diagnosis and appropriate treatment planning [3].

The epidemiological distribution of oral tumors demonstrates substantial geographic variation influenced by demographic factors, environmental exposures, cultural practices, and lifestyle habits. Established risk factors include tobacco smoking, smokeless tobacco use, alcohol consumption, betel quid chewing, chronic mechanical irritation, viral infections such as human papillomavirus, and poor oral hygiene. The interaction of these factors contributes to differences in tumor prevalence, anatomical distribution, and histological patterns among populations [4]. Consequently, region-specific epidemiological data are essential for understanding disease patterns and implementing effective preventive and diagnostic strategies.

Clinicopathological evaluation plays a central role in the assessment of oral tumors, integrating demographic

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information, clinical presentation, anatomical location, and histopathological diagnosis. Such comprehensive analysis provides valuable insight into tumor behavior, assists in predicting prognosis, and supports evidence-based clinical decision-making. Retrospective studies based on hospital and pathology records have been widely utilized to characterize oral tumors, particularly in settings where prospective data collection is limited by resource constraints [5].

In Libya, available data on oral tumors are limited, fragmented, and largely confined to small-scale institutional studies. The absence of consolidated epidemiological and clinicopathological information restricts the ability to accurately assess the burden of oral tumors within the Libyan population and hampers comparison with regional and international data. Moreover, changes in lifestyle patterns, population demographics, and healthcare accessibility over recent decades highlight the need for updated and comprehensive analyses of oral tumor characteristics in the country [6].

Accordingly, the present retrospective study aims to analyze the epidemiological and clinicopathological characteristics of oral tumors among Libyan patients using archived medical and histopathological records. By evaluating demographic distribution, tumor type, anatomical site, and histological features, this study seeks to provide reliable baseline data that may enhance early detection strategies, support clinical management, and contribute to the existing body of literature on oral tumors in North Africa.

Materials and Methods

Study Design

This retrospective observational study was conducted to evaluate the epidemiological and clinicopathological characteristics of oral tumors among Libyan patients through a systematic review of archived medical and histopathological records. A retrospective design was adopted to allow comprehensive analysis of documented cases within a defined timeframe while ensuring methodological rigor consistent with international academic standards.

Study Setting

The study was carried out in the city of Sorman, Libya, using medical and histopathological records obtained from selected hospitals and diagnostic centers that provide oral and maxillofacial surgical services. These institutions serve as primary referral centers for patients from Surman and surrounding areas presenting with oral lesions requiring biopsy and definitive histopathological diagnosis. Records were reviewed from the departments of Oral and Maxillofacial Surgery, Dentistry, and Pathology.

Study Period

The study covered a period extending from 1 April 2024 to 30 December 2025. All eligible cases diagnosed within this timeframe were screened and assessed for inclusion.

Study Population

During the study period, 176 patient records with a diagnosis of oral tumors were initially identified in the participating centers. After applying the predefined inclusion and exclusion criteria, 152 cases were included in the final analysis. The sample size was considered appropriate to provide a reliable epidemiological and clinicopathological characterization and is consistent with sample sizes reported in similar retrospective studies published.

Inclusion and Exclusion Criteria

The study population comprised Libyan patients of both sexes and all age groups who were diagnosed with tumors originating in the oral cavity and confirmed histopathologically through biopsy or surgical specimens. Cases with incomplete essential demographic, clinical, or histopathological information were excluded, as were lesions not originating from the oral cavity.

Data Collection

Data were retrospectively extracted from archived medical records and histopathology reports using a standardized data extraction form developed specifically for the study. Epidemiological variables included age at diagnosis, sex, and year of diagnosis. Clinical variables included the anatomical site of the tumor within the oral cavity, documented clinical presentation, and duration of symptoms before diagnosis when available. Histopathological variables included tumor type, classification as benign or malignant, histological subtype, and degree of differentiation or grading, where applicable. Information regarding treatment modalities, including surgical intervention, radiotherapy, chemotherapy, or combined approaches, was recorded when documented in the medical files.

Histopathological Classification

Verrucous carcinoma was classified as a histopathological variant of oral squamous cell carcinoma in accordance with the World Health Organization (WHO) classification of head and neck tumors. All histopathological diagnoses were reviewed and categorized according to the WHO Classification of Head and Neck Tumours, 4th edition (2017) to ensure standardization and facilitate comparison with international literature.

Ethical Considerations

Ethical approval for the study was obtained from the relevant institutional review boards and hospital authorities in the city of Sorman before data collection. Due to the retrospective nature of the study, informed consent was waived. All patient data were handled in accordance with ethical principles governing research involving human data, and strict confidentiality was maintained throughout the study.

Statistical Analysis

All data were anonymized before analysis and entered into the Statistical Package for the Social Sciences (SPSS). Descriptive statistical analyses were performed to summarize the epidemiological and clinicopathological characteristics of the study population. Categorical variables were presented as

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frequencies and percentages, while continuous variables were expressed as means and standard deviations. In addition to descriptive statistics, the chi-square test was applied to examine the association between age group and sex.

Results

The study cohort included 94 males (61.8%) and 58 females (38.2%), resulting in a male-to-female *ratio* of 1.6:1. Patients' ages ranged from 9 to 82 years, with a mean age of 46.3 ± 15.8 years. The distribution by age groups demonstrated the highest frequency among patients aged 41–60 years, which accounted for 45.4% of cases, followed by patients aged 21–40 years (32.2%).

Table 1. Age and Sex Distribution of Patients (n = 152)

Age Group (years)	Male (n, %)	Female (n, %)	Total (n, %)	*p-value*
0–20	6 (3.9)	5 (3.3)	11 (7.2)	
21–40	28 (18.4)	21 (13.8)	49 (32.2)	
41–60	43 (28.3)	26 (17.1)	69 (45.4)	
61–80	15 (9.9)	5 (3.3)	20 (13.2)	
>80	2 (1.3)	1 (0.7)	3 (2.0)	
Total	94 (61.8)	58 (38.2)	152 (100)	***p*** = 0.697

N: number, %: Percentage.
Chi-square test was used to assess the association between age group and sex, The chi-square test showed no statistically significant association between age group and sex (***p*** = 0.697).

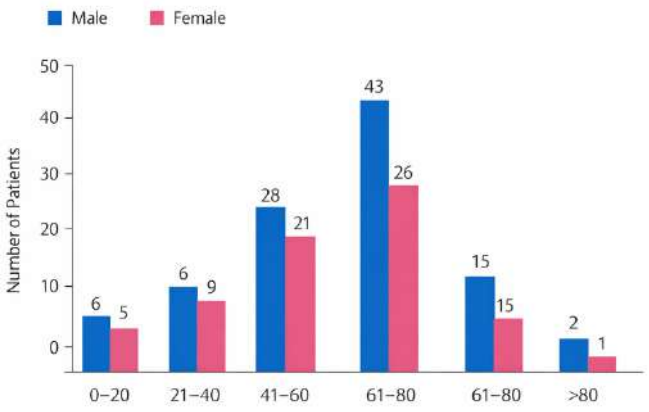

Figure 1. Distribution of oral tumor cases according to age and sex among 152 patients.

Figure 1 illustrates the distribution of oral tumor cases according to age and sex among 152 patients in Surman, Libya. The chart demonstrates that males were more frequently affected (61.8%) than females (38.2%), with a male-to-female ratio of approximately 1.6:1. The age distribution shows that the majority of cases occurred in middle-aged adults, particularly those aged 41–60 years (45.4%), followed by patients aged 21- 40 years (32.2%). Pediatric patients (≤20 years) and elderly patients (>80 years) were less commonly affected.

Table 2. Anatomical Distribution of Oral Tumors (n = 152)

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Tumor Site	Number of Cases (n)	Percentage (%)
Tongue	52	34.2
Gingiva	34	22.4
Buccal mucosa	28	18.4
Palate	19	12.5
Floor of mouth	12	7.9
Lips	7	4.6
Total	**152**	**100**

The anatomical distribution of oral tumors revealed that the tongue was the most frequently involved site (34.2%), followed by the gingiva (22.4%), the buccal mucosa (18.4%), the palate (12.5%), the floor of the mouth (7.9%), and the lips (4.6%). Most patients presented with painless swelling or ulceration, whereas a minority reported pain, bleeding, or difficulty in mastication. Symptom duration before diagnosis varied between 2 weeks and 14 months, with delayed presentation observed more frequently in malignant cases.

Table 3. Histopathological Classification of Oral Tumors (n = 152)

Tumor Type	Number of Cases (n)	Percentage (%)
Malignant (total)	98	64.5
- Squamous cell carcinoma	80	52.6
- Salivary gland carcinoma	10	6.6
- Lymphoproliferative tumors	8	5.3
Benign (total)	54	35.5
- Ameloblastoma	22	14.5
- Odontoma	15	9.9
- Pleomorphic adenoma	17	11.2
Total	**152**	**100**

Histopathological examination revealed 98 malignant tumors (64.5%) and 54 benign tumors (35.5%). Among malignant tumors, oral squamous cell carcinoma (OSCC) was the most common, representing 81.6% of malignant cases, followed by minor salivary gland carcinomas and lymphoproliferative tumors. Benign tumors were predominantly odontogenic, with ameloblastoma (22 cases) and odontoma (15 cases) being the most frequently diagnosed lesions. Benign salivary gland tumors, including pleomorphic adenoma, were less common. Regarding differentiation of OSCC, moderately differentiated tumors comprised 52.5% of cases, well-differentiated tumors 31.2%, and poorly differentiated tumors 16.3%.

Treatment Modalities:
Surgical intervention was the main treatment modality, applied in all benign tumors and approximately 92% of malignant cases. Adjuvant radiotherapy or chemotherapy was administered in selected malignant cases with advanced stage or high-grade differentiation. Follow-up data were available for malignant cases for a period of up to 12 months after treatment. During this follow-up period, recurrence was documented in six patients (6.1%). No recurrence was documented among benign tumors during the study period.

Discussion

The present study provides a detailed analysis of oral tumors among patients in Surman, Libya, based on 152

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cases recorded from April 2024 to December 2025. Our analysis revealed a clear predominance of male patients, accounting for 61.8% of cases, with a male-to-female ratio of 1.6:1, which is consistent with epidemiological patterns reported in Mediterranean populations [7]. The age distribution showed the majority of cases occurred in the 41–60 years group, highlighting middle-aged adults as the highest risk population [8]. Pediatric and elderly cases were comparatively rare [9].

The tongue was identified as the most frequently affected site, followed by the gingiva, buccal mucosa, palate, floor of the mouth, and lips. This distribution is similar to patterns reported in other Mediterranean studies [10]. The predominance of tongue and gingiva involvement can be attributed to high epithelial turnover and exposure to carcinogens, emphasizing the importance of careful oral examination for early detection [11].

Malignant tumors represented 64.5% of all cases, with oral squamous cell carcinoma (OSCC) being the most common subtype. This predominance may be explained by the high epithelial turnover of the oral mucosa and its continuous exposure to carcinogenic factors such as tobacco use, poor oral hygiene, and chronic mechanical irritation, which are well-established risk factors for OSCC. The relatively high proportion of malignant tumors observed in this study may be attributed to several factors. First, the study was conducted in referral hospitals and diagnostic centers, where advanced or suspicious lesions are more likely to be biopsied and recorded, leading to a selection bias toward malignant cases. Second, delayed presentation due to limited awareness, socioeconomic barriers, and restricted access to specialized oral healthcare services may contribute to diagnosis at more advanced stages. Additionally, exposure to known behavioral and environmental risk factors may further explain the increased burden of malignant lesions in this population.

Benign tumors accounted for 35.5%, predominantly odontogenic lesions such as ameloblastoma and odontoma, along with pleomorphic adenoma as the main benign salivary gland tumor. This distribution aligns with previous studies in North Africa and the Mediterranean region [12]. Among OSCC cases, moderate differentiation was most frequent, followed by well- and poorly differentiated tumors, which highlights the importance of histopathological grading in treatment planning and prognostic evaluation [12].

Most patients presented with painless swelling or ulceration. Surgical excision was the primary treatment for both benign and malignant tumors. Adjuvant therapy was applied selectively in high-grade or advanced malignant tumors. Recurrence was rare in benign tumors and limited among malignant cases, confirming the efficacy of complete surgical excision and the necessity of comprehensive management strategies for malignancies [7.11].

The demographic and clinical patterns identified suggest a need for public health interventions focusing on early detection, community awareness, and risk factor reduction, particularly among middle-aged men. These findings guide local healthcare planning and highlight the importance of multi-center studies across Libya to enhance understanding of oral tumor epidemiology and outcomes [8,10,12].

Conclusion

This retrospective study represents the first comprehensive evaluation of oral tumors in Surman, Libya, highlighting key epidemiological, anatomical, and histopathological patterns. The findings demonstrate a clear predominance of middle-aged male patients, with the tongue and gingiva being the most frequently affected sites. Malignant tumors, particularly oral squamous cell carcinoma, constituted the majority of cases, while benign odontogenic and salivary gland tumors were prevalent among non-malignant lesions.

The study underscores the critical importance of early detection through routine oral examinations, particularly in high-risk populations, and the necessity of timely surgical intervention. Histopathological grading remains essential for prognostic assessment and therapeutic planning in malignant cases. Furthermore, the data emphasize the need for public health initiatives focused on community awareness, risk factor reduction, and accessible diagnostic services.

Future multi-center, prospective studies across Libya are warranted to provide a broader understanding of oral tumor epidemiology, facilitate early diagnosis, and optimize management strategies, ultimately improving patient outcomes and reducing the burden of oral neoplasms in the region.

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Disclosure statement

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Author's contributions

Salwa Abukhedir, Sarah Alhameedi, and Tebra Abdulsalam conducted the study, collected and interpreted the data, and drafted the manuscript. All authors approved the final version of the manuscript.

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