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Original article

Epidemiological and Histopathological Profile of Oral and Head-and-Neck Tumors at the National Cancer Institute: A Five-Year Retrospective Analysis (2020–2024)

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Abstract
Cancers of the lip and oral cavity rank among the world's most prevalent malignancies and carry poor survival rates despite therapeutic advances. In Libya, epidemiological data on oral and head-and-neck tumors remain limited. This study aimed to characterize the five-year epidemiological and histopathological profile of these tumors at the National Cancer Institute (NCI), Sabratha, from 2020 to 2024. A retrospective review was conducted of all histologically confirmed carcinomas and sarcomas of the oral cavity, head, and neck recorded in the NCI archives. Patient demographics (age, sex), tumor site, and histopathologic diagnosis were extracted. Data were analyzed using R (v4.0.2) to calculate mean age, gender distribution, site-specific frequencies, and annual proportions of oral tumors relative to total cancer cases. Among 8,152 cancer cases reported over five years, 48 (0.59%) were oral tumors. Annual oral tumor proportions ranged from 0.34% in 2020 to 0.83% in 2023. The cohort comprised 28 males (58%) and 20 females (42%), with a male-to-female ratio of 1.4:1. The mean patient age was 54.2 years (range: 12–89). The tongue was the most affected site (42.5%), followed by the maxilla (15%) and nasopharynx (12.5%). Squamous cell carcinoma (SCC) constituted 69% of cases, adenocarcinoma 19%, and sarcoma 12%. Among SCCs, 55% occurred in males. Oral and head-and-neck tumors comprised less than 1% of all cancers at NCI during 2020–2024, predominantly affecting older males and most frequently involving the tongue as SCC. These findings underscore the need for targeted screening in high-risk anatomical sites and demographic groups. Future studies should integrate behavioral and environmental risk factors to inform prevention and early-detection strategies.
Keywords. Oral Tumors, Head-and-Neck Cancer, Squamous Cell Carcinoma, Retrospective Analysis.

Introduction

Cancers of the lip and oral cavity are the 16th most common cancers in the world [1] and are considered one of the major public health problems in the coming decades [2]. Despite recent advances in cancer therapy, this type of cancer has very poor survival rates worldwide [3]. According to GLOBOCAN 2018 (Global Cancer Incidence, Mortality and Prevalence), continuous global demographic and epidemiologic changes are expected to increase the cancer burden over the next decades [4]. This burden is projected to nearly double by 2030 [5]. The global prevalence of oral cancer shows wide geographic variation [6]. While head and neck cancers are among the most common cancers in South and Southeast Asia, they account for only 1–4% of all cancers in the Western world [7].

In eastern Libya, studies revealed that oral and pharyngeal cancers accounted for 4% and 2.2% of all cancers in males and females, respectively, in 2003. Interestingly, in 2004, the number of new cases increased slightly in males and doubled in females [8]. Oral squamous cell carcinoma accounts for 55.2% of all oral cavity malignancies in that region [9]. In western Libya, the Sabratha Cancer Registry published two online reports on oral cancer in 2006 and 2007. These reports revealed that head and neck cancers accounted for 5% and 4.8% of all cancer patients, respectively, in 2006 and 2007 [10,11]. Research on oral cancer in Libya is relatively lacking, and epidemiological data remain scant, although the disease is considered relatively uncommon there [4,8,9,10,11]. This study aims to investigate the prevalence of malignant tumors of the oral and maxillofacial region in the population of western Libya over the past five years and to identify the most common malignant neoplasm. The results will then be compared with those of previous Libyan studies, as well as with data from selected Arab countries and regions in eastern and western nations.

Methods

Study design and setting

A retrospective analysis was performed using records from the National Cancer Institute (NCI) covering the period 2020–2024. From the NCI archive, we identified all patients with histologically confirmed carcinomas or sarcomas of the oral cavity, head, and neck. For each selected case, we recorded the patient's age, sex, and tumor site. Cases were then categorized into groups based on their histopathologic diagnosis.

Ethical Considerations

This study was conducted in full accordance with the Declaration of Helsinki for medical research ethics. Because all data were retrospectively retrieved from the National Cancer Institute archives, individual patient consent was not required. Patient privacy and confidentiality were strictly maintained throughout data handling and analysis.

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Statistical Analysis

All data were reviewed and analyzed using R (version 4.0.2; R Foundation for Statistical Computing, Vienna, Austria). We calculated the mean age of patients and determined the percentage distribution of cases by gender and tumor site. In addition, for each year from 2020 to 2024, we computed the proportion of oral and head-and-neck tumor cases relative to the total number of cancer cases recorded.

Results

Five-Year Distribution of Cancer Cases

(Table 1) summarizes the annual totals of all cancer cases reported at the National Cancer Institute from 2020 to 2024, alongside the number and percentage of those that were oral tumors. Over the five years, 8,152 cancer cases were recorded, of which 48 (0.59%) were oral tumors. The total number of cancer cases peaked in 2020 (1,788) and reached its lowest point in 2022 (1,490). The annual proportion of oral tumors fluctuated, rising from 0.34% in 2020 to 0.64% in 2021, declining to 0.40% in 2022, then increasing to 0.83% in 2023 and slightly falling to 0.73% in 2024.

Table 1. Distribution of Cancer Cases and Oral Tumors, 2020–2024

Year	The total number of cancers	Oral Tumor Cases	% of Oral Tumors
2020	1788	06	0.33%
2021	1554	10	0.64%
2022	1490	06	0.40%
2023	1570	13	0.83%
2024	1760	13	0.73%

Gender and Age Distribution

(Figure 1) illustrates the gender distribution among the 48 oral tumor patients: 28 (58%) were male and 20 (42%) were female, yielding a male-to-female ratio of 1.4: 1. The mean age of oral tumor patients was 54.2 years (range: 12–89 years), indicating a predominance in older age groups but demonstrating that it can occur across the lifespan.

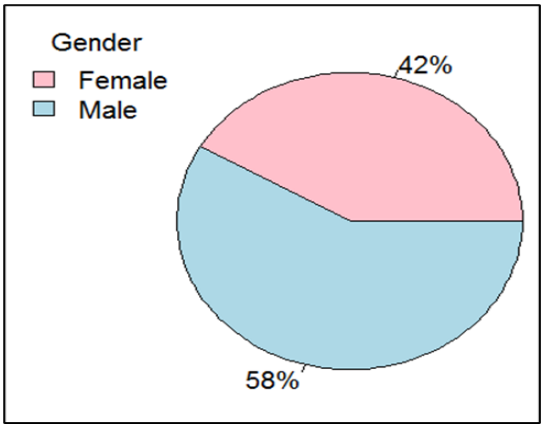

Figure 1. Gender Distribution of Oral Cancer Patients

Tumor Site Distribution

Table 2 shows the anatomical distribution of the 40 cases with specified oral sites (data were incomplete for eight patients). The tongue was the most affected site (17 cases; 42.5%), followed by the maxilla (6 cases; 15%) and nasopharynx (5 cases; 12.5%). All other sites—gingiva, lip, parotid gland, and others—each accounted for less than 10% of cases.

Table 2. Oral Tumor Distribution by Site

Site	Frequency	Percentage
Floor of mouth	1	2.5%
lip	3	6.25%
Palate	1	2.5%
Mandible	1	2.5%
Parotid	02	05%
Gingiva	03	7.5%
Maxilla	06	15%
tonsil	01	2.5%
Nasopharyngeal	05	12.5
Tongue	17	42.5%

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Histopathological Types

(Figure 2) presents the distribution of histopathological diagnoses among the 48 oral tumor cases. Squamous cell carcinoma (SCC) was the predominant type, accounting for 69% of cases. Adenocarcinoma comprised 19%, while sarcomas represented the remaining 12%.

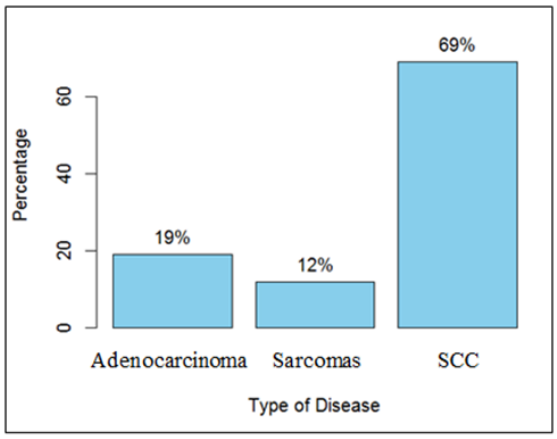

Figure 2: Distribution of Histopathological Types

SCC by Gender

Among the SCC cases, males constituted 55% and females 45% (Figure 3), suggesting a modest male predominance that may reflect gender-specific risk factor exposure.

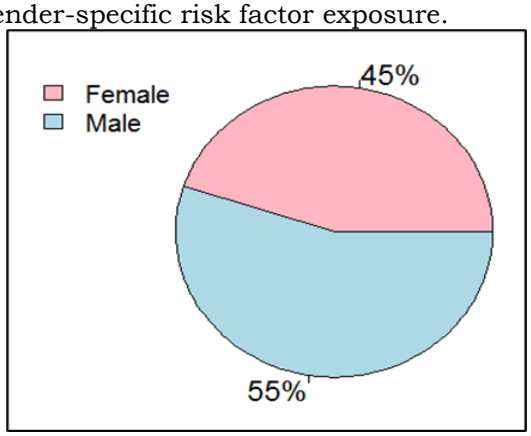

Figure 3: SCC Distribution by Gender

Overall, oral tumors represented less than 1% of all cancers treated at NCI over the study period. These tumors predominantly affected older adults, with a clear male predominance and a predilection for the tongue. Squamous cell carcinoma was the most frequent histological subtype.

Overall, 48 oral tumor cases (0.59% of 8,152 total cancers) were recorded at NCI between 2020 and 2024. Patients had a mean age of 54.2 years (range 12–89) with a male-to-female ratio of 1.4: 1.

The tongue was the most frequent tumor site (42.5%), followed by maxilla (15%) and nasopharynx (12.5%). Histopathologically, squamous cell carcinoma predominated (69%), with adenocarcinoma at 19% and sarcomas at 12%. *These findings highlight the relative rarity but clinical importance of oral tumors within oncology practice.*

Discussion

The incidence of oral malignancy at the National Cancer Institute (NCI) was like that reported in other North African countries but remained impressively low compared to the United Kingdom, the United States, and India [8,12–20]. This discrepancy may be attributed to shared cultural and religious behaviors—particularly the prohibition of alcohol consumption, since alcohol acts synergistically with cigarette smoking as a risk factor for oral cancer.

Previously, the NCI reported that oral cancer accounted for 5.0% and 4.8% of all cancer patients in 2006 and 2007, respectively [10,11]. Meanwhile, the Benghazi Cancer Registry in western Libya recorded oral and pharyngeal cancers at 4.0% in males and 2.2% in females in 2003, with a slight increase in 2004 [8,9]. In contrast, in our five-year review of NCI registry data, we observed an oral cancer proportion of 0,59 and never above 1% over the five years of the study. This can be explained by in 2020, the institute updated its tumor registry to include only histologically confirmed cases, excluding any unconfirmed diagnoses. This resulted in a lower total number compared to previous studies that included unconfirmed cases.

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Furthermore, with the onset of the COVID-19 pandemic, clinic attendance declined significantly, and diagnostic evaluations were delayed. As a result, only six cases of oral tumors were recorded that year. These procedural changes and those related to access to healthcare likely explain the unusually low rate observed in 2020.

As expected, squamous cell carcinoma (SCC) was the most prevalent malignant neoplasm, comprising approximately 69% of all oral and maxillofacial tumors—consistent with other Libyan studies [8–11]. Comparatively, eastern Libya reported SCC in 67% of cases versus about 50.6% in some western Libya series [13,21,22]. Variations in population density, sample size, and registry completeness likely underlie these differences.

In accordance with this study the previous global reports on oral cancer revealed that Scc has the highest rate of incidence, (23) analyses show a high prevalence of SCC in Iraq 70% [24], 84% in Jordan [25], and similarly elevated rates in Yemen and Saudi Arabia [26,27]. Exceeding our NCI-based figure of 69%. This may be linked to lifestyle factors more common in that region including alcohol consumption, water-pipe smoking, and tobacco chewing—habits that are uncommon in Libya.

In our cohort, males constituted 58% of cases versus 42% in females, reflecting a slight male predominance that aligns with previous reports [13,21]. Men may face greater exposure to carcinogens, such as smoking and alcohol. However, some Arab countries (e.g., Yemen, Saudi Arabia) report higher female incidence, attributed to the social acceptance of tobacco chewing among women [26,27].

Elgehani et al. (2021) reported an increase in prevalence of oral SCC (43%) in females—a finding that mirrors our (42%) female SCC prevalence and exceeds the 37% reported by Subhashraj et al. in Benghazi [13,21]. Possible explanations include nutritional deficiencies such as iron-deficiency anemia [28], human papilloma virus (HPV) infection in oropharyngeal sites [29], poor oral hygiene [30], and chronic irritation from faulty dental restorations [31]. Further research is needed to clarify these associations.

Anatomically, the tongue was the most affected site (42.5%), in agreement with studies from eastern Libya [13,21], North Africa and the Middle East [32,33], and Western countries [34,35]. In contrast, regions like Yemen, Saudi Arabia, and India report higher involvement of the buccal mucosa, vestibule, and gingiva—patterns linked to local tobacco-use customs [27,28,36].

Age distribution showed most cases occurred in individuals over 50 years old, although patients ranged from 12 to 89 years, consistent with global data [22–24]. Recent trends indicate rising incidence among younger patients, potentially driven by changing dietary habits and HPV exposure [32].

Conclusion

Oral and head-and-neck tumors remain a small fraction of the NCI's cancer burden, most commonly presenting as SCC of the tongue in older adults, with a modest male predominance. Variations in incidence and site distribution across regions underscore the influence of behavioral, environmental, and registry-related factors. Future studies should integrate detailed behavioral risk profiles, HPV status, and nutritional assessments to elucidate the drivers of oral cancer in Libya and inform targeted prevention and early-detection strategies.

Recommendations

It is essential to establish a national cancer registry to effectively monitor incidence trends, guide resource allocation, and support evidence-based policymaking. Targeted awareness campaigns and screening programs should be promoted, particularly among high-risk populations such as individuals over the age of 50 and tobacco users. In addition, HPV testing and vaccination must be encouraged as preventive measures against cervical and other HPV-related cancers. Training healthcare providers to recognize early signs and symptoms of malignancy is critical to improving early detection and patient outcomes. Furthermore, additional research is warranted to investigate the rising incidence of squamous cell carcinoma (SCC) among women and to identify underlying contributing factors.

Conflict of interest. Nil

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