

Histopathological Characteristics of Oral Cancer in Sudan

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ABSTRACT

Background: Oral cancer is a significant health issue in Sudan, characterized by an annual rise in the frequency of several histological subtypes. This study intended to evaluate the various histological subtypes of oral cancer in Sudan.

Methodology: This retrospective descriptive analysis was conducted at the National Public Health Laboratory in Sudan from 2022 to 2024. This research encompassed 183 patients diagnosed with oral cancer from 2018 to 2022. We obtained all patient data from the records.

Results: Among the 183 patients, 67.8% were male and 32.2% were female. Based on the lesion location, the majority of patients had lesions on the buccal and palatal areas, followed by the tongue and lip, accounting for 20.7%, 13.1%, and 12.6%, respectively. The majority of patients exhibited Grade I lesions, followed by Grade II and Grade III, accounting for 60.6%, 24%, and 15.4%, respectively. Oral squamous cell carcinoma was identified in 75.4% of patients.

Conclusion: The incidence of oral cancer is rising in Sudan, particularly among females. The incidence of OSCC is rising, along with other types of oral cancer. The buccal mucosa, tongue, and lip are the predominant locations. The rising epidemiology of ACC indicates the impact of toombak on salivary glands.

Keywords

Oral cancer, Sudan, Toombak, Histopathological type, OSCC.

Introduction

Oral cancer ranks as the sixth most common cancer worldwide. Oral cavity and lip cancers rank as the 16th most prevalent cancer globally. A deficiency in public awareness regarding precancerous lesions, symptoms of oral cancer, and associated risk factors contributes to diagnostic delays, resulting in decreased survival rates [1,2]. Oral squamous cell carcinoma (OSCC) primarily impacts the tongue and floor of the mouth, predominantly in individuals over the age of 50. Incidence and mortality rates exhibit considerable variation globally, shaped by geographic regions and demographic factors. Epidemiological studies indicate a rising incidence of OSCC in young adults aged 44 years and younger [3].

Research demonstrates a significant association between the duration and intensity of alcohol and tobacco consumption and the risk of oral cancer (OC) [4]. Oral cancer is a multifactorial condition with various risk factors, including tobacco and alcohol use, chronic inflammation, ultraviolet (UV) radiation (specifically for lip cancer), infections such as human papillomavirus (HPV) or Candida, immunosuppression, genetic predisposition, and dietary influences [5,6].

Oral cancer death rates in Sudan are very high, particularly in men, mainly due to the use of Toombak, which contains harmful substances called tobacco-specific nitrosamines (TSN). Researchers have thoroughly examined the association between toombak use and infection with high-risk Human Papilloma Virus (HPV), which is connected to the etiology of oral cancer in Sudan [7,8]. An estimated 6–10 million individuals in Sudan use smokeless tobacco (toombak), with a prevalence of male users. Toombak is known to cause cancer and can change the makeup of the oral microbiome, which raises the chances of developing and worsening oral cancer; however, there hasn't been enough research on this topic [9]. The late diagnosis of OSCC patients in Sudan,

which often shows up in advanced stages and widespread cancer, negatively impacts the health and survival rates of these patients [10]. The objective of this study was to investigate the prevalent histopathological characteristics of oral cancer in Sudanese patients.

Materials and Methods

This investigation was conducted at the National Public Health Laboratory in Sudan from 2022 to 2024. This is a retrospective descriptive study aimed at evaluating the histological characteristics of oral cancer in Sudan. This study included 183 patients diagnosed with oral cancer between 2018 and 2022. We acquired all patient data from records.

Ethical Consideration

A permission was obtained from National Public Health Laboratory.

Ethical Approval: The human research ethics committee at MRCC has approved this research proposal (Approval number: HREC 0013/MRCC.4/25).

Statistical Analysis

The data sets were loaded into the Statistical Package for the Social Sciences (SPSS Inc., Chicago, IL), and a test revealed that p-values less than 0.05 were statistically significant.

Results

This study included 183 oral cancer patients aged 7 to 83 years, with a mean age of 57.3 ± 16.6 years. Of the 183 patients, 124 (67.8%) were men and 59 (32.2%) were women. The majority of patients were between the ages of 56 and 65, with ≥ 71 and ≤ 40 years accounting for 54 (29.5%), 38 (20.7%), and 36 (19.7%), respectively. Males aged 56–65 years were the majority, followed by those aged ≥ 71 years, accounting for 38/124 (30.6%) and 25/124 (20.2%), respectively. Table 1 and Figure 1 show that the majority of females were under the age of 40, with those aged 56–65 accounting for 18/59 (30.5%) and 16/59 (27%), respectively.

Table 1: Distribution of the study subjects by sex and age.

Age range	Males	Females	Total
≤ 40 years	18	18	36
41 - 55	26	9	35
56 - 65	38	16	54
66 - 70	17	3	20
≥71	25	13	38
Total	124	59	183

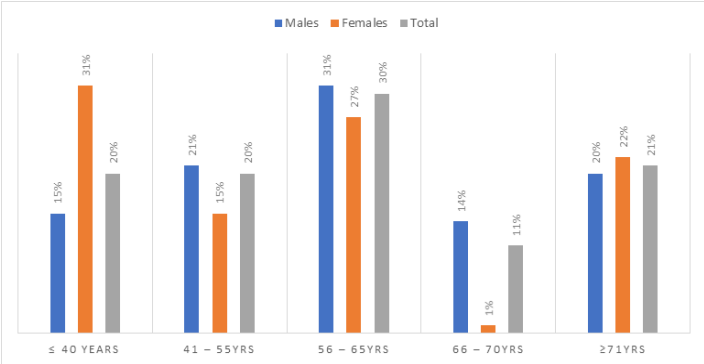


Figure 1: Description of the study subjects by sex and age.

Most patients presented with lesions located in the buccal and palatal regions, followed by the tongue and lip, comprising 38 (20.7%), 24 (13.1%), and 23 (12.6%), respectively. The majority of patients exhibited Grade I lesions, followed by Grade II and Grade III, with frequencies of 111/183 (60.6%), 44/183 (24%), and 28/183 (15.4%), respectively. Grade I was observed more frequently at buccal and palate sites, accounting for 26 out of 111 cases (23.4%), followed by the tongue with 13 out of 111 cases (11.7%), and the lip also with 13 out of 111 cases (11.7%). Grade II occurred more frequently in the tongue and lip, with a prevalence of 7 out of 44 cases (15.9%) for each location. Grade III is frequently observed in the buccal and palatal regions, occurring in 7 out of 28 cases (25%), as illustrated in Table 2 and Figure 2. Of the specimens, 104 out of 183 (57%) were incisional biopsies, while the remaining 79 out of 183 (43%) were excisional biopsies.

Table 2: Distribution of the patients by grade, lesion site and specimen type.

Variable	Grade I	Grade II	Grade III	Total
Lesion site				
Tongue	13	7	4	24
Cheek	4	5	2	11
Mandible	9	4	1	14
Parotid	4	1	0	5
Buccal and palate	26	5	7	38
Lip	13	7	3	23
Gingival	8	1	0	9
Maxillary	12	1	0	13
Retromolar	6	0	0	6
Sub mandibular	9	5	2	16
Other	6	7	5	18
Oropharynx	1	1	4	6
Total	111	44	28	183

Specimen type				
Incisional	65	27	12	104
Excisional	46	17	16	79
Total	111	44	28	183

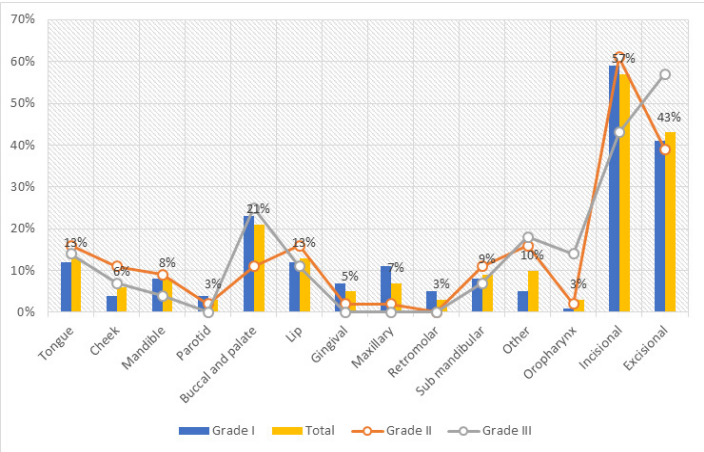


Figure 2: Description of the patients by grade, lesion site and specimen type.

Oral squamous cell carcinoma was identified in 138 of 183 patients (75.4%). The majority of cases (84/183, 46%) were diagnosed as well differentiated squamous cell carcinoma (WDSCC) (all Grade I), followed by moderately differentiated squamous cell carcinoma (MDSCC) (all Grade II), 30/183 (16.4%). We found poorly differentiated squamous cell carcinoma (PDSCC) in 12/183 instances (6.6%), all of which were Grade III. Adenoid cystic carcinoma (ACC) was found in 12 cases (6.6%), including 9 cases (75% grade I) and 3 cases (25% grade II). Invasive SCC was discovered in 12 (6.6%) patients. Myoepithelial carcinoma ex pleomorphic adenoma (MCA ex PA) was found in 5/183 cases (2.7%), with 3/5 (60%) being Grade I and 2/5 (40%) being Grade III. Table 3 and Figure 3 show that 8/183 (4.4%) and 7/183 (3.8%) patients had sarcoma and verrucous carcinoma, respectively.

Table 3: Distribution of oral cancer diagnosis by lesion grade.

Diagnosis	Grade I	Grade II	Grade III	Total
WDSCC	84	0	0	84
MDSCC	0	30	0	30
PDSCC	0	0	12	12
Adenoid cystic carcinoma	9	3	0	12
Invasive SCC	0	8	4	12
MCA ex PA	3	0	2	5
Sarcoma	2	1	5	8
Other	6	2	5	13
Verrucous ca	7	0	0	7
Total	111	44	28	183

Discussion

Oral cancer represents a considerable health issue in Sudan, especially given the widespread practice of toombak dipping. The local custom of utilizing smokeless tobacco is significantly linked to the development of oral precancerous and cancerous lesions,

particularly squamous cell carcinoma. The results of the current investigation revealed that the predominant histopathological type was OSCC. OSCC accounts for roughly 80% to 90% of all oral cancers. The incidence of oral cancer exhibits considerable geographical variation, influenced by a multitude of risk factors [11,12]. Our findings indicate a comparatively lower prevalence, which may be attributed to the predominance of other oral malignancies. This drop may be ascribed to the influence of risk factors present in Sudan. Earlier research conducted in Sudan has indicated prevalence rates that are lower than those observed in the present study [13,14].

The current study's data indicate that the predominant form following OSCC was adenoid cystic carcinoma (ACC). ACC of the oral cavity is an uncommon malignancy of the head and neck. The rarity of ACC contributes to the limited research available on this malignancy [15]. ACC is a neoplasm originating from the secretory glands, predominantly affecting the salivary glands. It constitutes roughly 1% of all head and neck cancers. It constitutes 10% of all salivary gland neoplasms [16,17]. In contrast to other head and neck carcinomas, such as squamous and basal cell carcinoma, smoking and alcohol consumption have not been associated with an increased risk of developing adenoid cystic carcinoma (ACC). Many genetic changes have been found through the study of chromosomes and the sequencing of over 80 ACC genomes, with age being a separate risk factor that makes someone more likely to develop it [16].

Nonetheless, there exists a notable deficiency of data concerning the majority of histological types of oral cancers. Research in this area has shown that OSCC is the most common type, making up 73.3%, followed by mucoepidermoid carcinoma at 4.8%, adenoid cystic carcinoma at 4%, osteosarcoma at 2.4%, and verrucous carcinoma also at 2.4% [18].

The predominant sites for oral cancer include the buccal mucosa and palate, succeeded by the tongue and lips. Previous reports have indicated comparable findings. The predominant locations for oral cancer are, in fact, the buccal mucosa (the lining of the cheeks), succeeded by the tongue, and subsequently the lips. Although the assertion regarding the palate as a prevalent site holds some truth, it is frequently overshadowed by references to the buccal mucosa, tongue, and lips [19,20].

The results of the current study indicated a higher prevalence of oral cancer in males than in females. In Sudan, the majority of oral cancer cases are linked to the use of toombak; however, its use among females is infrequent due to the associated social stigma. Nonetheless, the risk linked to toombak use was considered to be more pronounced among females than males. Notable risks associated with Toombak dipping (OR 3.8, 95% CI 1.7–8.6) and cigarette smoking (OR 2.7, 95% CI: 1.2–6.2) were identified. The site of toombak dipping and the tumour location demonstrated a positive correlation. The attribute risk for exclusive dippers was identified as 93% in females and 67% in males, while the adjusted attributable risk was calculated at 70.1%. The residual 20–30% of

risks were ascribed to additional risk factors [21].

The overall prevalence of Toombak consumption stands at approximately 45% within the male demographic aged 40 years and above, while it is observed at 10% among females aged 60 years and older [22]. The main harmful substances in smokeless tobacco are tobacco-specific nitrosamines (TSNA), N-nitrosornicotine, and 4'-(nitrosomethylamino)-1-(3-pyridyl)-1-butanone. Studies have documented an exceedingly elevated concentration of these carcinogens in toombak [23]. Although the present study made updates to the available literature about oral cancer from Sudan, it has some limitations, including its retrospective setting.

Conclusion

The incidence of oral cancer is on the rise in Sudan, particularly among females. Along with other types of oral cancer, OSCC is becoming more common. The buccal mucosa, tongue, and lip represent the most frequently observed locations. ACC is experiencing a rise in epidemiology, indicating the impact of toombak on salivary glands.

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