Clinicopathologic Profile of Oral Squamous Cell Carcinoma (OSCC) and Sinonasal Squamous Cell Carcinoma (SNSCC)

Mofoluwaso Abimbola Olajide[1*], Olasunkanmi Kuye[2], Afolabi Oyapero[3], Adeola Ladeji[4], Aderonke Abah[5]

[1]Senior Lecturer, Department of Oral Pathology& Oral Medicine, Faculty of Dentistry, Lagos State University College of Medicine, Ikeja, Nigeria.

[2]Senior Lecturer, Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Lagos State University College of Medicine, Ikeja, Nigeria.

[3]Associate Professor, Department of Preventive Dentistry, Faculty of Dentistry, Lagos State University College of Medicine, Ikeja, Nigeria.

[4]Associate Professor, Department of Oral Pathology& Oral Medicine, Faculty of Dentistry, Lagos State University College of Medicine, Ikeja, Nigeria.

[5]Senior Lecturer, Department of Oral Pathology& Oral Medicine, Faculty of Dentistry, Lagos State University College of Medicine, Ikeja, Nigeria.

[*]Corresponding Author

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ABSTRACT

Background: Oral Squamous Cell Carcinoma (OSCC) is said to be the most common malignancy affecting the oral cavity while Squamous cell carcinoma of the Sinonasal tract (SNSCC) is less common. Changing patterns have been observed in the incidence of these lesions in recent years.

Objective:

This study aims to determine the demographics, clinical and histopathologic characteristics of Oral Squamous Cell carcinoma and Sinonasal Squamous Cell Carcinoma in a Nigerian (African) population over a period of 7 years (2013 to 2019).

Materials and Methods:

In this retrospective study, records from the archives of the Oral Pathology laboratory, Faculty of Dentistry, Lagos State University College of Medicine over a period of 7 years (2013 to 2019) were reviewed to retrieve the age, sex, site, grade and variant (where indicated) of cases. Data was analyzed using IBM SPSS (version 20).

Results:

The prevalence of OSCC in our study was 34.5% of all oral and maxillofacial malignancies, while SNSCC accounted for 5.5%. Mean age for OSCC was 56.5(SD±16.4) years, while that of SNSCC was 47.0 (SD±9.23) years. These lesions were more frequent in males (63.2% and 66.7% for OSCC and SNSCC respectively) than females. The most common site of involvement in OSCC was the tongue (28.9%). 66.7% of the SNSCC was the Keratinizing type. 55.3% of OSCC were graded as moderately differentiated.

Conclusion:

This study demonstrates that oral squamous cell carcinoma (OSCC) accounts for a substantial proportion (34.5%) of head and neck malignancies diagnosed at our centre, confirming its significant disease burden within the oral and maxillofacial region. The tongue is the most affected oral site**.** Sinonasal squamous cell carcinoma (SNSCC) was still relatively rare (5.5%), occurred at a younger mean age than OSCC, and also demonstrated male predominance. Although the keratinizing subtype of SNSCC was more common, histological type was not significantly associated with sex. Overall, the findings highlight important clinicopathologic patterns of OSCC and SNSCC in our environment and provide baseline data for improved diagnosis and future research.

INTRODUCTION

Oral squamous cell carcinoma (OSCC) and sino-nasal squamous cell carcinoma (SNSCC) are both head and neck epithelial cancers, but they differ markedly in incidence, risk factors, biology, and management.[1-6] Understanding these contrasts is important for diagnosis, counseling, and treatment planning. Squamous cell carcinomas (SCCs) of the Head and Neck originate from the epithelial cells of the mucosal linings of the upper aerodigestive tract, which includes the oral cavity, the pharynx, the larynx, and the sinonasal cavities.[7] Alcohol drinking coupled with tobacco use are indicated in 70 to 80% of Head and Neck Squamous Cell Carcinomas (HNSCC) .[8,9] In recent times, human papilloma virus (HPV) has been identified as an independent causative agent for oropharyngeal SCC.[8, 9] Though it has been reported that the overall incidence of Head and Neck SCC continues to decline globally, possibly due to global campaign and awareness leading to decreased tobacco and alcohol consumption [10, 11] Oral tongue cancer incidence has been reported to be increasing in several countries. [1-3, 12-14] In spite of this, HPV seems to be involved in only a minor subset of squamous cell carcinomas of the oral cavity [15, 16]

Oral cancer refers to cancer occurring between the vermilion border of the lips and the junction of the hard and soft palates or the posterior one-third of the tongue.[17] Intraoral squamous cell carcinomas may begin on the floor of the mouth or on the lateral and ventral surfaces of the tongue.[17] Oral squamous cell carcinomas that occur on the lower lip are said to be solar-related cancers on the external surface. [17]

OSCC comprises approximately 90% of oral cancers and the majority of head and neck SCCs. [1-3, 18] In the United States, 3% of cancers in males and 2% in females are oral squamous cell carcinomas, and most of these occur after age 50 years.[17] The major risk factors for oral squamous cell carcinoma are Tobacco Smoking (especially > 2 packs/day) and Alcohol use[17]. Risk is also said to increase dramatically when alcohol use exceeds 177 mL (6 oz) of distilled liquor, 148 mL (5 oz) of wine, or 1065 mL (36 oz) of beer/day[17]. The combination of heavy smoking and heavy alcohol consumption is estimated to raise the risk 100-fold in females and 38-fold in males. [17] Moreover, betel quid chewing is a major risk factor for oral cavity squamous cell carcinoma (OSCC) in many southeast Asian countries, such as India, Sri Lanka, Taiwan, etc. [16, 19-24] HPV is associated with oral cancer much less often than it is in oropharyngeal cancer, and its presence in resected tissue does not necessarily imply causation[17]. Well-defined oral potentially malignant disorders like leukoplakia, erythroplakia, lichen planus and oral submucous fibrosis may also become oral squamous cell carcinoma. [17]

Squamous cell carcinoma (SCC) of the sinonasal tract (SNSCC) is "a malignant epithelial neoplasm arising from the surface epithelium lining the nasal cavity and paranasal sinuses and exhibiting squamous differentiation". [25] Despite this relatively simple definition, SNSCC may be included in a wide group of tumors with heterogeneous biological features, as its genetics showed partial overlap with other sinonasal cancers, such as sinonasal undifferentiated carcinoma (SNUC) and neuroendocrine carcinomas (NECs). [26, 27]

SNSCC is rare, accounting for approximately 3–5% of head and neck cancers and approximately 54% of sinonasal malignancies.[4-6] It arises in the nasal cavity and paranasal sinuses, often maxillary or ethmoid. SNSCC is less associated with Tobacco and alcohol use, while occupational dusts (leather, wood, chromium, nickel, welding- fumes, asbestos) are important associated aetiologic factors.[4-6] About 20–25% of SNSCC are HPV-positive, mostly the non-keratinizing type which may have better prognosis. SNSCC may arise de novo or from Schneiderian/inverted papilloma.[4-6, 28]

While OSCC presents conventionally with histologically heterogeneous features, often graded by degree of keratinization, tumour front, immune response and extent of cellular atypia; SNSCC has two basic histologic subtypes- keratinizing and non-keratinizing[4-6]. Both lesions can however exhibit histologic variants, such as basaloid, spindle, verrucous, papillary variants[4-6]. OSCC has shown frequent TP53, FAT1, CASP8, CDKN2A, NOTCH1 mutations and HRAS/PIK3CA oncogenic events; while immune-active versus immune-exhausted types guide targeted and immunotherapy approaches.[4-6] SNSCC subsets have shown HPV-association, SMARCB1/INI1 loss, or arise in papillomas, and each of these groups have distinct prognosis and treatment implications[4-6]

Clinically, both may present late and have high rates of local recurrence; SNSCC particularly shows frequent local recurrence and complex skull-base involvement with management focused on challenging skull-base surgery plus radiotherapy and selective chemotherapy.[28-31] Late presentation and high local recurrence in both lesions, makes early detection, risk-factor modification, and biologically driven therapies central to improving survival. [28-31]

This study aims to assess the distinguishing clinico-pathologic features of cases of OSCC and SNSCC diagnosed among Nigerians in an Urban-based Tertiary Hospital.

MATERIALS AND METHODS

This retrospective laboratory study was conducted to characterize clinico-pathologic features of Oral Squamous Cell Carcinoma (OSCC) and Sino-nasal Squamous Cell Carcinoma (SNSCC) cases diagnosed at Lagos State University Teaching Hospital over a 7-year period (January 2013 to December 2019). The study protocol was approved by the Institutional Research Ethics Committee of Lagos State University College of Medicine and conducted in compliance with relevant institutional guidelines for retrospective data research.

Study Design and Setting

This was a retrospective review of archival histopathology records and glass slide specimens held in the Oral Pathology Laboratory, Faculty of Dentistry, Lagos State University College of Medicine, Lagos, Nigeria. The histopathology registers maintained by the Department of Oral Pathology and Oral Medicine were used to identify cases with histologically confirmed diagnoses of OSCC and SNSCC within the study period.

Inclusion and Exclusion Criteria

- **Inclusion criteria** comprised all cases with a histopathological diagnosis of OSCC or SNSCC recorded between 2013 and 2019; available and retrievable H&E-stained slides; and complete baseline demographic information (age, sex) and clinicopathologic parameters (anatomic site, histological grade/type) in the register.

- **Exclusion criteria** were applied to eliminate records lacking core patient or tumour data (e.g., age, sex, site), records with **more than one missing key data element**, and cases where H&E slides were **inadequate for histological evaluation** (e.g., poor staining, tissue artefacts, incomplete section). Records with ambiguous or conflicting histological diagnoses were also excluded pending verification.

A **case identification and extraction log** was maintained to record all records screened, included, and excluded, with reasons for exclusion documented to ensure transparency and reproducibility.

Data Extraction and Calibration

Data were independently extracted by two trained reviewers (both authors with formal training in histopathologic research). Prior to formal data extraction, a **calibration exercise** was conducted: a subset of 30 randomly selected slides (15 OSCC, 15 SNSCC) was jointly reviewed to harmonise interpretation and ensure consistency in applying diagnostic categories, grading criteria, and data abstraction rules. Any discrepancies during calibration were resolved by consensus, and when necessary, by consultation with a third senior pathologist, resulting in a

refinement of the data extraction template to minimize inter-observer variation. This approach aligns with recommended quality assurance practices for retrospective chart reviews. Extracted variables for each case included: demographic characteristics (age at diagnosis, sex), anatomical site of lesion, histologic subtype/variant (e.g., keratinizing vs non-keratinizing), and histological grade. All slide reviews and data extractions were conducted with reviewers blinded to patient identifiers to reduce bias.

Histological Review and Diagnostic Confirmation

Haematoxylin and eosin (H&E) stained glass slides corresponding to identified OSCC and SNSCC cases were retrieved and reviewed by the authors who are experienced oral pathologists. Two independent histological assessments were performed for each case to confirm the original diagnosis. Discrepancies between reviewers were resolved by consensus, and, where consensus could not be achieved, by adjudication with reference to established histopathologic criteria for squamous cell carcinomas.

Statistical Analysis

Data were analysed using IBM SPSS Statistics for Windows version 20.0 (IBM Corp., Armonk, NY, USA). Continuous variables such as age were summarized as means ± standard deviation, while categorical variables including sex, age group, anatomical site, histologic type and grade were expressed as counts and percentages. Associations between categorical variables were evaluated using Chi-square tests where appropriate, and statistical significance was set at $p < 0.05$.

Results were presented in tabular form to show distributions of clinico-pathologic features across OSCC and SNSCC groups, facilitating direct comparison of patterns in the study population.

RESULTS

A total of **1,025** oral and maxillofacial/head and neck biopsy specimens were received at our centre's Oral Pathology laboratory between 2013 and 2019. Of these, **110 cases (10.7%)** were histologically diagnosed as malignant lesions, comprising squamous cell carcinomas, lymphomas, adenocarcinomas, and sarcomas. Among the malignant cases, **38 (34.5%)** were confirmed as oral squamous cell carcinoma (OSCC), while **6 cases (5.5%)** were diagnosed as sinonasal squamous cell carcinoma (SNSCC). The remaining cases consisted of other malignancies.

Table 1 presents the distribution of OSCC cases across defined age categories. The highest frequencies were observed in the 51–60 and 61–70-year age groups (28.9% each), jointly accounting for 57.8% of cases, indicating peak incidence in the sixth and seventh decades of life. Very few cases were observed below the age of 30 years (10.5%), and only one case (2.6%) occurred in the first decade of life. No cases were recorded in the second and tenth decades. Percentages are calculated based on the total number of OSCC cases (n = 38).

Table 1. Age Group Distribution of OSCC (n = 38)

Age Group (years)	Frequency (n)	Percentage (%)
0–10	1	2.6
11–20	0	0.0
21–30	3	7.9
31–40	2	5.3
41–50	4	10.5
51–60	11	28.9
61–70	11	28.9
71–80	5	13.2
81–90	1	2.6
91–100	0	0.0
Total	**38**	**100**

Table 2 shows the sex distribution of patients diagnosed with OSCC. Males constituted the majority of cases (63.2%), while females accounted for 36.8%, yielding a male-to-female ratio of approximately 1.7:1. Percentages are calculated relative to the total OSCC cases (n = 38).

Table 2. Sex Distribution of OSCC (n = 38)

Sex	Frequency (n)	Percentage (%)
Male	24	63.2
Female	14	36.8
Total	**38**	**100**

Table 3 illustrates the histopathological grading of OSCC based on degree of differentiation. Moderately differentiated carcinomas constituted the majority (55.3%), followed by poorly differentiated lesions (26.3%) and well differentiated tumours (10.5%). In three cases (7.9%), histological grade was not documented in the records.

Table 3. Histological Grading of OSCC (n = 38)

Histological Grade	Frequency (n)	Percentage (%)
Poorly Differentiated	10	26.3
Moderately Differentiated	21	55.3
Well Differentiated	4	10.5
Record Not Found	3	7.9
Total	**38**	**100**

Table 4 presents the anatomical distribution of OSCC lesions. The tongue was the most commonly affected site (28.9%), followed by the mandibular gingiva (21.1%) and buccal mucosa (13.2%). Less frequently involved sites included the retromolar area, palate, floor of mouth, and inner lip. In four cases (10.5%), the primary site was not specified in the clinical records. Percentages are calculated based on total OSCC cases (n = 38). Missing site data accounted for 10.5% of cases.

Table 4. Primary Site/Location of OSCC (n = 38)

Site	Frequency (n)	Percentage (%)
Tongue	11	28.9
Floor of Mouth	1	2.6
Buccal Mucosa	5	13.2
Retromolar Area	2	5.3
Mandibular Gingiva	8	21.1
Maxillary Gingiva	4	10.5
Palate	2	5.3
Inner Lip	1	2.6
Record Not Found	4	10.5
Total	**38**	**100**

Table 5 compares the anatomical distribution of OSCC between male and female patients. Certain sites showed sex-specific occurrence patterns: buccal mucosa, retromolar area, and floor of mouth lesions were observed exclusively in males, whereas palate and inner lip lesions occurred only in females. Tongue lesions were slightly more frequent in females than males. Fisher's Exact Test was applied due to small cell counts and expected frequencies below 5 in multiple categories. A statistically significant association was observed between tumour site and sex ($p < 0.05$), indicating that anatomical distribution varied significantly by sex.

Table 5. Distribution of OSCC Site by Sex (n = 38)

Site	Male (n=24)	Female (n=14)	Total
Tongue	5	6	11
Floor of Mouth	1	0	1
Buccal Mucosa	5	0	5
Retromolar Area	2	0	2
Mandibular Gingiva	6	2	8
Maxillary Gingiva	3	1	4
Palate	0	2	2
Inner Lip	0	1	1
Record Not Found	2	2	4
Total	**24**	**14**	**38**

Statistical Analysis:

Fishers Exact = 15.817; df = 8; **p = 0.045**

Table 6 shows the distribution of histological grades of OSCC according to sex. Moderately differentiated carcinoma was the predominant grade in both males and females. Poorly differentiated tumours were proportionally slightly higher among females, while moderately differentiated tumours were proportionally higher among males. Fisher's Exact Test was used because of small sample size and low expected counts in some cells. No statistically significant association was found between sex and histological grade ($p > 0.05$), indicating comparable grade distribution across sexes.

Table 6. Histological Grade of OSCC by Sex (n = 38)

Histological Grade	Male (n=24)	Female (n=14)	Total
Poorly Differentiated	5 (20.8%)	5 (35.7%)	10
Moderately Differentiated	15 (62.5%)	6 (42.9%)	21
Well Differentiated	2 (8.3%)	2 (14.3%)	4
Record Not Found	2 (8.3%)	1 (7.1%)	3
Total	**24**	**14**	**38**

Statistical Analysis:

Fishers Exact = 1.675; df = 3; **p = 0.643**

Sinonasal Squamous Cell Carcinoma (Snscc)

The age of patients diagnosed with SNSCC ranged from **36 to 63 years**, with a **mean age of 47 ± 9.23 years**, indicating presentation at a relatively younger mean age compared to OSCC.

This table illustrates the sex distribution among SNSCC cases. Males accounted for two-thirds of cases (66.7%), while females comprised one-third (33.3%), yielding a male-to-female ratio of 2:1. Percentages are calculated from the total number of SNSCC cases (n = 6)-Table 7

Table 7. Sex Distribution of SNSCC (n = 6)

Sex	Frequency (n)	Percentage (%)
Male	4	66.7
Female	2	33.3
Total	**6**	**100**

Table 8 shows that keratinizing SNSCC was more common than non-keratinizing type. However, no statistically significant association was observed between sex and histological type ($p > 0.05$).

Table 8. Histological Types of SNSCC (n = 6)

Histological Type	Frequency (n)	Percentage (%)
Keratinizing	4	66.7
Non-Keratinizing	2	33.3
Total	**6**	**100**

Statistical Analysis:

Fishers Exact = 0.38; df = 1; **p = 0.54**

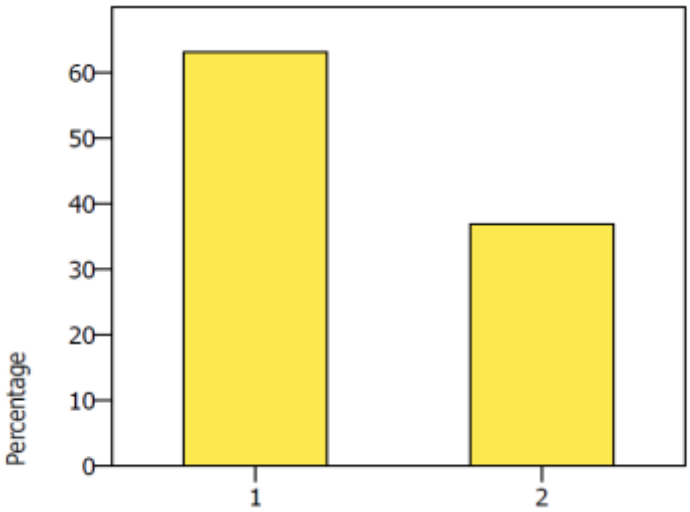

FIGURE 1: Sex Distribution of OSCC (*Key: 1-Male 2-Female)

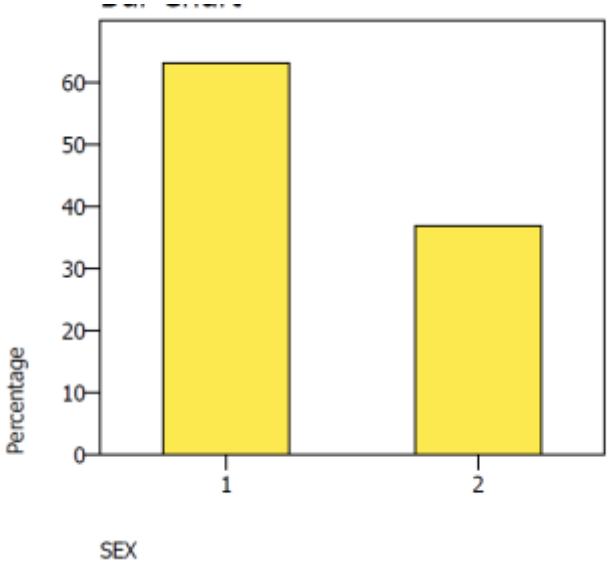

FIGURE 2: Sex Distribution of SNSCC (*Key: 1-Male 2-Female)

DISCUSSION

In our study, OSCC comprised 34.5% of all maxillofacial /head and neck (including oral cavity) malignancies diagnosed. This represents about a third of malignancies in all head and neck sites received. Other malignancies seen in various proportions, which are not the focus of our study include sarcomas, lymphomas and adenocarcinomas.

Most epidemiological studies report OSCC as the most common oral malignancy accounting for about 90% of malignancies of the oral cavity. [1-3, 18] Our study however took into account its prevalence among all head and neck malignancies, not just oral malignancies. Our study also shows OSCC male predominance, and was almost twice as common in males as in females, similar to other studies in Nigeria and globally. [17, 32] This may be related to a higher exposure to primary risk factors of tobacco smoking and alcohol use among males in our Nigerian society. The mean age for OSCC in our study is 56.5(SD±16.4) years, similar to previous Nigerian Studies and US statistics[17, 33]

The most prevalent primary clinical site of OSCC in our study, is the tongue, making up 28.9% of all oral sites involved. This is in tandem with previous studies globally, indicating the tongue as the most common site, 25% to 40% of all oral sites affected by OSCC. [34-36]

A previous multi-center Nigerian study reported the palate as the most common site.[33] That study however did not make a distinction from SNSCC, as sinonasal sites like the maxillary antrum and nasopharynx were also included among the sites of OSCC. It is also notable that ascertaining the primary site may be difficult in sites that are adjacent to each other like palate and maxillary antrum, where infiltration of adjacent mucosa becomes inevitable, due to late presentation, which is often the case in our environment as a result of poor health awareness or healthcare access.

The mandibular gingiva is the next most common site seen in our series, several studies have given variable sites as next in frequency to the tongue, mostly buccal mucosa, floor of mouth and alveolar mucosa/gingiva.[34, 35, 37] As previously noted, adjacent mucosa infiltration may make it difficult to distinguish primary sites in late clinical stages. A recent systematic review of OSCC articles from Nigeria has highlighted regional geographic variations in some clinico-pathologic characteristics of OSCC studied.[32]

It is also noted by our study that there is a statistically significant difference between males and females, by site ($p = 0.045$). While most females had the tongue as the primary site, no female presented with buccal mucosa or palate sites; the mandibular gingiva site was mostly seen in males, tongue and buccal mucosa sites presenting equally as next most common in males. Perhaps the mode of contact of the oral cavity to various risk factors or habits (e,g chewing, licking, placing or smoking of tobacco products and carcinogenic agents) varied by socio-cultural practices between genders may influence the primary site presented. Further research into gender practices may identify differential exposure to risk factors.

For the histological grading of OSCC, most of the cases diagnosed in this study are moderately differentiated that is Grade II (55.3%), which is in keeping with other global studies [38, 39] though a study from Nigeria had indicated the well- differentiated type (Grade I) as most common. [40] This is followed by the poorly differentiated type (Grade III), in this study. Thus, our study indicates that there is a burden of advanced OSCC in our environment, since histological of OSCC is a factor to consider in clinical staging, this often gives poorer prognosis and require extensive management modalities.[38] Histological grading may have inter-observer variability across different studies, moreover, more parameters are now considered in grading, than degree of keratinization alone used basically in older periods. Hence, despite abundant keratinization in neoplastic nests, other parameters like mitotic figures and cellular atypia, inflammatory response, invasive fronts and depth of invasion of neoplastic cells are considered in giving an overall grading to the malignancy. [38] We suggest that differences in approach may be partly responsible for variations in reports on grading of OSCC.

SNSCC in our study accounts for only 5.5% of head and neck malignancies studied, attesting to the relative rarity of this malignancy.[4-6] The mean age of SNSCC was 47.0 (SD±9.23) years. This is at variance with studies reporting higher mean ages and predilection for 6th to 7th decade of life. The small number of SNSCC cases found in our series, though with age range of 36 to 63 years, may be skewed and not reflect the true distribution of this lesion. HPV positive SNSCC cases are also said to be associated with younger ages.[4-6] We did not however, investigate HPV association or other risk factors in this study, as the aim of our study did not focus on risk factors but it is a gap for further study. Similar to OSCC, SNSCC in our study is commoner in males accounting for 66.7% of cases. This in keeping with most reports [4,5] All cases of SNSCC in these series indicated primary sites as the maxillary antrum, with one involving the nasal sinus,

The Keratinizing type of SNSCC accounts for 66.7% of the cases seen, but no significant difference was found between the keratinizing and non-keratinizing types in both genders. While the non-keratinizing types is said to be more associated with HPV, the keratinizing type is typically associated with smoking and environmental carcinogens.[4, 5]

Oral Squamous Cell Carcinoma (OSCC) and Sinonasal Squamous Cell Carcinoma (SNSCC) are both malignancies of the mucosal lining, which are said to differ significantly in frequency, risk factors, clinical and histological presentation.[4-6] Our study has looked into the presentation and distribution of these lesions in our population in the light of new adaptations in socio-cultural practices globally, in order to identify patterns for diagnosis in Nigerians and possibly Africans generally.

Limitations

This study is limited by its retrospective design and reliance on archived histopathology records, which resulted in incomplete documentation in some cases. As a single-center study, the findings may not be fully generalizable to the wider population. The small number of SNSCC cases reduced the statistical power of subgroup analyses. Additionally, risk factor information, including tobacco, alcohol, occupational exposures, and HPV status, was not available, preventing etiologic correlations.

CONCLUSION

This study demonstrates that oral squamous cell carcinoma (OSCC) accounts for a substantial proportion (34.5%) of head and neck malignancies diagnosed at our centre, confirming its significant disease burden within the oral and maxillofacial region. OSCC showed a clear male predominance and occurred most frequently in the sixth and seventh decades of life, with a mean age comparable to previous Nigerian and international reports. The tongue was the most common primary site, followed by the mandibular gingiva, and a significant association was observed between tumour site and sex using Fisher's exact test. Most tumours were moderately differentiated, with no significant association between histological grade and sex. Sinonasal squamous cell carcinoma (SNSCC) was relatively rare (5.5%), occurred at a younger mean age than OSCC, and also demonstrated male predominance. Although the keratinizing subtype was more common, histological type was not significantly associated with sex. Overall, the findings highlight important clinicopathologic patterns of OSCC and SNSCC in our environment and provide baseline data for improved diagnosis and future research.

REFERENCES

1. Chamoli, A., Gosavi, A., Shirwadkar, U., Wangdale, K., Behera, S., Kurrey, N., Kalia, K., & Mandoli, Overview of oral cavity squamous cell carcinoma: Risk factors, mechanisms, and diagnostics. Oral oncology, 2021; 121: 10545.
2. Tan, Y., Wang, Z., Xu, M., Li, B., Huang, Z., Qin, S., Nice, E., Tang, J., & Huang, C. Oral squamous cell carcinomas: state of the field and emerging directions. International Journal of Oral Science, 2023; 15.
3. Bugshan, A., & Farooq, I. Oral squamous cell carcinoma: metastasis, potentially associated malignant disorders, etiology and recent advancements in diagnosis. F1000Research, 2020; 9.
4. Ferrari, M., Taboni, S., Carobbio, A., Emanuelli, E., Maroldi, R., Bossi, P., & Nicolai, P. Sinonasal Squamous Cell Carcinoma, a Narrative Reappraisal of the Current Evidence. Cancers, 2021; 13.
5. Jakimovska, F., Stojkovski, I., & Kjosevska, E. Nasal Cavity and Paranasal Sinus Cancer: Diagnosis and Treatment. Current Oncology Reports, 2024; 26: 1057 - 1069.
6. Diah, M., Bestari, A., S., Prapyatiningsih Y.S, & Onk S. Squamous Cell Carcinoma Sinonasal: A Case Report. International Journal of Science and Research (IJSR). 2024
7. Leemans, C.R.; Snijders, P.J.; Brakenhoff, R.H. The molecular landscape of head and neck cancer. Nat. Rev. Cancer **2018**; 18,269–282.
8. Marziliano, A.; Teckie, S.; Diefenbach, M.A. Alcohol—Related head and neck cancer: Summary of the literature. Head Neck **2020**; 42: 732–738.
9. Argiris, A.; Karamouzis, M.V.; Raben, D.; Ferris, R.L. Head and neck cancer. Lancet **2008**; 371, 1695–1709.

10. Ribassin-Majed, L.; Hill, C. Trends in tobacco-attributable mortality in France. Eur. J. Public Health **2015**; 25, 824–828.
11. Holford, T.R.; Meza, R.; Warner, K.E.; Meernik, C.; Jeon, J.; Moolgavkar, S.H.; Levy, D.T. Tobacco control and the reduction in smok-ing-related premature deaths in the United States, 1964–2012. JAMA **2014**; 311, 164–171.
12. Renou, A.; Guizard, A.-V.; Chabrillac, E.; Defossez, G.; Grosclaude, P.; Deneuve, S.; Vergez, S.; Lapotre-Ledoux, B.; Plouvier, S.D.;Dupret-Bories, A.; et al. Evolution of the Incidence of Oral Cavity Cancers in the Elderly from 1990 to 2018. J. Clin. Med. **2023**; 12: 1071.
13. Deneuve, S.; Pérol, O.; Dantony, E.; Guizard, A.; Bossard, N.; Virard, F.; Fervers, B.; FRANCIM Network (French NationalNetwork of Cancer Registries). Diverging incidence trends of oral tongue cancer compared to other head and neck cancers inyoung adults in France. Int. J. Cancer **2022**; 150, 1301–1309.
14. Ng, J.H.; Iyer, N.G.; Tan, M.-H.; Edgren, G. Changing epidemiology of oral squamous cell carcinoma of the tongue: A globalstudy. Head Neck **2016**; 39, 297–304.
15. Nauta, I.H.; Heideman, D.A.M.; Brink, A.; Steen, B.; Bloemena, E.; Koljenovi´c, S.; de Jong, R.J.B.; Leemans, C.R.; Brakenhoff, R.H.The unveiled reality of human papillomavirus as risk factor for oral cavity squamous cell carcinoma. Int. J. Cancer **2021**; 149,420–430.
16. Nokovitch L, Maquet C, Crampon F, Taihi I, Roussel LM, Obongo R, Virard F, Fervers B, Deneuve S. Oral Cavity Squamous Cell Carcinoma Risk Factors: State of the Art. J Clin Med. 2023; 12(9):3264.
17. Siegel RL, Giaquinto AN, Jemal A. Cancer statistics, 2024 [published correction appears in CA Cancer J Clin. 2024; 74(2):203.]. CA Cancer J Clin 2024; 74(1):12-49.
18. Jagadeesan, D., Sathasivam, K., Fuloria, N., Balakrishnan, V., Khor, G., Ravichandran, M., Solyappan, M., Fuloria, S., Gupta, G., Ahlawat, A., Yadav, G., Kaur, P., & Husseen, B. Comprehensive insights into oral squamous cell carcinoma: Diagnosis, pathogenesis, and therapeutic advances. Pathology, research and practice, 2024; 261:155489.
19. Guha, N.;Warnakulasuriya, S.; Vlaanderen, J.; Straif, K. Betel quid chewing and the risk of oral and oropharyngeal cancers: A meta-analysis with implications for cancer control. Int. J. Cancer **2014**, 135, 1433–1443.
20. Jeng, J.; Chang, M.; Hahn, L. Role of areca nut in betel quid-associated chemical carcinogenesis: Current awareness and future perspectives. Oral Oncol. **2001**, 37, 477–492.
21. Amarasinghe, H.K.; Usgodaarachchi, U.S.; Johnson, N.W.; Lalloo, R.;Warnakulasuriya, S. Betel-quid chewing with or without tobacco is a major risk factor for oral potentially malignant disorders in Sri Lanka: A case-control study. Oral Oncol. **2010**, 46, 297–301.
22. Amarasinghe, H.K.; Usgodaarachchi, U.S.; Johnson, N.W.; Warnakulasuriya, S. High Prevalence of Lifestyle Factors At-tributable for Oral Cancer, and of Oral Potentially Malignant Disorders in Rural Sri Lanka. Asian Pac. J. Cancer Prev. APJCP **2018**; 19: 2485–2492.
23. Cheng, R.H.; Wang, Y.P.; Chang, J.Y.F.; Pan, Y.H.; Chang, M.C.; Jeng, J.H. Genetic Susceptibility and Protein Expression of Extracel-lular Matrix Turnover-Related Genes in Oral Submucous Fibrosis. Int. J. Mol. Sci. **2020**; 21: 8104.
24. Lee, C.H.; Ko, A.M.S.; Yen, C.F.; Chu, K.S.; Gao, Y.J.; Warnakulasuriya, S.; Sunarjo Ibrahim, S.O.; Zain, R.B.; Patrick, W.K.; Ko, Y.C. Betel-quid dependence and oral potentially malig-nant disorders in six Asian countries. Br. J. Psychiatry **2012**; 201: 383–391.
25. El-Naggar, A.K.; Chan, J.K.C.; Grandis, J.R.; Takata, T.; Slootweg, P.J.; International Agency for Research on Cancer. WHO Classification of Head and Neck Tumours; WHO: Lyon, France, 2017; ISBN 9789283224389.
26. Cecco, L.D.; Serafini, M.S.; Facco, C.; Granata, R.; Orlandi, E.; Fallai, C.; Licitra, L.; Marchesi, E.; Perrone, F.; Pilotti, S.; et al. A functional gene expression analysis in epithelial sinonasal cancer: Biology and clinical relevance behind three histological subtypes. Oral Oncol. **2019**; 90: 94–101.
27. Ferrari M, Taboni S, Carobbio ALC, Emanuelli E, Maroldi R, Bossi P, Nicolai P. Sinonasal Squamous Cell Carcinoma, a Narrative Reappraisal of the Current Evidence. Cancers (Basel). 2021; 13(11):2835.
28. Ryantama, A., Setiawan, E., Lesmana, W., Asthuta, A., Saputra, K., & Sari, L. Non-Keratinizing Sinonasal Squamous Cell Carcinoma Extending to the Skull Base: Surgical Management with Total Maxillectomy - A Case Study. Archives of The Medicine and Case Reports. 2025

29. Goh, R., & Keng, C. A Meta-Analysis on the Impact of Induction Chemotherapy on Survival Outcomes for Sinonasal Squamous Cell Carcinoma. Journal of Rhinology, 2025; 32: 10 - 16.
30. Deshkina, T., Bolotina, L., Gevorkov, A., Boyko, A., Kornietskaya, A., Polyakov, A., Golubev, P., Sydykova, R., & Fedenko, A. Results of complex treatment of patients with locally advanced squamous cell carcinoma of the paranasal sinuses and nasal cavity using induction chemotherapy. Head and Neck Tumors (HNT). 2023
31. Kravitz MB, Annadata V, Ilyaev B, Tong CCL, Fastenburg JH, Chaskes MB. Recurrent Sinonasal Squamous Cell Carcinoma: Current Insights and Treatment Advances. Cancers. 2025; 17(1):4.
32. Uchenna P. Egbunah. Prevalence, presentation, risk factors and awareness of oral cancer: A systematic review of the Nigerian experience, Ibom Medical Journal, 2025 |; 18(1) Pages 18 - 29
33. Omitola OG, Soyele OO, Sigbeku O, Okoh D, Akinshipo AO, Butali A, Adeola HA. A multi-centre evaluation of oral cancer in Southern and Western Nigeria: An African oral pathology research consortium initiative. Pan Afr Med J. 2017; 22; 28:64.
34. Tan Y, Wa Fatima J, Fatima E, Mehmood F, Ishtiaq I, Khan MA, Khurshid HMS, Kashif M. Comprehensive Analysis of Oral Squamous Cell Carcinomas: Clinical, Epidemiological, and Histopathological Insights with a Focus on Prognostic Factors and Survival Time. Cureus. 2024; 16(2): e54394.
35. Reichal P, Ramani P, Kizhakkoottu S. Association of Site and Recurrence in Oral Squamous Cell Carcinoma Patients Visiting Private Hospital in Chennai: A Retrospective Study. Cureus. 2024 Jan 23;16(1): e52774.
36. Ibrahim O. Bello, Ylermi Soini, Tuula Salo, Prognostic evaluation of oral tongue cancer: Means, markers and perspectives (I), Oral Oncology, Volume 46, Issue 9, 2010, Pages 630-635
37. Natheer H. Al-Rawi, Ibrahim Y. Hachim, Mahmood Y. Hachim, Abdulrahman Salmeh, Asmaa T. Uthman, Hesham Marei, Anatomical landscape of oral squamous cell carcinoma: A single cancer center study in UAE, Heliyon, 2023; 9 (5): e15884.
38. Fatima J, Fatima E, Mehmood F, Ishtiaq I, Khan MA, Khurshid HMS, Kashif M. Comprehensive Analysis of Oral Squamous Cell Carcinomas: Clinical, Epidemiological, and Histopathological Insights with a Focus on Prognostic Factors and Survival Time. Cureus. 2024; 16(2): e54394.
39. Ilie IO, Mărgăritescu OC, Stepan AE, Ciurea RN, Florescu MM, Munteanu C, Şerbănescu MS, Mărgăritescu C. Epidemiological and Histopathological Features of Oral Squamous Cell Carcinoma-A Retrospective Study. Curr Health Sci J. 2024; 50(3):411-420
40. Bala, Mujtaba, Ramat Oyebunmi Braimah, Abdurrazaq Olanrewaju Taiwo, Bandar Alyami, Bashar Muhammed Aliyu, Kehinde Kazeem Kanmodi, Sadeeq Fawa Abubakar, Abubakar Muhammad Kaura, Lateef Alani Yekini, and Sufiyanu Umar Yabo. “Squamous Cell Carcinoma in the Oral and Maxillofacial Region: A 12-Year Analysis at a Tertiary Healthcare Facility from North-Western Nigeria”. Journal of Cancer and Tumor International, 2023; 13 (3):19-27.