Oral squamous cell carcinoma: A 26 years institutional cross-sectional study

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Abstract

Context: The variance in the prevalence of oral squamous cell carcinoma (OSCC) around the world has been associated with a number of sociocultural traits, significant regional variations in risk factors, variations in data gathering, and the degree of health service development in different populations. Here, we undertake a 26 years institutional review and analysis of OSCC cases.

Aim: To evaluate and analyse 26 years Institutional Data of OSCC.

Settings and Design: Department of Oral and Maxillofacial Pathology's archives, Government Dental College and Hospital, Nagpur, Maharashtra, and observational cross-sectional study.

Methods and Material: This study examines instances of OSCC that were histologically diagnosed between 1997 and 2022. All information pertaining to cases of OSCC was obtained from the departmental archives.

Statistical Analysis Used: Data tabulated and then subjected to descriptive statistical analysis with the SPSS statistical software.

Results: The total number of the patients included 1508 (69.6%) males and 660 (30.4%) females, whose age ranged from the second decade to the tenth decade of life with a mean age of 55.5 years with a range of 20–91 years. The incidence was the highest in the fifth and sixth decades ($n = 603$, 27.8% and $n = 572$, 26.4%), respectively. The left buccal mucosa recorded the maximum number of cases (left buccal mucosa 559, 25.8%). There were 1405 (64.8%) cases of well-differentiated SCC, 301 (13.9%) cases of moderately differentiated SCC, and 51 (2.4%) cases of poorly differentiated SCC.

Conclusions: The overall incidence and prevalence of OSCC can be estimated using baseline epidemiological data from our institution.

Keywords: Institutional Data, incidence, prevalence, oral squamous cell carcinoma (OSCC)

INTRODUCTION

Oral squamous cell carcinoma (OSCC) is a malignant neoplasm that arises from the mucosal epithelium of the oral cavity and exhibits varied squamous differentiation. It is a cancerous growth of squamous cells that exhibit different levels of keratinisation. Squamous cell carcinoma (SCC) accounts for more than 90% of malignancies in the oral cavity. Patients' overall 5-year survival rate is less than 50%.[1]

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Cancer is the term for any unchecked cell proliferation that invades another tissue and damages it. Oral cancer ensues with a small, unfamiliar, unexplained growth or sore in the mouth parts that include lips, cheeks, sinuses, tongue, hard and soft palate, and the base of the mouth extended to the oropharynx. Oral cancer is the sixth most common type of cancer worldwide. Approximately one-fourth of all cases worldwide are reported in India each year, with 52,000 deaths and 77,000 new cases. India accounts for one-third of the global oral cancer burden and the greatest number of instances of the disease. At 57- 84%, OSCC is a significant contributor to oral cancer.[2]

Ninety percent of the instances of OSCC that have been recorded have been linked to tobacco use in one form or another. Other factors that have been implicated include alcohol and smoking. In addition, a number of putative risk factors for the development of OSCC have been identified, including persistent irritation, poor dental hygiene, viral infections, occupational exposure, malnourishment, and genetics.[3]

Age was widely regarded as a covariable and was known to affect the way a treatment worked.[4] For patients with OSCC, gender did not appear to be a significant predictor of survival.[5]

The primary reason of the comparatively high incidence of oral cancer in India is the ongoing use of tobacco in several forms, including gutka, zarda, mawa, kharra, khaini, cigarettes, bidi, and hookah. In addition to tobacco use, human papillomavirus (HPV) infection has drawn particular attention lately.[2,3]

In this study, we mainly focused on cases of OSCC having tobacco or tobacco-associated habits because the central Indian population abundantly used tobacco and its associated products, so our main purpose here is to create more awareness about hazardous effects of tobacco in various forms by correlating them to OSCC cases and that may affect the degree of health services and policies development in this area.

Research has indicated that there are notable regional variations in the prevalence of OSCC. The difference in the prevalence of OSCC around the world has been associated with a number of sociocultural traits, significant regional variations in risk factors, variations in data gathering, and the degree of health service development in different populations. Accurately recorded data are a crucial gauge of the scope and trends of India's cancer epidemic. Educating policy makers on the histopathologic trend and demographics of OSCC will assist the authorities in setting up additional facilities to serve patients and laboratories.[1]

Till now, very few epidemiological studies have been conducted exclusively on OSCC. In this study, we undertake a 26 years institutional review and analysis of OSCC cases.

MATERIAL AND METHODS

This study examines instances of OSCC that were histologically diagnosed at Government Dental College and Hospital in Nagpur, Maharashtra, between 1997 and 2022. All information pertaining to instances of OSCC was obtained from the Department of Oral and Maxillofacial Pathology's archives. From departmental archives, the biopsy forms filled with case history that were received along with incisional biopsies from other departments and other areas, the information below was gathered and examined. The following factors were taken into consideration: age, gender,

Table A: Shows overall Statistical analysis

		Gender	Diagnosis	Site	Habit	AgeGroup	Age
				Statistics			
n	Valid	2168	2168	2168	2168	2168	2168
	Missing	0	0	0	0	0	0
Mean						5.5291	51.5895
Std. Error of Mean						0.02664	0.26365
Median						6.0000	51.0000
Mode						5.00	50.00
Std. Deviation						1.24041	12.27610
Variance						1.539	150.703
Kurtosis						-0.474	-0.543
Std. Error of Kurtosis						0.105	0.105
Range						8.00	71.00
Minimum						2.00	20.00
Maximum						10.00	91.00
Sum						11987.00	111846.00

habit history (smokeless or smoking tobacco) and anatomical site:

- Non-keratinised mucosa (floor of the mouth, buccal mucosa, labial mucosa)
- Keratinised mucosa (gingiva, palate)
- Specialised mucosa or tongue dorsum.

Haematoxylin and Eosin (H and E)-stained histopathology slides were chosen from departmental archives and reassessed in accordance with Bryne's grading (1989) system.[6] Our inclusion criteria had histologically confirmed incisional OSCC cases. The study excluded lesions that did not exhibit histological results consistent with OSCC. Some records that were sent with the biopsy specimens were inadequate and were dropped.

From patients' records, we obtained patients' demographic characteristics (age, gender, and smokeless tobacco or smoking tobacco habits) and clinicopathologic features (anatomic site, differentiation degree). Data tabulated and then subjected to descriptive statistical analysis with the SPSS statistical software [Table A].

RESULTS

1. Clinical Presentation: Pain, growth, and teeth mobility were prevalent symptoms among the OSCC cases in our institutional review. A few cases also had a history of leukoplakia and oral submucous fibrosis; the exact number of OSSC cases having premalignant conditions was not mentioned here due to lack data related to it. The most common presentation of the lesion was in the form of ulcer or ulcero-proliferative growth.
2. Anatomical Site Distribution: The buccal mucosa on the left side mainly recorded the most cases in our study. The area least impacted was the anterior maxilla. A total of 559 cases (25.8%) involved the left buccal mucosa, and 440 cases (20.3%)

included the left mandible. The non-keratinised mucosa (buccal mucosa, labial mucosa, floor of the mouth, lateral and ventral tongue) was the site of about 1878 cases of OSCC. In 290 cases, the keratinised mucosa (hard palate, gingiva) was involved [Table 1].

3. Age: According to our study, there were OSCC instances from the second to the tenth decade of life, with an average age of 55.5 and a range of 20 to 91 years.
   The largest incidence of disease was found in the fifth and sixth decades (n = 603, 27.8% and n = 572, 26.4%, respectively) [Table 2 and Graph 1].
4. Gender: In this study, the male to female ratio was 2.28:1, with 1508 (69.6%) male patients and 660 (30.4%) female patients [Table 3 and Pie diagram 1].
5. Habits: Out of the total number of OSCC cases, 1859 (85.8%) had a habit of chewing smokeless tobacco (tobacco, areca nut, gutkha, pan masala, kharra, snuff), and 97 (4.5%) had a habit of smoking tobacco (cigarettes and bidis). We also discovered instances where the patient's habit was absent or where there were incomplete data. There were 212 cases, whose data were lacking or who may or may not have the habit [Table 4 and Graph 2].
6. Histological Types of OSCC:
   A total of 1405 (64.8%) cases of well-differentiated SCC (WDSCC) (Grade I Well), 301 (13.9%) cases of moderately differentiated SCC (MDSCC) (Grade II Moderate), 51 (2.4%) cases of poorly differentiated SCC (PDSCC) (Grade III Poor) based on Bryne's grading system,[6] and 208 (10%) cases of verrucous carcinoma (VC) and 209 (9%) cases of non-classified OSCC were included in this investigation [Table 5 and Pie diagram 2].
7. Incidence and Prevalence [Table 6 and Pie diagram 3]:
   As we had only the last few years' total OPD patients' data, we were able to calculate the last eight years' annual incidence rate and point prevalence. From here, we appreciated that the incidence and prevalence

Table 1: Shows Anatomic Site Distribution

Site	Frequency	Percent
Left Buccal Mucosa	559	25.8
Left Mandible	440	20.3
Right Buccal Mucosa	402	18.5
Right Mandible	294	13.6
Anterior Mandible	173	8.0
Tongue	159	7.3
Left Maxilla	44	2.0
Right Maxilla	35	1.6
Palate	32	1.5
Floor Of Mouth	24	1.1
Anterior Maxilla	6	0.3
Total	2168	100.0
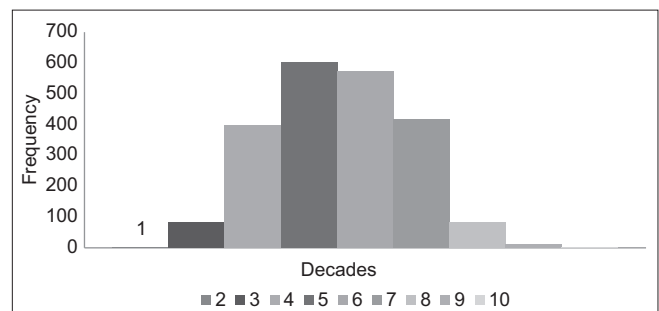
Graph 1: Show Age distribution

Table 2: Show Age distribution

		Age Group		
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2.00	1	0.0	0.0	0.0
	3.00	82	3.8	3.8	3.8
	4.00	396	18.3	18.3	22.1
	5.00	603	27.8	27.8	49.9
	6.00	572	26.4	26.4	76.3
	7.00	418	19.3	19.3	95.6
	8.00	83	3.8	3.8	99.4
	9.00	12	0.6	0.6	100.0
	10.00	1	0.0	0.0	100.0
	Total	2168	100.0	100.0	

Decade	Frequency	%
2-20 yr	1	0.05
3	82	3.8
4	396	18.3
5	603	28
6	572	27
7	418	19.3
8	83	3.8
9	12	0.6
10-91 yr	1	0.05
Total	2168	100.0

		Age		
		Frequency	Percent	Valid Percent	Cumulative Percent
Vali	20.00	1	.0	.0	.0
	21.00	1	.0	.0	.1
	22.00	1	.0	.0	.1
	23.00	1	.0	.0	.2
	24.00	1	.0	.0	.2
	25.00	15	.7	.7	.9
	26.00	9	.4	.4	1.3
	27.00	6	.3	.3	1.6
	28.00	10	.5	.5	2.1
	29.00	8	.4	.4	2.4
	30.00	30	1.4	1.4	3.8
	31.00	12	.6	.6	4.4
	32.00	36	1.7	1.7	6.0
	33.00	11	.5	.5	6.5
	34.00	18	.8	.8	7.4
	35.00	94	4.3	4.3	11.7
	36.00	29	1.3	1.3	13.1
	37.00	17	.8	.8	13.8
	38.00	28	1.3	1.3	15.1
	39.00	17	.8	.8	15.9
	40.00	134	6.2	6.2	22.1
	41.00	16	.7	.7	22.8
	42.00	75	3.5	3.5	26.3
	43.00	23	1.1	1.1	27.4
	44.00	38	1.8	1.8	29.1
	45.00	158	7.3	7.3	36.4
	46.00	31	1.4	1.4	37.8
	47.00	30	1.4	1.4	39.2
	48.00	38	1.8	1.8	41.0
	49.00	25	1.2	1.2	42.1
	50.00	168	7.7	7.7	49.9
	51.00	13	.6	.6	50.5
	52.00	50	2.3	2.3	52.8
	53.00	23	1.1	1.1	53.8

Contd...

Table 2: Contd...

	Frequency	Percent	Valid Percent	Cumulative Percent
54.00	34	1.6	1.6	55.4
55.00	161	7.4	7.4	62.8
56.00	38	1.8	1.8	64.6
57.00	30	1.4	1.4	66.0
58.00	45	2.1	2.1	68.0
59.00	24	1.1	1.1	69.1
60.00	155	7.1	7.1	76.3
61.00	20	.9	.9	77.2
62.00	45	2.1	2.1	79.3
63.00	23	1.1	1.1	80.4
64.00	24	1.1	1.1	81.5
65.00	151	7.0	7.0	88.4
66.00	23	1.1	1.1	89.5
67.00	22	1.0	1.0	90.5
68.00	19	.9	.9	91.4
69.00	5	.2	.2	91.6
70.00	86	4.0	4.0	95.6
71.00	7	.3	.3	95.9
72.00	11	.5	.5	96.4
73.00	6	.3	.3	96.7
74.00	5	.2	.2	96.9
75.00	27	1.2	1.2	98.2
76.00	6	.3	.3	98.4
77.00	1	.0	.0	98.5
78.00	4	.2	.2	98.7
79.00	5	.2	.2	98.9
80.00	11	.5	.5	99.4
81.00	1	.0	.0	99.4
82.00	2	.1	.1	99.5
83.00	1	.0	.0	99.6
84.00	3	.1	.1	99.7
85.00	3	.1	.1	99.9
88.00	1	.0	.0	99.9
90.00	1	.0	.0	100.0
91.00	1	.0	.0	100.0
Total	2168	100.0	100.0	
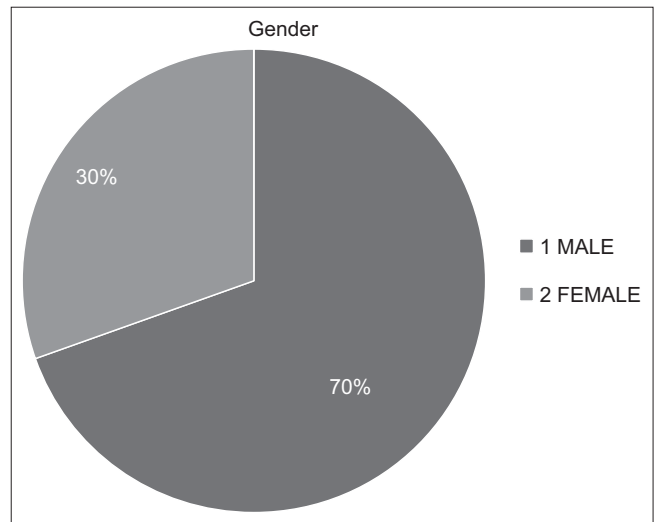
Pie diagram 1: Show Gender distribution

of OSCC cases rise from recent values. Although the total number of WDSCC was larger overall, our data indicate that the greatest incidence of MDSCC

Table 3: Show Gender distribution

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	F	660	30.4	30.4	30.4
	M	1508	69.6	69.6	100.0
	Total	2168	100.0	100.0	

Gender	Frequency	Percent
F	660	30.4
M	1508	69.6
Total	2168	100.0

M:F Ratio=2.28:1

Table 4: Show Habit association

Habit	Frequency		Percent
Tobacco	1081	49.9	Smokeless tobacco
Kharra	594	27.4	Chewing- 86%
Areca nut	122	5.6	
Gutkha	36	1.7	
Pan masala	21	1.0	
Snuff	5	0.2	
Bidi	73	3.4	Smoking tobacco-
Cigarette	24	1.1	4.5%
No habit	212	9.8	
Total	2168	100.0	

Habit					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		212	9.8	9.8	9.8
	Areca nut	122	5.6	5.6	15.4
	Bidi	73	3.4	3.4	18.8
	Cigarette	24	1.1	1.1	19.9
	Gutkha	36	1.7	1.7	21.5
	Kharra	593	27.4	27.4	48.9
	Khrra	1	0.0	0.0	48.9
	Man masala	1	0.0	0.0	49.0
	Pan masala	20	0.9	0.9	49.9
	Snuff	5	0.2	0.2	50.1
	Tobacco	1081	49.9	49.9	100.0
	Total	2168	100.0	100.0	

Table 5: Show Histopathological diagnosis

H/P Types Of OSCC	Frequency	Percent
WDSCC- Grade I	1405	65
MDSCC- Grade II	301	14
PDSCC- Grade III	51	2
VC	208	10
SCC	203	9
Total	2168	100.0

Diagnosis					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MDSCC	301	13.9	13.9	13.9
	PDSCC	51	2.4	2.4	16.2
	SCC	203	9.4	9.4	25.6
	VC	208	9.6	9.6	35.2
	WDSCC	1405	64.8	64.8	100.0
	Total	2168	100.0	100.0	

Table 6: Shows Incidence and Prevalence of OSCC

| Year	Annual Incidence Rate for the Year/ thousand patients	Cumulative Incidence for the Year/ thousand patients	Point Prevalence for the Year
2022	5	39.8	0.50%
2021	2	16.5	0.20%
2020	1	08.3	0.10%
2019	2	10.2	0.20%
2018	1	05.5	0.10%
2017	2	06.0	0.20%
2016	2	04.7	0.20%
2015	2	02.0	0.20%
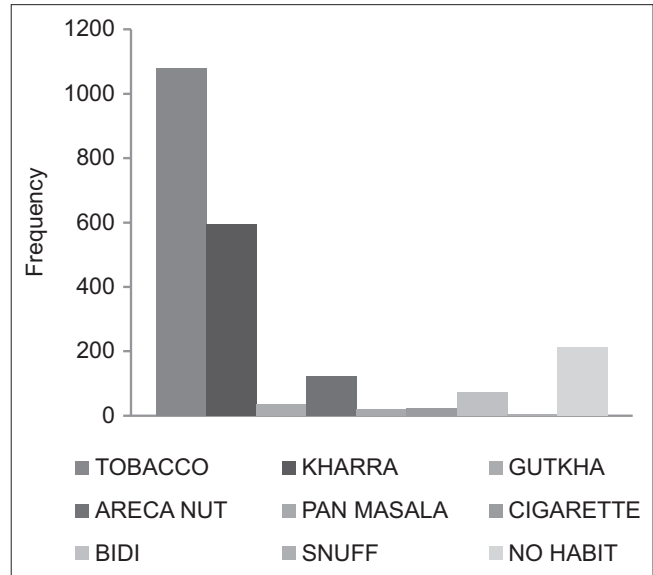
Graph 2: Show Habit association
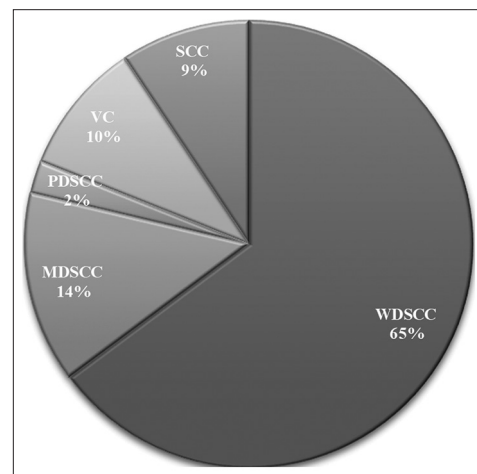
Pie diagram 2: Show Histopathological diagnosis

occurred between 2015 and 2018, while the peak incidence of PDSCC occurred in the seventh decade of life between 2019 and 2022.

Out of the 10,000 incisional histological cases we had between 1997 (B/5300/1997) and 2022 (B/15000/2022), 2168 instances had OSCC. This was a significant number, and it warrants serious consideration [Pie diagram 3].
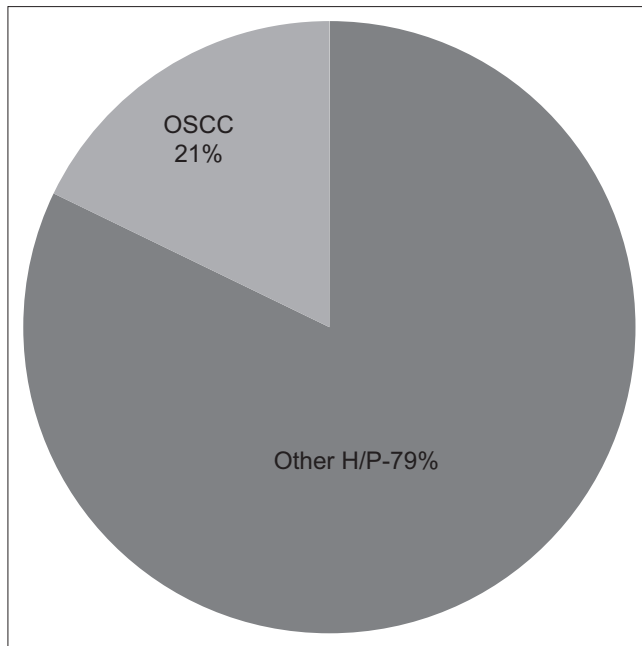
Pie diagram 3: Shows OSCC-21% and all remaining histopathological cases - 79%

DISCUSSION

Worldwide, the projected number of patients with oral cancer each year is 300,000. India has the highest rate of oral cancer in the world (almost 20%), with 1% of the population thought to have oral premalignant lesions.[7] In India, it is the most common cancer amongst men. Worldwide, the male to female ratio is roughly 2.4:1.[1] There were more male OSCC cases than female OSCC cases in the current study. The male to female ratio of 2.28:1 is in line with the findings of other OSCC studies.[2,3,7-11] Conversely, a small number of research studies indicate a minor preference for women.[1,12,13] Men are more likely to have easy access to tobacco products due to sociocultural norms and values. With the advent of ready-to-use tobacco products and aggressive marketing which targets not only adults but also youths.[7]

Oral cancer is typically diagnosed in the middle age; however, in the current study, the majority of male and female cases were diagnosed in their fifth or sixth decade of life, with a range from 2nd to 10th decades. The age distribution of OSCC is in line with previous research.[1,7,9,11] Two peaks were noted in the third and fifth decades of a Nigerian study, with the first peak occurring in a younger decade, contradictory to our study.[14] According to our study findings, PDSCC is more common in the seventh and eighth decades of life. This could be because of immune system deterioration, prolonged exposure to risk factors, and the accumulation of genetic mutations that increase with age. In contrast to our research, Nayak *et al.*'s[1] study discovered that

the mean age of poorly differentiated carcinoma occurrence was 48 years old, with a tendency toward a lower age group. The oldest male patient was 91 years old, while the youngest was 21. The oldest patient in the case of the female patients was 90 years old, while the youngest was 20.

The mouth cavity is especially susceptible to cancer because tobacco includes numerous toxins. The amount of tobacco used is directly correlated with the early onset of cancer. Worldwide variations also exist in the site predilection. Among those in Iraq who were exposed to ultraviolet radiation, the lip was the favoured site of OSCC.[15] The tongue was the most often used site in numerous studies.[12,16] The common site in Sao Paulo, Brazil, was gingiva.[17] The most common sites involved in our study were the left buccal mucosa, 559 cases (25.8%), and the left mandible and/or gingivobuccal sulcus, 440 cases (20.3%), were the most affected sites, followed by the right buccal mucosa (402, 18.5%), right mandible (294, 13.6%), anterior mandible (173, 8%), tongue, maxilla, palate, and floor of the mouth. These results align with those of other studies.[1,7,10]

According to our research, non-keratinised mucosa was present in 87% of OSCC patients, indicating that non-keratinised mucosa is susceptible to carcinogenesis, and only 13% OSCC cases involve keratinised mucosa, which can be owing to the keratin layer on the surface of the keratinised mucosa that functions as a barrier against the carcinogens. Other studies have also reported findings that are consistent with our study. For example, the Nayak *et al.*[1] study found that only nine cases affected the keratinised mucosa out of 136 cases in the non-keratinised mucosa. In the study conducted by, Rautava *et al.*[16] also found that 42% of cases had keratinised mucosa and 57% of cases had non-keratinised mucosa.

People in central India chew mostly gutkha, tobacco, or kharra. After being diluted with saliva, the tobacco's carcinogens are absorbed and swallowed. The site closest to the tobacco products experienced the most impact. Most individuals are right-handed, so they pick the quid with their right hand, and put it in a left vestibule of oral cavity, and this could be the possible reason for the lower left side of the jaw to be the most impacted anatomical site in our study.

The development of cancer has been linked to the placement of tobacco quid in the gingivobuccal sulcus area. Due to alcohol and tobacco use, the tongue and floor of mouth cancer are more prevalent in western nations. While smoking is the most common way to consume tobacco in western nations, smokeless forms such as kharra, pan masala, khaini, and gutkha are more popular in India and the Indian subcontinent.[7]

Accordingly, our study includes 1081 (49.9%) cases with a tobacco chewing habit, 594 (27.4%) cases with a kharra habit, 122 (5.6%) cases with areca nut habit, 36 (1.7%) cases with gutkha habit, 21 (1%) cases with pan masala habit, and 4.6% cases with tobacco smoking habit.

Pain and burning were the most common complaints among the patients in our study as well as the other studies.[1,13] Our data revealed that the most prevalent clinical manifestation was ulcer or ulcero-proliferative growth.

The incidence of well-differentiated carcinoma is higher in our institutional study (65%). The majority of studies[1,9,13] have shown the same incidence excluding the Nigerian report, which found a high prevalence of poorly differentiated SCC.[14]

CONCLUSION

In our analysis, the fifth decade of life was the most common age at which OSCC was diagnosed. The areas most impacted were the left gingivobuccal sulcus, left mandible, and left buccal mucosa. Men are more likely than women to have OSCC, primarily as a result of a tobacco habit.

The variations observed between the data from this study and other region studies highlight how crucial it is to create databases for various regions in order to facilitate appropriate screening, diagnosis, prevention, and treatment methods. Based on our data, we analysed that recently, the incidence and prevalence of OSCC is on the.

The overall incidence and prevalence of OSCC can be estimated using baseline epidemiological data from our institution.

Conflicts of interest
There are no conflicts of interest.

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