e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(7); 1263-1269

Original Research Article

Clinicopathological Predictors of Recurrence in Oral Squamous Cell Carcinoma at An Oncosurgery Hospital in Maharashtra

Nikhil Vinod Nalawade[1], Shreya Devidas Badhe[2], Subodh Vikas Patil[3]

[1]Assistant Professor, Department of Surgery, Rajmata Jijau Government Medical College, Buldhana
[2]Assistant Professor, Department of Pathology, Rajmata Jijau Government Medical College, Buldhana
[3]Associate Professor, Department of Medicine, Rajmata Jijau Government Medical College, Buldhana

Received: 10-05-2026 / Revised: 04-06-2026 / Accepted: 22-07-2026
Corresponding Author: Dr Shreya Devidas Badhe
Conflict of interest: Nil

Abstract

Background: Oral squamous cell carcinoma (OSCC) is the most common oral malignancy and is associated with a high risk of recurrence despite definitive treatment. Identification of clinicopathological predictors of recurrence may facilitate risk stratification and improve postoperative management. This study evaluated the clinicopathological predictors associated with recurrence in patients with OSCC.

Methods: This retrospective observational study included 27 surgically treated OSCC patients managed at an oncosurgery hospital in Buldhana, Maharashtra, between June 2023 and May 2026. Clinical, histopathological and follow-up data were retrieved from hospital records. Fisher's exact test was used to evaluate the association between clinicopathological variables and recurrence, with $p<0.05$ considered statistically significant.

Results: The mean age of patients was 51.70 ± 13.03 years, with a male predominance (74.1%). Buccal mucosa was the most common tumour site (44.4%), and ulcer was the commonest presenting complaint (85.2%). Recurrence occurred in 6 (22.2%) patients, of whom 5 (83.3%) developed local recurrence. Significant histopathological predictors of recurrence included depth of invasion >10 mm (p=0.010), poor tumour differentiation (p=0.018), lymphovascular invasion (p=0.004), perineural invasion (p=0.017), nodal involvement (p=0.011), and distant metastasis (p=0.011). The mean time to recurrence was 14.83 ± 11.5 months.

Conclusion: Histopathological parameters were stronger predictors of recurrence than demographic or clinical characteristics. Careful assessment of these factors may help identify high-risk patients requiring adjuvant treatment and closer postoperative surveillance.

Keywords: Oral squamous cell carcinoma; Depth of invasion; Lymphovascular invasion; Perineural invasion; Recurrence.

DOI: 10.25258/ijcpr.18.7.193

Introduction

Oral squamous cell carcinoma (OSCC) is a malignant tumour arising from the lips (vermilion border and the oral aspect) and oral cavity (anterior two-thirds of tongue, buccal mucosa, gingiva, hard palate, retromolar trigone and floor of the mouth) [1]. It is the most common type of head and neck malignancy, accounting for ~90% of oral malignancies, and has adverse effects on appearance, pronunciation, swallowing and taste perception [2,3].

According to the latest GLOBOCAN estimates, OSCC is the seventh most common cancer worldwide, with an estimated 4.5% of all cancers diagnosed worldwide. It is also responsible for around 450,000 deaths a year and represents about 4.6% of all cancer deaths globally [4]. The scenario is different in India. It accounts for almost 40% of all types of cancer in India, and the incidence rate of oral cancers is estimated to be nearly 60,000 new cases annually, with over 5 people dying every hour every day due to oral cancer, indicating that the disease is highly fatal in nature [5]. India accounts for one-third of the total oral cancer cases worldwide. The burden of OSCC is particularly high in developing countries such as India due to widespread use of tobacco in smoked and smokeless forms, betel nut chewing, alcohol consumption, poor oral hygiene, and delayed diagnosis.

Clinically, OSCC commonly presents as a red and white or red lesion with a slightly uneven surface and distinct margins. Early lesions are typically painless, but may become painful and exhibit features such as ulceration, nodularity and tissue attachment as they progress [6]. Despite adequate treatment, it is still a major public health problem throughout the world because of high morbidity,

mortality and tendency for local recurrence. The five-year relative survival rate for oral cancer in developed countries is 68.0%. In comparison, it is around 50% in India after surgery and radiotherapy, which is much lower than in many developed countries [7].

Despite great advances in chemotherapy, radiotherapy and targeted therapy over the past three decades, the prognosis of OSCC remains poor due to aggressive local invasion and metastasis, leading to recurrence [8]. Recurrence, which is defined as the reappearance of cancer following initial treatment, is an important prognostic indicator of patients with OSCC [9]. Approximately 50% of oral cancers develop recurrence (most often at the primary site). Recurrence can be local, regional (in the cervical lymph nodes) or distant. It is one of the most important causes of treatment failure and poor survival outcomes. Identification of the factors associated with oral cancer recurrence is important for optimising treatment outcomes, increasing survival and designing targeted interventions. The recurrence of OSCC has been analysed in relation to several clinical as well as pathological parameters in previous studies. However, the predictive validity of these factors has not been uniform across populations, and regional variation in risk factors and treatment patterns may affect disease behaviour [10,11].

Histopathological examination is the gold standard for diagnosis and prognostication of OSCC. The analysis of pathological parameters like depth of invasion, metastasis, and degree of differentiation can give valuable information on tumour aggressiveness and biological behaviour. Recognition of features of high-risk pathology can help stratify patients according to their risk of recurrence and guide decisions regarding adjuvant therapy and follow-up protocols.

The data on clinicopathological predictors associated with recurrence of OSCC in India are limited, and there is a need to explore the predictors of recurrence. Hence, considering the above points, our study was conducted to evaluate the clinicopathological predictors associated with recurrence in patients with oral squamous cell carcinoma. The other objectives included studying the demographic and clinicopathological profile of patients diagnosed with OSCC, determining the frequency and pattern of recurrence among patients with oral squamous cell carcinoma and evaluating the association between tumour-related factors (histological grade, depth of invasion, nodal involvement, margin status, and TNM stage) and recurrence of oral squamous cell carcinoma.

Materials And Methods

Study Design and Setting: This retrospective observational study was conducted at an oncosurgery hospital in Buldhana, Maharashtra, over a period of three 3 years.

Study Population and Period: The study included patients diagnosed with oral squamous cell carcinoma (OSCC) who underwent consultation, treatment, and follow-up at the oncosurgery hospital over the past three years, i.e. between June 2023 and May 2026. Patients diagnosed with OSCC who underwent surgical treatment with or without adjuvant therapy were included. Only those patients with complete clinicopathological records and adequate follow-up details were considered eligible for inclusion. The study excluded patients presenting with recurrent OSCC at the time of diagnosis, cases of metastatic malignancy originating from other primary sites, patients with incomplete histopathological or follow-up records, as well as those who were lost to follow-up.

Sampling and Sample Size: All cases fulfilling the inclusion criteria during the study period were included. Finally, 27 patients were included in the study.

Methodology: Permission for data acquisition was obtained from the oncosurgery hospital administration. Patient confidentiality was maintained throughout the study. All clinical, histopathological, and follow-up data were collected from hospital medical records and entered into a predesigned and pre-structured proforma. Demographic details, including age, sex, and history of tobacco and alcohol consumption, were recorded. Clinical parameters such as presenting complaints, duration of symptoms, tumour site, laterality, TNM stage, and treatment details were obtained from case records and pathology reports. Histopathological data were extracted from biopsy and resection specimen reports. The following histopathological parameters were documented from existing records: histological grade, depth of invasion, lymphovascular invasion, perineural invasion, lymph node involvement, and TNM staging. Follow-up data were reviewed from hospital records to determine recurrence status. Recurrence was categorised as local, regional, or distant. The time interval from primary treatment to recurrence was also recorded. The primary outcome was the presence or absence of recurrence. Secondary outcomes included identification of predictors and associated factors influencing recurrence.

Quality control and data security: Histopathological diagnoses were based on reports issued by experienced pathologists. Standard laboratory protocols were followed for tissue processing and staining. Data entry was cross-verified to minimize errors and ensure accuracy. Any type of patient identifiers were removed during data analysis and reporting to maintain confidentiality. The collected data were used

exclusively for academic and research purposes, and confidentiality was strictly maintained throughout the study.

Statistical Analysis: Data were entered into Microsoft Excel and analysis was carried out using SPSS software. Categorical variables were expressed as numbers and percentages, while continuous variables were presented as mean ± standard deviation. Fisher's exact test was used to assess associations between categorical variables and a p-value of less than 0.05 was considered statistically significant.

Results

The study included a total of 27 patients. The mean age of the patients was 51.70 ± 13.03 years (range: 32–77 years). The majority of participants belonged to the 51–60 years age group (9, 33.3%), followed by the 31–40 years age group (7, 25.9%), >60 years age group (6, 22.2%), and 41–50 years age group (5, 18.5%). The study population comprised 20 (74.1%) males and 7 (25.9%) females with a male-to-female ratio of 2.9:1.

Table 1: Clinical profile of the patients

Clinical profile	Number (Percentage)
Presenting complaints	
Ulcer	23 (85.2)
Lump in the neck	2 (7.4)
Fungating mass	2 (7.4)
Gross appearance of tumour	
Ulcero-infiltrative tumour	17 (63.0)
Ulcero-proliferative tumour	4 (14.8)
Solid cystic mass in neck	2 (7.4)
Proliferative tumour	1 (3.7)
Ulcerated tumour	1 (3.7)
Ulceroinfiltrative lesion over lower alveolus	1 (3.7)
Verrucous lesion	1 (3.7)
Site involved (n = 27)	
Buccal mucosa	12 (44.4)
Gingivobuccal sulcus (GBS)	5 (18.5)
Tongue	7 (25.9)
Neck	2 (7.4)
Alveolus	3 (11.1)
Retromolar trigone	1 (3.7)
Floor of mouth	1 (3.7)
Mandible/Mandibular arch	2 (7.4)
Side involved	
Left	18 (66.7)
Right	8 (29.6)
Midline	1 (3.7)
Size of tumour	
≤ 4 cm	21 (77.8)
> 4 cm	6 (22.2)

The clinical profile of the patients is shown in Tabl e 1. It was observed that the most common presenting complaint was ulcer in 23 (85.2%) patients, followed by neck mass and lump in 2 (7.4%) patients each. Ulcero-infiltrative tumour was the predominant gross appearance. The buccal mucosa was the most frequent site involved (12, 44.4%), followed by the tongue (7, 25.9%) and gingivobuccal sulcus (5, 18.5%). Some patients showed involvement in more than 1 site. Left-sided involvement was noted in 18 (66.7%) patients, while right-sided and midline involvement were observed in 8 (29.6%) and 1 (3.7%) patients, respectively. Most tumours measured ≤4 cm 21 (77.8%), whereas 6 (22.2%) measured >4 cm.

During the follow-up period, recurrence was observed in 6 (22.2%) patients, while 21 (77.8%) patients remained recurrence-free (Figure 1).

In terms of demographic and clinical predictors of recurrence, recurrence was more frequent in patients aged >50 years [5/15 (33.3%)] compared with those aged ≤50 years [1/12 (8.3%)], but the difference was not statistically significant (p=0.182). Likewise, recurrence was more frequent in males [5/20 (25.0%)] than in females [1/7 (14.3%)] (p=1.000). Recurrence rate was higher in right-sided tumours

[4/8 (50.0%)] than in left-sided tumours [2/18 (11.1%)], and no recurrence was observed in the single patient with a midline lesion (p=0.102). The recurrence was more frequent in patients with tumours >4 cm [2/6 (33.3%)] than in patients with tumours ≤4 cm [4/21 (19.0%)], but the difference was not statistically significant (p=0.588) (Table 2).

Table 2: Demographic and clinical predictors of recurrence

Variables	Recurrence		Total	P-value
	Present	Absent		
Age				
≤ 50 years	1 (8.3)	11 (91.7)	12	0.182
>50 years	5 (33.3)	10 (66.7)	15	
Gender				
Male	5 (25.0)	15 (75.0)	20	1
Female	1 (14.3)	6 (85.7)	7	
Side involved				
Right	4 (50.0)	4 (50.0)	8	0.102
Left	2 (11.1)	16 (88.9)	18	
Midline	0 (0.0)	1 (100.0)	1	
Tumour size				
≤ 4 cm	4 (19.0)	17 (81.0)	21	0.588
> 4 cm	2 (33.3)	4 (66.7)	6	

Table 3: Histopathological predictors of recurrence

Variables	Recurrence		Total	P-value
	Present	Absent		
Depth of invasion (n = 25)				
<10 mm	0 (0.0)	16 (100.0)	16	0.010
>10 mm	4 (44.4)	5 (55.6)	9	
Degree of differentiation				
Well-differentiated	0 (0.0)	7 (100.0)	7	0.018
Moderately differentiated	4 (22.2)	14 (77.8)	18	
Poorly differentiated	2 (100.0)	0 (0.0)	2	
LVI (n = 26)				
Present	3 (100.0)	0 (0.0)	3	0.004
Absent	2 (8.7)	21 (91.3)	23	
PNI (n = 25)				
Present	4 (40.0)	6 (60.0)	10	0.017
Absent	0 (0.0)	15 (100.0)	15	
Pathological staging (n = 25)				
T1/T2	1 (6.3)	15 (93.7)	16	0.116
T3/T4	3 (33.3)	6 (66.7)	9	
Nodal involvement				
Present	4 (66.7)	2 (33.3)	6	0.011
Absent	2 (9.5)	19 (90.5)	21	
Metastasis				
Present	4 (66.7)	2 (33.3)	6	0.011
Absent	2 (9.5)	19 (90.5)	21	
Chemotherapy				
Given	4 (30.8)	9 (69.2)	13	0.648
Not given	2 (14.3)	12 (85.7)	14	
Radiotherapy				
Given	3 (15.0)	17 (85.0)	20	0.290
Not given	3 (42.9)	4 (57.1)	7	

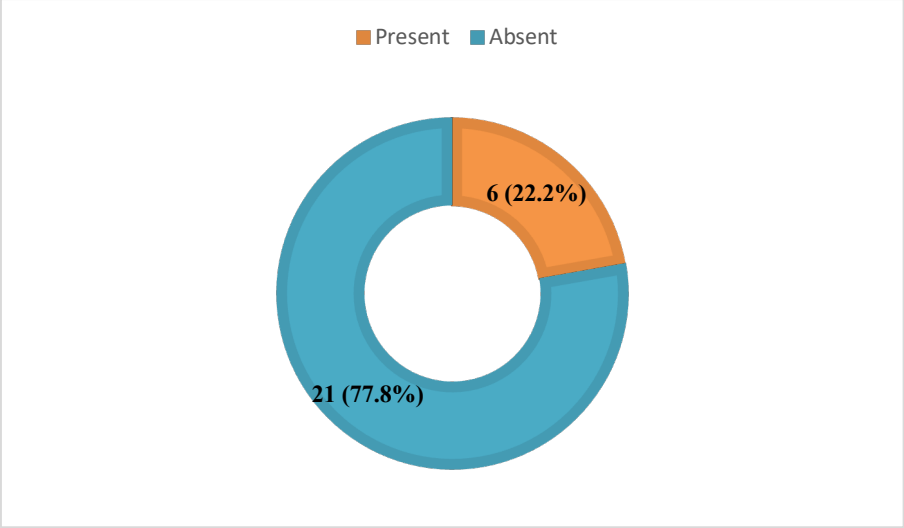

Figure 1: Incidence of recurrence

Table 3 shows the histopathological predictors of recurrence. The primary tumour details were unknown in two cases; therefore, histological grading and stage could not be assessed. Patients with a depth of invasion >10 mm had a significantly higher recurrence rate [4/9 (44.4%)] than those with a depth of invasion <10 mm [0/16 (0%)] (p=0.010). Recurrence was significantly higher with poorer tumor differentiation 2/2(100%), Moderately differentiated tumors 4/18(22.2%) and none of well differentiated tumors0/7(0%) (p=0.018). All patients with lymphovascular invasion developed recurrence [3/3 (100%)] compared to only 2/23 (8.7%) patients without lymphovascular invasion (p=0.004). Recurrence occurred in 4/10 (40.0%) patients with perineural invasion, whereas no recurrence occurred in patients without perineural invasion [0/15 (0%)] (p=0.017). Patients with nodal involvement had a significantly higher rate of recurrence [4/6 (66.7%)] compared to the patients without nodal involvement [2/21 (9.5%)] (p=0.011). The recurrence was also significantly more frequent in patients with distant metastasis [4/6 (66.7%)] than those without metastasis [2/21 (9.5%)] (p=0.011). Patients with advanced pathological stage T3/T4 [3/9 (33.3%), those who received chemotherapy [4/13 (30.8%),] and those who did not receive radiotherapy [3/7 (42.9%) had higher recurrence, but the differences were not statistically significant (all p>0.05).

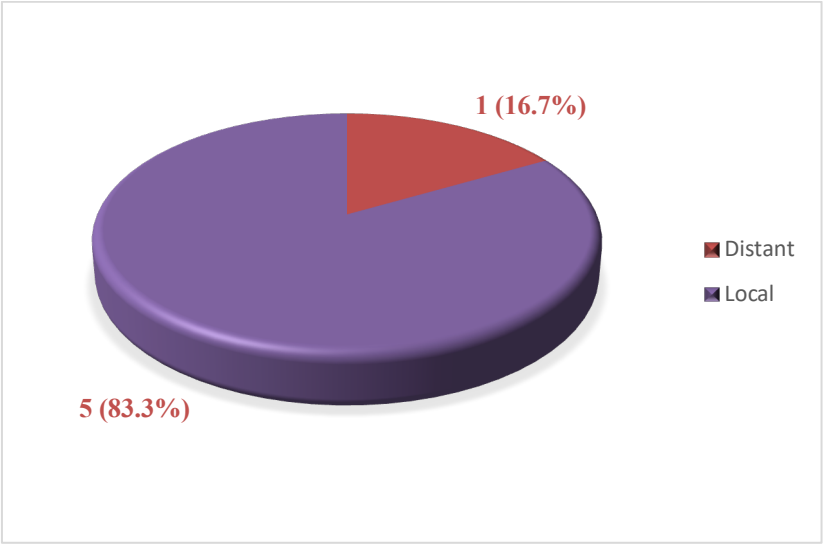

Figure 2: Site of recurrence (n = 6)

Among the six patients who developed recurrence, local recurrence was observed in 5 (83.3%) patients, while distant recurrence occurred in 1 (16.7%) patient. The mean duration between completion of treatment and recurrence was 14.83 ± 11.5 months, ranging from 6 to 36 months. At the last follow-up, 3 (50.0%) patients with recurrence were alive, whereas 3 (50.0%) had died.

Discussion

The present study showed that OSCC mainly affected patients in the age group of 51–60 years (33.3%) with the mean age of 51.70 ± 13.03 years

and also revealed a marked male predominance (74.1%; male-to-female ratio 2.9:1). Similar observations have been reported by Singh J et al. [12], who reported the highest frequency in age group of 51–60 years (30.6%). Reichal P et al. [13] reported 80% of male patients in their study. Ulcer was the most common presenting complaint in our study (85.2%), which was in alignment with Sousa JT et al. [14] who also found ulcer as the most frequent presenting complaint. The buccal mucosa was the most common site in our study (44.4%), consistent with findings from Singh J et al. [12] (43.9%) and Senapati SN et al. [15] (41.7%). This can be attributed to the widespread use of smokeless tobacco in the Indian population and thus contributing to the increased incidence of buccal mucosal cancers. Recurrence was observed in 22.2% of patients, comparable to Zubair F et al. [16] (22.4%) but less than the incidence reported by Singh J et al. [12] (34.7%). In our study, local recurrence accounted for 83.3% of all recurrences, indicating that local disease failure was the predominant pattern of recurrence. The relatively lower recurrence rate observed in our study may also reflect early detection, timely surgical management, and appropriate adjuvant therapy in a proportion of patients.

Recurrence was higher among patients >50 years (33.3% vs 8.3%), males (25.0% vs 14.3%), tumours >4 cm (33.3% vs 19.0%), advanced pathological stage T3/T4 (33.3% vs 6.3%), patients who received chemotherapy (30.8% vs 14.3%) and patients who did not receive radiotherapy (42.9% vs 15.0%), but these differences were not statistically significant. Similar non-significant associations with age (p=0.13), pathological stage (p=0.66) and tumour differentiation (p=0.08) have been reported by Agrawal M et al. [17].

Histopathological parameters were the strongest predictors of recurrence in this study. Depth of invasion >10 mm was significantly associated with recurrence (44.4% vs. 0%; p=0.010) as demonstrated by Singh J et al. [12], who also reported a significant association (p<0.001), while Wahab NU et al. [18] showed an OR of 2.4 for recurrence with deeper invasion. Poor tumour differentiation was also significantly associated with recurrence (p=0.018). Agrawal M et al. [17], also found recurrence to be more common in poorly and moderately differentiated tumours; however, the association was non-significant. Significant associations with recurrence were also observed for lymphovascular invasion (100% vs. 8.7%; p=0.004), perineural invasion (40.0% vs. 0%; p=0.017), nodal involvement (66.7% vs. 9.5%; p=0.011) and distant metastasis (66.7% vs. 9.5%; p=0.011). Agrawal M et al. [17] reported similar results for lymphovascular invasion (p=0.04) and nodal involvement (p=0.02). Nair D et al. [19] identified perineural invasion as an independent negative prognostic factor. The observed associations can be explained by the aggressive biological behaviour of tumours exhibiting deeper invasion, poor differentiation, lymphovascular invasion, and perineural invasion. These features facilitate local infiltration, regional spread, and occult residual disease, thereby predisposing patients to recurrence despite definitive surgical treatment.

Our results suggest that histopathological variables are more powerful predictors of recurrence than demographic or clinical characteristics and should be prioritised when identifying high-risk patients for adjuvant therapy and intensive postoperative surveillance.

Some strengths of our study were that it evaluated both clinical and histopathological predictors of recurrence in surgically treated OSCC patients in comprehensive manner and that uniform histopathological assessment and adequate follow-up enabled reliable analysis of recurrence patterns and associated prognostic factors. However, the retrospective design, small sample size and single-centre setting of the study may limit the generalisability of the findings. The statistical power to detect significant associations for some clinical variables was also limited by the relatively small number of recurrence events.

Conclusion

In the current study, recurrence was noted in 22.2% of OSCC patients, predominantly local. Histopathological predictors of recurrence included depth of invasion >10 mm, poor tumour differentiation, lymphovascular invasion, perineural invasion, nodal involvement and distant metastasis, while demographic and clinical characteristics were not significantly associated. Among patients who developed recurrence, 50.0% were alive and 50.0% had died at the last follow-up, highlighting the adverse impact of recurrence on patient outcomes. Careful assessment of these pathological parameters might help to identify high-risk patients early, enabling appropriate adjuvant treatment and more intensive postoperative follow-up to improve long-term outcomes.

References

1. Wu J, Chen H, Liu Y, Yang R, An N. The global, regional, and national burden of oral cancer, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. J Cancer Res Clin Oncol. 2025 Jan 28;151(2):53.
2. Tan Y, Wang Z, Xu M, Chen F, Huang Z, Luo N, et al. Oral squamous cell carcinomas: state of the field and emerging directions. Int J Oral Sci. 2023;15:44.
3. Vigneswaran N, Williams MD. Epidemiologic trends in head and neck cancer and aids in

diagnosis. Oral Maxillofac Surg Clin North Am. 2014;26(2):123-141.
4. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin. 2021;71(3):209-249.
5. National Oral Cancer Registry. Oral cancer in India [Internet]. Mumbai: Indian Dental Association; [cited 2026 May 12]. Available from: https://nocr.org.in/
6. Bagan JV, Sarrion G, Jimenez Y. Oral cancer: clinical features. Oral Oncol. 2010;46(6):414-417.
7. Akashanand, Syed ZQ, Khatib MN, Jena D, Ballal S, Kumar S, et al. Burden of oral cancer and associated risk factors at national and state levels: A systematic analysis from the global burden of disease in India, 1990–2021. Oral Oncol. 2024;159:107063.
8. Wang B, Zhang S, Yue K, Wang XD. The recurrence and survival of oral squamous cell carcinoma: a report of 275 cases. Chin J Cancer. 2013 Nov;32(11):614-8.
9. National Institutes of Health, editor. Recurrence definition. In: NCI Dictionary of Cancer Terms. 2023.
10. Wang W, Han S, Yao Z, Li X, Huang P, Zhang M, Chen Y, He J. A study of epidemiologic and recurrence factors of oral cancer. J Oral Maxillofac Surg. 2012 Sep;70(9):2205-10.
11. Dhanuthai K, Rojanawatsirivej S, Thosaporn W, Kintarak S, Subarnbhesaj A, Darling M, et al. Oral cancer: a multicenter study. Med Oral Patol Oral Cir Bucal. 2018;23(1):e23-e29.
12. Singh J, Gupta S, Sajeevan S, Sikdar D, Chakravarty A, Singh S, et al. Analysis of clinicopathological factors associated with recurrence after postoperative radiotherapy in oral cavity squamous cell carcinoma. J Can Res Ther. 2025;21:558-66.
13. 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;16(1):e52774.
14. Sousa JT, Morais HGF, Galvão HC, da Silveira EJD, Miguel MCDC, Freitas RA, Queiroz LMG. Clinicopathological profile of oral squamous cell carcinoma in young patients: a 53-year retrospective analysis. Oral Surg Oral Med Oral Pathol Oral Radiol. 2025;139(5):e104.
15. Senapati SN, Samanta DR, Avinash A, Parida M, Mohanty SN, Bhuyan SK, et al. Clinicopathological profile of oral squamous cell carcinoma in Eastern India. J Clin Diagn Res. 2021;15(9):XC05-XC08.
16. Zubair F, Farooq S, Wright S, Schipani S, McMahon J. Patterns of recurrence amongst patients undergoing resection of oral squamous cell carcinoma with curative intent. Br J Oral Maxillofac Surg. 2022;60(10):1379-1384.
17. Agrawal M, Konduru V, Tirkey AJ, Jeyashant R, George P, Philip DM, et al. Predictors of recurrence in oral cavity cancer with clear surgical margins. Curr Med Issues. 2023;21:98-103.
18. Wahab NU, Ashiq MA, Hanif M, Qureshi I, Shafiq S, Asghar F. Factors Influencing Recurrence Rates of Oral Squamous Cell Carcinoma in Surgically Treated Patients: A Retrospective Study in Pakistan. Int J Drug Deliv Technol. 2026;16(10s):61-68.
19. Nair D, Mair M, Singhvi H, Mishra A, Nair S, Agrawal J, Chaturvedi P. Perineural invasion: Independent prognostic factor in oral cancer that warrants adjuvant treatment. Head Neck. 2018 Aug;40(8):1780-1787.