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Original Research Article

HISTOPATHOLOGICAL STUDY OF NEOPLASTIC & NON-NEOPLASTIC LESIONS OF ORAL CAVITY AT RURAL BASED TERTIARY CARE CENTER

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ABSTRACT

Background: Oral cavity lesions include a spectrum of neoplastic and non-neoplastic conditions, often clinically overlapping, making histopathology essential for diagnosis. **Objective:** To assess the histopathological spectrum, demographic distribution, and anatomical predilection of oral cavity lesions.
Materials and Methods: A prospective cross-sectional study was conducted over 24 months (July 2023–June 2025) in the Department of Pathology. A total of 109 surgical and biopsy specimens from ENT and Dental OPD/IPD were processed, stained with hematoxylin and eosin, and analyzed histopathologically.
Results: Neoplastic lesions predominated (78/109, 71.56%), with squamous cell carcinoma most common (38/109, 34.86%), mainly well-differentiated (63.16%). Premalignant lesions included severe dysplasia (55%) and oral submucous fibrosis (10%). Benign neoplasms comprised haemangioma (35%) and squamous papilloma (25%). Non-neoplastic lesions were mostly inflammatory (35.48%) and mucous retention cysts (19.35%). Buccal mucosa (46.79%) and tongue (30.27%) were the most affected sites. Neoplastic lesions were common in 41–60 years, while non-neoplastic lesions were more frequent in 21–40 years. A male predominance was observed.
Conclusion: Neoplastic lesions are predominant in the oral cavity, with SCC being most frequent. Histopathological evaluation is critical for accurate diagnosis, early detection of premalignant lesions, and guiding management.
Keywords: Oral cavity lesions, Squamous cell carcinoma, Dysplasia, Histopathology, Buccal mucosa.

INTRODUCTION

The oral cavity consists of the lips, hard palate, alveolar ridges, anterior two-thirds of the tongue, sublingual area, buccal mucosa, retromolar trigone, and the floor of the mouth, supported by the mylohyoid, digastric, and geniohyoid muscles. It houses multiple tissues, including maxillary and mandibular bones, oral mucosal epithelium, odontogenic tissues, and minor salivary glands, making it a site for diverse mesenchymal, lymphoid, and epithelial proliferations, as well as various tumor-like and neoplastic lesions. Tumors may originate from connective tissue, vasculature, nerves, muscles, or epithelium. Population-based studies have reported lichen planus, leukoplakia, fibroma, pyogenic granuloma, hairy tongue, recurrent herpes, recurrent aphthous stomatitis, mucocele, and candidiasis as the most frequent oral lesions, many of which are clinically diagnosed without biopsy.[1]
Oral cavity neoplasms are among the most common in men, especially in India, where the mucosa is continuously exposed to carcinogens such as tobacco.[2] Oral cancer is a major global public health issue, particularly in developing nations. Despite the oral cavity's accessibility, many lesions remain asymptomatic or exhibit overlapping presentations with systemic diseases, complicating early diagnosis.[3-5] Habits such as tobacco chewing, smoking, and alcohol intake are major risk factors in India, while chronic irritation from ill-fitting dentures or sharp broken teeth also contributes to malignant

transformation.[6] Benign lesions such as hemangioma, fibroma, lipoma, mucocele, and nevus are frequently encountered, whereas squamous cell carcinoma is the most common malignant lesion, typically affecting the tongue, palate, buccal mucosa, and lips.[7]

Reactive lesions represent a group of tumor-like hyperplasias that arise secondary to trauma or persistent local irritation. These are usually painless pedunculated or sessile growths, ranging in color from pale pink to reddish, and in size from millimeters to several centimeters. Their surface appearance may vary from smooth and non-ulcerated to ulcerated. Histologically, reactive proliferations are composed of fibrous tissue, sometimes containing calcified material, multinucleated giant cells, or capillary hyperplasia. Clinically grouped as epulis, common examples include cemento-ossifying fibroma, pyogenic granuloma, irritation fibroma, and peripheral giant cell granuloma. Other variants include inflammatory fibrous hyperplasia, inflammatory papillary hyperplasia, and epulis fissuratum. Reactive lesions and true neoplastic proliferations often present with similar clinical features, posing diagnostic challenges.[8]

Localized reactive lesions of the oral cavity—such as fibro-epithelial hyperplasia, peripheral giant cell granuloma (PGCG), peripheral ossifying fibroma (POF), pyogenic granuloma (PG), focal fibrous hyperplasia, and inflammatory gingival hyperplasia—are predominantly seen in the gingiva, but may also occur in the tongue, palate, buccal mucosa, and floor of the mouth. These lesions are associated with chronic irritants including plaque, calculus, sharp carious teeth, defective restorations, persistent biting, poorly fitting prostheses, and food impaction. In addition, systemic influences such as hormonal changes may predispose individuals to their development. Clinically, their slow growth and mild symptoms often delay recognition, with many persisting for weeks to months. Although histologically distinct, reactive lesions share overlapping clinical features, further complicating differential diagnosis.[9]

As the clinical diagnosis of malignant oral lesions alone is insufficient, histopathological evaluation is essential to confirm or exclude malignancy and to guide treatment. Among premalignant disorders, oral submucous fibrosis is particularly common in India, linked to habits such as frequent consumption of spicy foods and areca nut chewing. Despite the easy accessibility of the oral cavity for examination, many patients present late, due to lack of awareness or poor access to medical care.[10]

MATERIALS AND METHODS

A prospective cross-sectional observational study was carried out in the Department of Pathology at a tertiary care center over two years (June 2023–July 2025). All surgical and biopsy specimens received from patients attending ENT and Dental OPD/IPD during the study period were included, while autolyzed tissues and samples received after the study period were excluded. Specimens were fixed in 10% formalin and grossly examined for size, shape, color, consistency, and cut surface. Representative tissue sections (~1.5 × 1 cm) were processed by routine histopathological methods: fixation, graded alcohol dehydration, xylene clearing, paraffin embedding, microtome sectioning (4–5 µm), and hematoxylin–eosin (H&E) staining. For H&E staining, sections were deparaffinized, hydrated, stained with alum hematoxylin, differentiated in 1% acid alcohol, blued in alkaline solution, counterstained with eosin, dehydrated, cleared, and mounted. The stained slides were examined microscopically, and findings were correlated with clinical details. Reagents used included 10% formalin, graded alcohol, xylene, paraffin wax, Ehrlich's hematoxylin, eosin, 1% acid alcohol, and DPX mounting medium.

RESULTS

Over 24 months (July 2023–June 2025), 109 cases of oral cavity lesions were documented in this study.

Of the 109 histopathologically diagnosed cases, neoplastic lesions (71%) predominated over non-neoplastic (28%). Squamous cell carcinoma was most common (34.86%), followed by severe dysplasia (10.09%), while haemangioma and mild dysplasia were less frequent. Among non-neoplastic lesions, inflammatory changes (35.5%) and mucous retention cysts (19.3%) were most prevalent, with hyperkeratosis and squamous papilloma also noted.

Among 109 cases, neoplastic lesions predominated (71.56%) over non-neoplastic lesions (28.44%). Squamous cell carcinoma was the most common neoplasm (48.71%), followed by severe dysplasia (14.1%), emphasizing malignant and premalignant changes. Non-neoplastic lesions were chiefly inflammatory (35.48%) and mucous retention cysts (19.35%), representing common reactive oral conditions.

Table 1: Age wise distribution of oral cavity cases

Age (Years)	Neoplastic	Non-Neoplastic	Total
<=10	0	2	2
10-20	3	1	4
21-30	7	7	14
31-40	20	12	32
41-50	15	5	20
51-60	15	1	16

61-70	14	2	16
71-80	4	1	5
Total	78	31	109

Age-wise analysis shows neoplastic lesions rising with age, peaking between 31–40 years and remaining predominant through 41–70 years, reflecting cumulative risk factors. Non-neoplastic lesions were more frequent in younger individuals (≤30 years), particularly 21–30 years, indicating a higher prevalence of benign and reactive conditions in this group.

Table 2: Age wise percentage of oral cavity cases

Age (Years)	Neoplastic	Non-Neoplastic	Total
<=10	0%	6.45%	1.83%
20-Nov	3.84%	3.22%	3.66%
21-30	8.97%	22.58%	12.84%
31-40	25.64%	38.70%	29.35%
41-50	19.23%	16.12%	18.34%
51-60	19.23%	3.22%	14.67%
61-70	17.94%	6.45%	14.67%
71-80	5.12%	3.22%	1.83%
Total	78(100%)	31(100%)	100%

Percentage-based analysis shows the highest burden of oral lesions in the 31–40 age group (29.35%), with neoplastic cases at 25.64% and non-neoplastic at 38.70%. Gender-wise, males represent a significant majority (75.22%) of total cases, with a notably higher neoplastic burden (56.88%) compared to females (14.67%).

Table 3: Site wise distribution of total oral cavity cases

Site	Neoplastic	Non-Neoplastic	Total
Buccal mucosa	38	13	51
Tongue Cases	25	8	33
Floor of mouth	2	1	3
Gingiva	1	4	5
Gingival buccal area	1	0	1
Palate	1	1	2
Lip	8	4	12
Retromolar trigone	2	0	2
Total	78	31	109

Table 4: Site wise percentage of neoplastic and non-neoplastic oral cavity cases out of total cases

Site	Neoplastic	Non-Neoplastic	Total
Buccal mucosa	34.86%	11.92%	46.79%
Tongue Cases	22.93%	7.33%	30.27%
Floor of mouth	1.83%	0.91%	2.75%
Gingiva	0.91%	3.66%	4.58%
Gingival buccal area	0.91%	0%	0.91%
Palate	0.91%	0.91%	1.83%
Lip	7.33%	3.66%	11.00%
Retromolar trigone	1.83%	0%	1.83%
Total			100% (109)

Neoplastic lesions predominated across oral sites, especially in the buccal mucosa (34.86%) and tongue (22.93%), comprising over half of all neoplastic cases. The lip showed a notable neoplastic burden (7.33%), whereas the floor of mouth, gingiva, and palate had a higher proportion of non-neoplastic lesions.

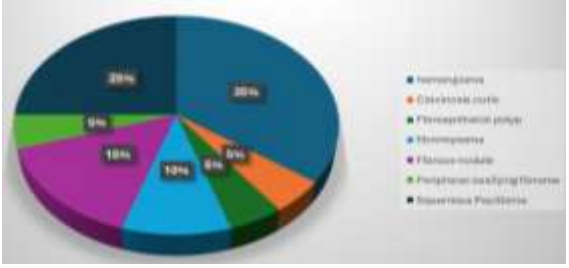

Figure 5: Benign cases percentage

Of the 20 benign neoplasms, haemangioma was most common (35%), followed by squamous papilloma (25%). Fibrous lesions, including fibrous nodules (15%) and fibromyxoma (10%), highlight the diverse histogenesis of benign oral tumors.

Figure 5: Premalignant cases percentage

Among 22 premalignant cases, severe dysplasia was most common (55%), followed by mild dysplasia (30%). Intermediate grades—mild to moderate (10%) and moderate to severe (5%)—represent transitional stages, while oral submucous fibrosis accounted for 10% of premalignant lesions.

Table 5: Malignant case count and percentage

All Other cases	**71**	**65%**
Squamous cell carcinoma	38	35%
Total cases	109	100%

Squamous cell carcinoma (SCC) was diagnosed in 38 of 109 cases (35%). Grade-wise, most were well-differentiated (Grade 1, 63.16%), followed by moderately differentiated (Grade 2, 18.42%) and poorly differentiated (Grade 3, 7.89%), indicating increasing malignant potential with lower differentiation.

Table 6: SCC case count and percentage according to broders classification

Grade distribution of SCC	Count and %
SCC G1	24 (24.72%)
SCC G2	7 (7.87%)
SCC G3	3 (3.37%)
SCC G4	0 (0.00%)
Total	38 (35%)

DISCUSSION

The present study highlights the histopathological spectrum of oral cavity lesions, encompassing neoplastic and non-neoplastic entities with analysis of their demographic, anatomical, and histological patterns.

Age-wise, most patients were between 31–40 years, with neoplastic lesions peaking in 41–60 years (38.46%) and non-neoplastic lesions in 21–40 years (61.28%), consistent with Patro et al. (2020) and Rathva et al. (2020),[11] who attributed this pattern to prolonged exposure to risk factors such as tobacco, alcohol, and poor oral hygiene. A marked male predominance was observed across both groups—neoplastic (79.48%) and non-neoplastic (64.51%)—aligning with Dholakiya et al. (2019) and Gupta et al. (2021).[12,13] Although Shrestha et al,[14] and Halder et al. (2019),[15] noted a rising incidence among females, the current data reaffirm higher susceptibility among males due to lifestyle and occupational exposures.

Anatomically, the buccal mucosa (46.79%) was the most frequently involved site, followed by the tongue (30.27%), comparable to findings by Kak et al. (2021), Akhilesh Krishna et al., and Rajawat et al.[16-18] The buccal mucosa's direct exposure to smokeless tobacco and betel quid explains its vulnerability, while the tongue's mobility predisposes it to trauma-induced carcinogenesis.

Histopathologically, squamous cell carcinoma (SCC) was the most common malignancy (35%), as similarly reported by Rathva et al. (2020), Dholakiya et al. (2019), and Gupta et al. (2021).[19-21] The predominance of well-differentiated SCC (63.16%) parallels the observations of Rajawat et al., Modi et al., and Akhilesh Krishna et al,[22] emphasizing the importance of early screening and biopsy. Premalignant lesions comprised 20.18% of neoplastic cases, mainly severe dysplasia (10.09%), consistent with Shrestha et al. and Halder et al. (2019), underscoring the need for early recognition of potentially malignant disorders (PMDs) such as leukoplakia and oral submucous fibrosis.

Among benign lesions, hemangioma (35%) and squamous papilloma (25%) predominated, mirroring Gaire et al,[23] and Permi et al. (2015),[24] who described similar benign histomorphology arising from chronic irritation. Non-neoplastic lesions (28.4%) were chiefly inflammatory (35.48%) and mucous retention cysts (19.35%), in agreement with Jain et al. (2023) and Naderi et al. (2012),[25,8] reflecting poor oral hygiene and persistent local trauma. Oral submucous fibrosis (2.56%) correlated with Patro et al. and Shrestha et al., reaffirming its premalignant potential in areca nut–chewing populations.

Overall, the findings reaffirm that histopathology remains the gold standard for accurate diagnosis and management of oral cavity lesions. As emphasized by Halder et al. (2019) and Tatli et al. (2013),[26] clinicopathological correlation is essential to distinguish benign, premalignant, and malignant entities, enabling early detection and improved patient outcomes.

Table 7: Comparative Table of Oral Cavity Lesion Studies

Study / Reference	Study Setting / Year	Key Findings	Comparison with Present Study (n = 109)
Patro et al. (2020)[6]	Odisha, India – 100 cases	Neoplastic 68%, Non-neoplastic 32%; SCC most frequent (36%)	Similar neoplastic predominance (71.6%) and SCC as leading malignancy (35%)
Rathva et al. (2020)[11]	Gujarat – 120 cases	Neoplastic lesions peaked in 5th–6th decade; SCC 33%	Matches age and histologic trend; 41–60 years peak in current series
Dholakiya et al. (2019)[12]	Gujarat – 150 cases	Male predominance (M:F 3:1); SCC 38%; Buccal mucosa 40%	Comparable male bias (M:F 3:1) and buccal mucosa as major site (46.8%)

Gupta et al. (2021)[13]	Delhi – 160 cases	SCC 34%; tongue and buccal mucosa commonest	Concordant SCC rate and anatomic sites
Halder et al. (2019)[15]	Kolkata – 90 cases	Male predominance 72%; increasing female incidence	Similar male preponderance (75.2%) but note rising female trend regionally
Krishna et al. (2014)[22]	North India – 220 SCC cases	SCC 42%; tongue and buccal mucosa common; G1 in 58%	Matches grade distribution (G1 63.2%) and topography
Rajawat et al. (2021)[16]	MP – 120 cases	Buccal mucosa 48%, tongue 25%; SCC 40%	Nearly identical pattern: buccal mucosa 46.8%, tongue 30.3%
Gaire et al. (2017)[23]	Nepal – 80 benign lesions	Hemangioma (30%), papilloma (28%), fibroma (15%)	Mirrors benign lesion spectrum (hemangioma 35%, papilloma 25%)
Permi et al. (2015)[24]	Karnataka – 100 benign lesions	Fibroepithelial and vascular lesions predominant	Similar distribution of benign vascular and fibrous lesions
Jain et al. (2023)[25]	Maharashtra – 369 cases	Non-neoplastic lesions 27%; inflammatory and hyperkeratotic most common	Consistent with current study: non-neoplastic 28.4%, inflammatory 35.5%
Naderi et al. (2012)[8]	Iran – 2068 reactive lesions	Inflammatory/reactive 40%; mucoceles 20%	Similar pattern: inflammatory 35.5%, mucous cysts 19.3%

CONCLUSION

This study highlights the broad histopathological spectrum of oral cavity lesions and the pivotal role of microscopic evaluation in distinguishing neoplastic from non-neoplastic conditions. Neoplastic lesions were more common, with squamous cell carcinoma being the predominant malignancy, especially in middle-aged males. The buccal mucosa was the most frequently affected site, reflecting its vulnerability to chronic irritants such as tobacco. Identification of potentially malignant disorders underscores the need for early diagnosis and surveillance. Histopathology remains the gold standard for accurate diagnosis and management, supporting routine biopsy and screening of high-risk populations to enable timely detection and improved outcomes.

REFERENCES

1. Halder B, Halder NR. Histopathological Study of Tumor and Tumor Like Lesions of The Oral Cavity. Ann Pathol Lab Med. 2019;6(4):A248-252.
2. Shivshetty BS. Histopathological Study of Neoplastic Lesions of Oral Cavity (Doctoral dissertation, Rajiv Gandhi University of Health Sciences (India)).
3. Mehta NV, Dave KK, Gonsai RN, Goswami HM, Patel PS, Kadam TB. Histopathological study of oral cavity lesions: A study on 100 cases. International Journal of Current Research and Review. 2013 May 15;5(10):110.
4. Mehrotra R, Pandya S, Chaudhary AK, Kumar M, Singh M. Prevalence of oral pre-malignant and malignant lesions at a tertiary level hospital in Allahabad, India. Asian Pac J Cancer Prev. 2008 Jan 1;9(2):263-5.
5. Modi D, Laishram RS, Sharma LD, Debnath K. Pattern of oral cavity lesions in a tertiary care hospital in Manipur, India. Journal of Medical Society. 2013 Sep 1;27(3):199-202.
6. Patro P, Lad P, Mithila KB, Sahu SA. A Histopathological study of oral cavity lesions. Int J Health Sci Res. 2020;10(3):17-21.
7. Pudasaini S, Baral R. Oral cavity lesions: A study of 21 cases. Journal of Pathology of Nepal. 2011;1(1):49-51.
8. Naderi NJ, Eshghyar N, Esfehanian H. Reactive lesions of the oral cavity: A retrospective study on 2068 cases. Dental research journal. 2012 May;9(3):251.
9. Hunasgi S, Koneru A, Vanishree M, Manvikar V, Patil AM, Gottipati H. Retrospective analysis of the clinical features of 530 cases of reactive lesions of oral cavity. Journal of Advanced Clinical and Research Insights. 2014 Jul 1;1(1):1-6.
10. Rauf SPA, Sonwane BR; Tumors and tumor-like lesion of the oral cavity: A study of 100 cases at tertiary care hospital; Trop J Pathol Microbiol 2020;6(4):page no;266.
11. Rathva H, Shah A, Goswami H. Histopathological study of Pre-malignant and malignant lesions of oral cavity at tertiary care center. Int J Clin Diagn Pathol. 2020;3(3):6-9.
12. Dholakiya Z, Gohel A, Suri SK, Patel SM. Histopathological interpretation of oral cavity lesions: study at a tertiary care hospital. IOSR J Dent Med Sci. 2019;18(4):40-7.
13. Gupta I, Rani R, Suri J. Histopathological spectrum of oral cavity lesions–A tertiary care experience. Indian J Pathol Oncol. 2021;8(3):364-8.
14. Shrestha B, Subedi S, Poudel S, Ranabhat S, Gurung G. Histopathological Spectrum of Oral Mucosal Lesions in a Tertiary Care Hospital.
15. Halder B, Halder NR. Histopathological Study of Tumor and Tumor Like Lesions of The Oral Cavity. Ann Pathol Lab Med. 2019;6(4):A248-252.
16. Rajawat P, Sanwelka M, Khatri SL. Clinico-histopathological evaluation of oral cavity lesions: A prospective cross-sectional study.
17. Gupta I, Rani R, Suri J. Histopathological spectrum of oral cavity lesions–A tertiary care experience. Indian J Pathol Oncol. 2021;8(3):364-8.
18. Rajawat P, Sanwelka M, Khatri SL. Clinico-histopathological evaluation of oral cavity lesions: A prospective cross-sectional study.
19. Gupta I, Rani R, Suri J. Histopathological spectrum of oral cavity lesions–A tertiary care experience. Indian J Pathol Oncol. 2021;8(3):364-8.
20. Rathva H, Shah A, Goswami H. Histopathological study of Pre-malignant and malignant lesions of oral cavity at tertiary care center. Int J Clin Diagn Pathol. 2020;3(3):6-9.
21. Dholakiya Z, Gohel A, Suri SK, Patel SM. Histopathological interpretation of oral cavity lesions: study at a tertiary care hospital. IOSR J Dent Med Sci. 2019;18(4):40-7.
22. Krishna A, Singh RK, Singh S, Verma P, Pal US, Tiwari S. Demographic risk factors, affected anatomical sites and clinicopathological profile for oral squamous cell carcinoma in a north Indian population. Asian Pacific Journal of Cancer Prevention. 2014;15(16):6755-60.
23. Reichart PA, Philipsen HP. Betel chewer's mucosa-a review. Journal of oral pathology & medicine. 1998 Jul;27(6):239-42.
24. Permi HS, Agrawal T, Sajitha K, Bhat SP, Prasad HK, Srinivas T. A histomorphological study of benign lesions of oral cavity in a tertiary care hospital. Journal of Evolution of Medical and Dental Sciences. 2015 Dec 14;4(100):16495-9.
25. Jain VR, Mahajan RS, Rathi SS, Biyani VV, Ninama KR, Marfatia YS. Oral Mucosal Lesions-A Study of 369 Cases. Indian Dermatology Online Journal. 2023 Mar 1;14(2):213-220
26. Tatli U, Erdoğan Ö, Uğuz A, Üstün Y, Sertdemır Y, Damlar I. Diagnostic concordance characteristics of oral cavity lesions. The Scientific World Journal. 2013;2013(1):785929.