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Original Research Article

MUCOSCOPIC EVALUATION OF ORAL SQUAMOUS CELL CARCINOMA AT A TERTIARY CARE CENTRE IN CENTRAL INDIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Oral squamous cell carcinoma (OSCC) is a common head and neck malignancy associated with significant global morbidity and mortality. Prognosis is closely related to stage at diagnosis, highlighting the need for early detection. However, early lesions frequently mimic benign or potentially malignant conditions, contributing to diagnostic delay. Mucoscopy facilitates visualization of subsurface epithelial and vascular structures and may improve diagnostic accuracy in OSCC.

Materials and Methods: This prospective cross-sectional observational study was conducted for a period of one year in the Department of Dermatology, Venereology, and Leprosy at a tertiary care centre. Consecutive patients with biopsy-proven OSCC were included after Institutional Ethics Committee approval. Detailed clinical examination was followed by mucoscopic evaluation, and findings were recorded in a pre-structured proforma and analysed statistically.

Results: Among 120 patients with histopathologically confirmed OSCC, a male predominance (75%) and mean age of 53.9 ± 11.6 years were observed, with addictive habits present in 84.2%. Buccal mucosa (45%) was the most common site, and ulcerative lesions (35%) predominated. Mucoscopy most frequently revealed white structureless areas (75.8%) and polymorphous vascular patterns (72.5%). Significant correlations were noted between mucoscopic features and corresponding histopathological findings.

Conclusion: Mucoscopy demonstrates significant clinicopathological correlation in OSCC and serves as a valuable non-invasive adjunct in lesion assessment. Its application may enhance diagnostic accuracy and aid in targeted biopsy, thereby improving early detection and clinical outcomes.

Keywords: Dermoscopy, Mucoscopy, oral cavity, carcinoma, histopathology, Oral squamous cell carcinoma.

INTRODUCTION

Oral squamous cell carcinoma (OSCC) is essentially described as "a malignant epithelial neoplasm exhibiting squamous differentiation as characterized by the formation of keratin and/or the presence of intercellular bridges".[1] According to GLOBOCAN 2020 estimates, OSCC is one of the most common cancers worldwide, ranking as the seventh most common cancer, and accounts for about 4.5% of all new cancer diagnoses globally.[2] Despite improvements in diagnosis and treatment, OSCC still leads to a significant number of deaths, contributing to nearly 450,000 fatalities each year, representing about 4.6% of all cancer-related deaths worldwide.[2] In South and Southeast Asia, the

burden is especially noticeable because of the prevalence of tobacco use and areca nut chewing. Due to late-stage presentation and limited access to early therapy, the 5-year age-standardized relative survival for oral cancer varies between around 23% and 42%, with the majority of areas reporting survival rates of between 30% and 35%, according to population-based cancer registry data from India.[3]

OSCC may involve any mucosal surface of the oral cavity, including the lip, buccal mucosa, tongue, gingiva, palate, and floor of mouth. Tumours are graded as well-, moderately-, or poorly-differentiated based on the degree of keratinization and cytological atypia, with important prognostic implications.

Prognosis in OSCC is strongly stage-dependent, underscoring the critical importance of early detection. However, early lesions frequently present as erythroplakic areas, leukoplakic patches, indurated ulcers, or exophytic proliferations that may morphologically mimic benign inflammatory, traumatic, and infectious conditions, notably tuberculosis, syphilis, chronic hyperplastic candidiasis, histoplasmosis, blastomycosis, and mucocutaneous leishmaniasis.[4]

Histopathological grading is a key determinant of tumour behaviour in OSCC and based on Broders' system, grading is determined by the proportion of undifferentiated tumour cells and the degree of keratinization. Tumours are classified as well differentiated (<25% undifferentiated cells), moderately differentiated (<50% undifferentiated cells), and poorly differentiated (<75% undifferentiated cells). Increasing loss of differentiation reflects greater cellular atypia and diminished keratin production, and is associated with more aggressive biological behaviour and adverse prognostic outcomes in squamous cell carcinoma.[5]

While histopathological examination remains the diagnostic gold standard for squamous cell carcinoma, biopsy is inherently invasive and typically performed after substantial clinical suspicion has arisen. Consequently, there is increasing emphasis on adjunctive, non-invasive diagnostic modalities capable of enhancing early recognition and facilitating targeted biopsy in these instances.

Dermoscopy is a non-invasive method for evaluating skin conditions using a portable device called a dermoscope. Dermoscopy's enormous potential for identifying skin cancer and pigmented lesions has been sufficiently utilized.[6] Mucoscopy is the application of dermoscopy for the evaluation of mucosal lesions. Although dermoscopic features of squamous cell carcinoma are increasingly recognized, mucoscopy has been increasingly explored in the assessment of oral lesions, [7,8] it may serve as a useful adjunctive tool by enabling visualization of subsurface structural and vascular patterns, particularly features related to tumour neoangiogenesis. Furthermore, mucoscopy can facilitate targeted biopsy by helping clinicians identify the most representative or atypical areas of the lesion, thereby reducing the likelihood of false-negative results.

The present study was undertaken to systematically document mucoscopic features of histopathologically confirmed OSCC and evaluate their diagnostic relevance, thereby adding to the nascent evidence on utility of mucoscopy in the diagnosis of oral malignant lesions.

Aim: To evaluate the mucoscopic features of histopathologically confirmed Oral Squamous Cell Carcinoma.

MATERIALS AND METHODS

Study Design and Setting: This prospective observational cross-sectional study was conducted in the Department of Dermatology, Venereology and Leprosy after obtaining approval from the Institutional Ethics Committee (CMCH/IEC/2024/114).

Sample Size Calculation: Adequate sample size was considered for the development of appropriate diagnostic framework of present study and was calculated using the standard formula for estimation of a single population proportion, $n = Z^2pq/d^2$. The prevalence (p) was taken as 9.85% (0.0985).9 With a 95% confidence interval, the Z value was considered as 1.96, and the allowable error (d) was taken as 5% (0.05). Substituting these values into the formula, the calculated sample size was 137.

Although the calculated sample size was 137, only 120 lesions were finally included in the analysis. Seventeen patients could not be evaluated adequately due to factors such as inability to obtain properly focused dermoscopic photographs, suboptimal visualization of dermoscopic features, or lack of patient cooperation during the examination, which precluded reliable assessment.

Inclusion criteria

All patients with biopsy-proven squamous cell carcinoma of the oral mucosa, regardless of age and gender, who were willing to provide written informed consent were included in the study.

Exclusion criteria

Patients with active infections at the site of examination or in whom mucoscopic evaluation could not be performed due to restricted mouth opening, inaccessible lesion sites, severe illness, or debilitation were excluded. Patients who were currently receiving or had previously received treatment for OSCC (surgery, radiotherapy, or chemotherapy) were also excluded.

Study procedure: After obtaining written informed consent, all patients with biopsy-proven oral squamous cell carcinoma were evaluated in detail. Demographic data were recorded along with a comprehensive history, including onset, duration, progression of lesions, and history of addictions.

This was followed by a thorough general, systemic, and dermatological examination, with special emphasis on the morphology and distribution of lesions. All findings were systematically documented in a pre-structured proforma.

This was followed by mucoscopic examination using a Dino-Lite Edge digital microscope (AF7515) in polarized mode. Images were captured using DinoCapture 2.0 software on an HP Pavilion x360 laptop for further analysis.

Various dermoscopic parameters were evaluated, including white structures (white structureless areas, keratin, and scales), red structures (red structureless areas and blood spots on keratin scales), and vascular patterns (polymorphous, linear irregular, hairpin, and dotted vessels). The corresponding mucoscopic and histopathological features in well-, moderately-, and poorly differentiated lesions were recorded. Clinical and mucoscopic photographs were taken after obtaining patient consent, ensuring that patient identity was not revealed and confidentiality was maintained at all stages.

Statistical analysis: Statistical analysis was performed using the latest version of SPSS software. Descriptive statistics including frequencies and percentages were used to summarize demographic, clinical, and mucoscopic characteristics. The association between mucoscopic features and their corresponding histopathological findings was evaluated using the Chi-square test. A p-value of <0.05 was considered statistically significant.

RESULTS

Age, Gender, and Sociodemographic Profile: A total of 120 patients with histopathologically confirmed OSCC were included in the study. Among them, 90 (75%) were males and 30 (25%) were females, yielding a male-to-female ratio of 3:1. The mean age of patients was 53.9 ± 11.6 years. The most affected age group was 51–60 years (34.2%), followed by 41–50 years (25%). The socio-demographic characteristics of the study population are summarized in [Table 1].

Addiction pattern in OSCC: Addiction history was present in 101 patients (84.2%). A higher prevalence of addictive habits was observed among males (78/90; 86.7%) compared with females (23/30; 76.7%). Single addictive habits were reported by 61 patients (50.8%) where tobacco chewing was the most prevalent addictive habit, observed in 31 patients (25.8%), followed by areca nut consumption in 20 patients (16.7%).Multiple addictions were identified in 43 patients (35.8%), highlighting the considerable burden of combined carcinogenic exposures within the study population, with tobacco chewing in combination with areca nut chewing emerging as the most frequent dual addiction (11.7%), and its further association with smoking constituting the most common triple addiction pattern (3.3%).

The mean duration of addictive habits was 18.4 ± 7.2 years, whereas the mean duration of lesions prior to presentation was 7.6 ± 3.1 months, highlighting the long-standing exposure to carcinogenic habits preceding the clinical detection of lesions.

Clinical Profile and Morphology: With respect to anatomical distribution, the buccal mucosa was the most frequently involved site, observed in 54 patients (45.0%). This was followed by involvement of the tongue in 28 patients (23.3%), alveo-buccal sulcus in 18 patients (15.0%), and the gingivobuccal complex in 10 patients (8.3%). The floor of the mouth represented the least commonly affected site, identified in 6 patients (5.0%).

In present study of OSCC, the most common presenting complaint was a non-healing oral ulcer, reported by 42 patients (35.0%), corresponding to the predominance of ulcerative lesions on clinical examination. Persistent oral pain was the next most frequent symptom, reported by 38 patients (31.7%), particularly among patients with ulcerative lesions. A visible oral mass or proliferative growth was noted by 39 patients (32.5%). Difficulty in mastication or swallowing was present in 22 patients (18.3%), reflecting functional impairment caused by lesion size and location. Additional complaints included bleeding from the lesion in 15 patients (12.5%), loosening of teeth in 11 patients (9.2%), restricted mouth opening in 8 patients (6.7%), while 6 patients (5.0%) reported difficulty in speech or articulation related to the lesion location.

On clinical examination, ulcerative lesions constituted the most common morphological pattern, observed in 42 patients (35.0%). Endophytic lesions, characterized by infiltrative or indurated growth patterns, were identified in 30 patients (25.0%), while exophytic proliferative growths were observed in 20 patients (16.7%). Erythroplakic lesions accounted for 14 cases (11.7%), whereas leukoplakic presentations were noted in 9 patients (7.5%). Verrucous morphology represented the least frequent clinical presentation, documented in 5 patients (4.2%).

Regional lymphadenopathy was observed in 68 patients (56.7%), most commonly involving Level IB lymph nodes in 39 patients (57.4%), followed by Level II nodes in 26 patients (38.2%).

Mucoscopic Characteristics: Mucoscopic examination demonstrated characteristic features across morphological variants of OSCC lesions. White structureless areas were most frequent, followed by polymorphous vessels, keratin scales, red structureless areas, and blood spots.

Predominance of red structureless areas (81.0% and 76.7%) and polymorphous vessels (81.0% and 80.0%) in ulcerative and endophytic variants can be attributed to invasive tumour growth with stromal desmoplasia and neo angiogenesis respectively. The frequent presence of blood spots (57.1% and 40.0%) in these respective morphologies further reflects surface ulceration and vascular exposure, consistent with epithelial breach.

In contrast, the dominance of white structureless areas (95.0%, 88.9%, and 80.0%) and keratin scales (90.0%, 100%, and 100%) in respective exophytic, leukoplakic, and verrucous lesions corresponds histologically to keratin pearl formation, hyperkeratosis, and parakeratosis. All these features further obscure the underlying vascular patterns, explaining the relatively lower frequency of polymorphous vessels (55.0%, 33.3%, and 40.0%) and red structureless areas (10.0% and 11.1%) in these respective lesions.

Erythroplakic lesions, characterized dermoscopically by prominent vascularity (92.9%) and erythematous areas (57.1%) with minimal keratinization (28.6%), likely reflect epithelial atrophy or high-grade dysplasia with reduced keratin production, allowing enhanced visualization of subepithelial vasculature. The absence of blood spots in verrucous lesions and their low prevalence in leukoplakic lesions (11.1%) is in keeping with the intact epithelial surface and lack of ulceration, further supporting the role of dermoscopy as a surrogate marker of underlying histological differentiation and tumour behaviour.

Significant correlations were observed between dermoscopic features and their histopathological counterparts ($p < 0.05$). Keratin-related features showed strong concordance, while vascular patterns demonstrated significant association with tumor angiogenesis. Ulceration-related changes exhibited moderate correlation, whereas hemorrhagic features showed comparatively weaker but significant association.

Table 1: Sociodemographic profile of patients

Variable	Frequency (%)
Age group (years)	
21–30	4 (3.3)
31–40	10 (8.3)
41–50	30 (25.0)
51–60	41 (34.2)
61–70	27 (22.5)
71–80	8 (6.7)
Sex	
Male	90 (75.0)
Female	30 (25.0)
Education	
Illiterate	28 (23.3)
Primary level	30 (25.0)
Secondary level	34 (28.3)
Graduate	28 (23.3)
Occupation	
Agricultural worker	44 (36.7)
Daily wage worker	31 (25.8)
Homemaker	16 (13.3)
Service/Business	13 (10.8)
Mechanical workers	6 (5.0)
Retired	4 (3.3)
Unemployed	6 (5.0)
Socioeconomic class	
Upper	6 (5.0)
Upper middle	12 (10.0)
Middle	18 (15.0)
Lower middle	24 (20.0)
Lower	60 (50.0)
Marital status	
Married	96 (80.0)
Unmarried	18 (15.0)
Divorced/Widowed	6 (5.0)

Table 2: Addiction patterns in patients

Addiction Pattern	Males (n)	Females (n)	Total (n)	Percentage (%)
Single Addiction				
Tobacco chewing only	25	6	31	25.8
Areca nut chewing only	12	8	20	16.7
Smoking only	6	0	6	5.0
Alcohol consumption only	3	1	4	3.3
Total Single Addiction	46	15	61	50.8
Dual Addictions				
Tobacco chewing + Areca nut chewing	11	3	14	11.7
Tobacco chewing + Smoking	7	0	7	5.8
Tobacco chewing + Alcohol consumption	4	0	4	3.3
Areca nut chewing + Smoking	3	2	5	4.2
Areca nut chewing + Alcohol consumption	2	2	4	3.3

Smoking + Alcohol consumption	1	0	1	0.8
Triple Addictions				
Tobacco chewing + Areca nut chewing + Smoking	4	0	4	3.3
Tobacco chewing + Areca nut chewing + Alcohol	1	0	1	0.8
Tobacco chewing + Smoking + Alcohol	1	0	1	0.8
Areca nut chewing + Smoking + Alcohol	0	2	2	1.7
Total Multiple Addictions	34	9	43	35.8
No Addiction	12	7	19	15.8
Total	90	30	120	100

Table 3: Mucoscopic characteristics of different morphological types of OSCC

Morphology	n	White structureless areas n (%)	Keratin scales n (%)	Red structureless areas n (%)	Blood spots on keratin scales / ulcerations n (%)	Polymorphous vessels n (%)
Ulcerative	42	32 (76.2)	26 (61.9)	34 (81.0)	24 (57.1)	34 (81.0)
Endophytic	30	22 (73.3)	21 (70.0)	23 (76.7)	12 (40.0)	24 (80.0)
Exophytic	20	19 (95.0)	18 (90.0)	2 (10.0)	5 (25.0)	11 (55.0)
Erythroplakic	14	6 (42.9)	4 (28.6)	8 (57.1)	6 (42.9)	13 (92.9)
Leukoplakic	9	8 (88.9)	9 (100)	1 (11.1)	1 (11.1)	3 (33.3)
Verrucous	5	4 (80.0)	5 (100)	1 (20.0)	0 (0)	2 (40.0)

Table 4: Mucoscopic and histopathological correlation

Histopathological Feature	Dermoscopic Feature	Dermoscopy Present n (%)	Histopath Present n (%)	Both Present n (%)	χ^2	P value
Keratin pearl formation	White structureless areas	91 (75.8)	88 (73.3)	80 (66.7)	9.68	0.002*
Hyperkeratosis / parakeratosis	Keratin scales	83 (69.2)	90 (75.0)	78 (65.0)	10.92	0.001*
Tumor angiogenesis	Polymorphous vessels	74 (61.7)	82 (68.3)	70 (58.3)	12.84	0.001*
Ulceration and stromal inflammation	Red structureless areas	69 (57.5)	76 (63.3)	64 (53.3)	6.72	0.010*
Intraepithelial hemorrhage	Blood spots on keratin/ulceration	48 (40.0)	52 (43.3)	44 (36.7)	5.21	0.022*

Figure 1: Oral Squamous Cell Carcinoma Variants (A) Erythroplakic OSCC (lateral border of the tongue): Erythematous surface with areas of surface breakdown. (B) Exophytic OSCC (retromolar trigone region): Keratotic, whitish proliferative growth with irregular surface. (C) Proliferative OSCC (anterior tongue): Cauliflower-like mass with prominent keratinization. (D) Ulcerative OSCC (lower gingivobuccal complex): Irregular margins and surrounding mucosal changes.

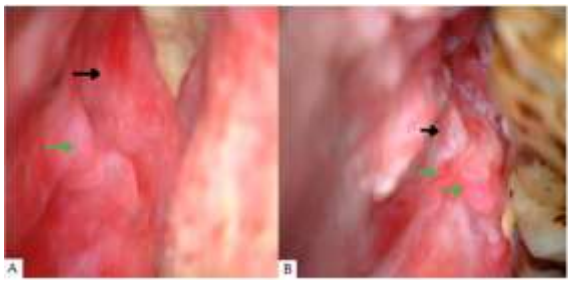

Figure 2: (A) White structureless area (green arrow) along with red structureless area (black arrow). (B)White structureless area (black arrow) along with milky red structureless areas (green arrows).

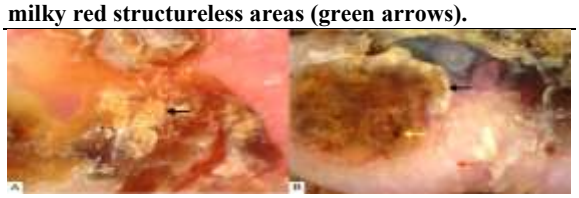

Figure 3: (A) Thick keratin scales (black arrow). (B) Thick keratin scales (black arrow) along with blood spots on keratin scales (yellow arrow) and white structureless areas (orange arrow).

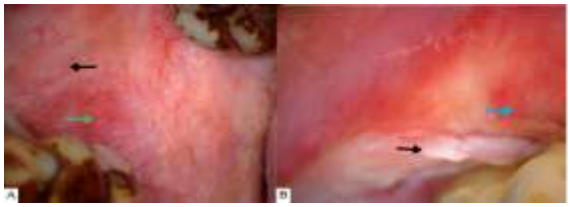

Figure 4: (A)Polymorphous vascular pattern(green arrow) along with few white structureless areas (black arrow). (B) Linear vascular pattern (blue arrow) along with keratin (black arrow).

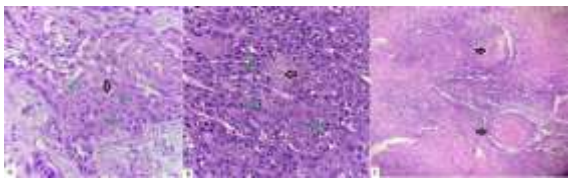

Figure 5: Histopathological spectrum of oral squamous cell carcinoma(A) Poorly differentiated SCC: Sheets of markedly atypical squamous cells showing pronounced cellular pleomorphism, nuclear hyperchromatism, and cellular atypia (green arrows), with minimal to absent keratinization.(B) Moderately differentiated SCC: Tumor islands exhibiting moderate pleomorphism and nuclear atypia (green arrows) with focal keratinization/early keratin pearl formation (black arrow).(C) Well-differentiated SCC: Infiltrating nests of squamous cells with abundant keratin pearl formation (black arrows).

DISCUSSION

In the present study of 120 patients with OSCC, a marked male predominance (75%) was observed, consistent with previous Indian studies such as those by Singh et al and Shenoi et al.[10,11] This trend is likely attributable to higher exposure to established risk factors, particularly tobacco and areca nut use among males. In contrast, Castillejos-García et al. reported a higher proportion of female patients, highlighting the role of geographic and sociocultural variation in risk factor distribution.[12]

The mean age of 53.9 ± 11.6 years, with peak incidence in the 51–60-year age group (34.2%), is in agreement with prior hospital-based study.[13] This distribution reflects the temporal progression of oral carcinogenesis, wherein cumulative genetic alterations and stepwise epithelial transformation culminate in clinically apparent malignancy predominantly in the fifth to sixth decades of life.

A high prevalence of addictive habits (84.2%) was noted, with tobacco chewing (51.7%) and areca nut consumption (41.7%) being the most common. This high prevalence reflects the deep-rooted sociocultural acceptance of smokeless tobacco, its widespread availability and affordability, and the relative but persistent lack of effective public health awareness regarding its carcinogenic risks in the Indian population. The presence of multiple addictions in 35.8% of patients further supports the synergistic role of combined carcinogenic exposures in oral carcinogenesis, where chronic mucosal irritation and chemical injury act in concert to accelerate tumor development. Warnakulasuriya and Chen highlighted that areca nut is classified as a Group 1 human carcinogen by the International Agency for Research on Cancer, with oral cancer risk increasing in a dose-dependent manner with frequency and duration of use.[14] This may partly explain the high burden of OSCC in populations with combined tobacco and areca nut exposure.

In the present study, buccal mucosa was the most frequently involved site (45%), followed by the tongue (23.3%) and alveobuccal sulcus (15%). The predominance of buccal mucosa in our cohort may be attributed to habitual quid placement, resulting in prolonged localized exposure to carcinogens. Additionally, the relatively high frequency of alveobuccal and gingivobuccal involvement may reflect regional chewing patterns and prolonged mucosal contact with carcinogenic substances.

Comparable patterns have been documented in Indian epidemiological literature, with Rai and Ahmed,[15] reporting buccal mucosa involvement in 53.1% of cases, attributing this predominance to localized carcinogen exposure from habitual tobacco quid placement, while Agarwal et al. likewise identified the buccal mucosa as the predominant site, accounting for 41% of cases.[16] Although the tongue is widely recognized as a major site of involvement, accounting for approximately 40% of intraoral carcinomas in the oral cavity proper,[17] its relatively lower frequency in the present study highlights site-specific exposure patterns.

Ulcerative morphology (35%) was the most common clinical presentation in the present study, followed by endophytic (25%) and exophytic (16.7%) OSCC. Similar observations have been reported by A.M. Alves et al., who also identified ulcerative lesions as the most frequent clinical variant.[18] The predominance of ulcerative OSCC may be indicative of delayed presentation; wherein initially proliferative lesions undergo secondary breakdown due to tumor necrosis and repeated mechanical trauma. In contrast, Agarwal et al. reported a markedly different distribution, with exophytic or proliferative lesions accounting for approximately 89% of cases, whereas ulcerative or infiltrative lesions were observed in only 11%.[16] This disparity may be attributed to differences in stage at presentation and healthcare-seeking behavior, suggesting that earlier lesions are more likely to present as proliferative growths, while ulceration represents a later morphological transformation.

Dermoscopy of OSCC remains relatively underexplored, with limited studies focusing specifically on mucoscopic patterns of oral lesions. Most available literatures, including studies by Rosendahl et al,[19] and Lallas et al,[20] have primarily described dermoscopic features of cutaneous squamous cell carcinoma, while mucosal applications remain less extensively characterized. The present study attempts to address this gap by providing a comprehensive morphology-wise and histopathological correlation of mucoscopic findings in OSCC.

Mucoscopic evaluation in our study demonstrated that white structureless areas (75.8%) and polymorphous vessels (72.5%) were the most frequent findings. These findings are in concordance with dermoscopic observations in cutaneous squamous cell carcinoma reported by Rosendahl et al,[19] and Lallas et al,[20] who described keratin-related white structures and polymorphous vascular patterns as key diagnostic features. However, unlike

cutaneous lesions, mucosal lesions in our study demonstrated relatively less prominent scaling and crusting, likely due to the moist intraoral environment limiting keratin desiccation.

The observations of Manish Bajpai and Gupta,[21] on mucoscopic features of OSCC also demonstrated the presence of white areas, vascular patterns, and surface changes, in concordance with the findings of the present study. However, their pictorial study was based on a relatively smaller sample size. In comparison, the present study offers a more comprehensive evaluation in a series of adequate number of patients, incorporating detailed morphological and histopathological correlation with statistically significant associations.

Morphology-specific analysis demonstrated a predominance of keratin-associated features in exophytic and verrucous lesions, whereas erythroplakic and ulcerative OSCC were characterized by prominent vascular patterns, highlighting the importance of correlating clinical morphology with mucoscopic features to accurately reflect underlying differences in keratinization and tumor angiogenesis.

Polymorphous vascular patterns, observed in 72.5% of lesions, reflect tumor-induced neoangiogenesis characterized by disorganized and heterogeneous vascular proliferation. This is in agreement with previous dermoscopic study by Benati et al. which identified irregular vascular patterns as a key feature of malignancy.[21] Blood spots, more frequently seen in ulcerative lesions, likely represent intraepithelial hemorrhage due to fragile neo vasculature and surface disruption.

The present study adopts an integrated clinicomucoscopic–histopathological approach, demonstrating statistically significant correlations across all evaluated parameters. Notably, such systematic correlation of mucoscopic features with defined histopathological parameters remains relatively underexplored in the existing literature. This comprehensive analysis provides meaningful insight into the histopathological basis of mucoscopic patterns, strengthening the clinicopathological relevance of mucoscopy in oral squamous cell carcinoma. Such an approach facilitates improved lesion characterization and supports its potential role as a valuable adjunct in diagnostic evaluation.

Future multicentric studies with larger sample sizes and blinded, multiple observers could address existing lacunae and further validate the diagnostic utility of mucoscopy in OSCC.

Strength and Limitations

Strengths: A notable strength of the present study is the systematic dermoscopic–histopathological correlation, which enables a deeper understanding of the morphological basis of observed mucoscopic patterns. By demonstrating consistent associations between surface features and underlying tissue alterations, the study reinforces the biological validity of mucoscopy in oral squamous cell carcinoma. Such structured correlation in malignant oral lesions remains relatively underexplored in current literatures, thereby contributing meaningful insight to the diagnostic application of mucoscopy.

Limitations: Being a single-centre study, the findings may have limited generalizability to broader populations. While the sample size was sufficient for descriptive and correlation analyses, it restricted detailed subgroup comparisons across histopathological grades and rare morphological types. Mucoscopic assessments were performed by a single observer, so interobserver variability was not evaluated, which may affect reproducibility.

CONCLUSION

Mucoscopy serves as a valuable non-invasive tool for the evaluation of oral squamous cell carcinoma by demonstrating consistent correlation with underlying histopathological features. It enables better characterization of lesion morphology and vascular patterns, thereby aiding in early detection and clinical assessment. The findings of the present study support its role as a useful adjunct in guiding targeted biopsy and improving diagnostic accuracy. Incorporation of mucoscopy into routine clinical practice may enhance the diagnostic approach to suspicious oral lesions, although further large-scale studies are warranted for validation.

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