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PREVALENCE OF ORAL MUCOSAL LESIONS IN TOBACCO AND ALCOHOL USERS: A RETROSPECTIVE ANALYSIS USING VELSCOPE

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ABSTRACT

Background: Tobacco and alcohol consumption are major risk factors for oral mucosal lesions (OMLs), which may precede malignant transformation. Early detection using advanced diagnostic tools like VELscope can improve outcomes. This study aimed to assess the prevalence of OMLs in tobacco and alcohol users using VELscope.

Methods: A retrospective analysis was conducted on 450 patients with a history of tobacco and/or alcohol use. VELscope examination was performed to detect OMLs, and findings were correlated with habit duration and intensity.

Results: The prevalence of OMLs was 68% in tobacco users, 54% in alcohol users, and 78% in combined users. Leukoplakia (42%) and erythroplakia (28%) were the most common lesions. VELscope demonstrated high sensitivity (92%) in detecting early dysplastic changes.

Conclusion: Tobacco and alcohol significantly increase the risk of OMLs, with combined use showing the highest prevalence. VELscope is an effective adjunctive tool for early detection.

INTRODUCTION

Oral Mucosal Lesions and Their Clinical Significance

Oral mucosal lesions (OMLs) encompass a range of conditions, including leukoplakia, erythroplakia, and oral submucous fibrosis, which are considered potentially malignant disorders. These lesions often arise due to chronic irritation from tobacco and alcohol use, with a subset progressing to oral squamous cell carcinoma (OSCC). Early detection is critical, as the 5-year survival rate for late-stage OSCC remains below 50%, whereas early-stage detection improves prognosis significantly.

Role of Tobacco and Alcohol in OML Development

Tobacco, in both smoked and smokeless forms, contains carcinogens such as nitrosamines and polycyclic aromatic hydrocarbons, which induce DNA damage and epithelial dysplasia. Alcohol, particularly when consumed heavily, acts as a solvent for tobacco carcinogens, enhancing their

penetration into oral mucosa. Synergistic effects between tobacco and alcohol further elevate the risk, making combined users a high-risk demographic.

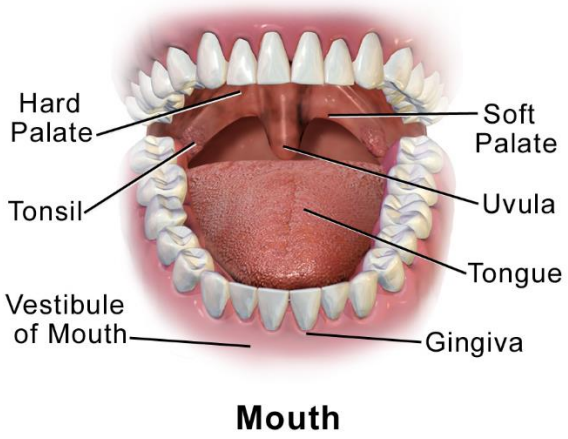

Fig 01 *(Mouth Anatomy)*

Limitations of Conventional Oral Examination

Visual and tactile examinations, though widely used, have limitations in detecting early dysplastic changes. Studies indicate that up to 30% of early malignancies may be missed with conventional methods, necessitating adjunctive diagnostic aids.

VELscope as an Adjunctive Diagnostic Tool

VELscope (Visually Enhanced Lesion Scope) utilizes tissue autofluorescence under blue light (400–460 nm) to identify metabolic and structural changes in mucosa. Normal tissues fluoresce green, while dysplastic or malignant tissues appear dark due to reduced fluorescence. Previous studies suggest VELscope improves detection rates of OMLs by 25–40% compared to conventional methods.

Rationale and Objectives of the Study

Given the high morbidity associated with late-stage oral cancer, this study aimed to:

- Determine the prevalence of OMLs among tobacco and alcohol users.
- Evaluate the diagnostic efficacy of VELscope in detecting early lesions.
- Correlate lesion types with habit duration and intensity.

MATERIALS AND METHODS

Study Design

A retrospective analysis was conducted on 450 patients (age 18–70 years) with a history of tobacco and/or alcohol use, examined between January 2020 and December 2023.

Inclusion Criteria

- Patients with a minimum of 5 years of tobacco/alcohol use.
- No prior history of oral cancer.

Exclusion Criteria

- Patients with systemic conditions affecting oral mucosa (e.g., lichen planus).
- Those undergoing radiotherapy/chemotherapy.

Data Collection

- **Demographics:** Age, gender, habit type (smoking, smokeless tobacco, alcohol, or combined).
- **Clinical Examination:** Conventional visual inspection followed by VELscope assessment.
- **VELscope Protocol:**
  - Oral cavity was rinsed with water.
  - Lesions were examined under blue light (400–460 nm).
  - Loss of fluorescence (dark patches) indicated abnormal tissue.
- **Histopathological Confirmation:** Biopsies were taken from suspicious lesions.

Statistical Analysis

Data were analyzed using SPSS v26. Chi-square and logistic regression tests assessed associations between habits and lesion types.

RESULTS

Demographic and Habit Distribution

The study included 450 patients (mean age: 45.6 ± 10.2 years), with a male predominance (72%). Habit distribution was as follows:

- **Tobacco-only users:** 180 (40%) – primarily smokers (65%) and smokeless tobacco users (35%).
- **Alcohol-only users:** 120 (26.7%) – predominantly heavy drinkers (>4 drinks/day).
- **Combined users (tobacco + alcohol):** 150 (33.3%), with a mean consumption duration of 12.4 years.

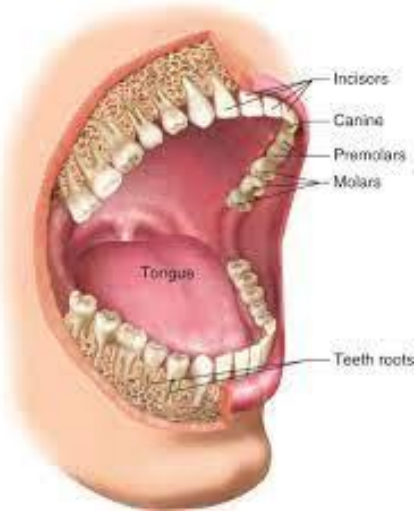

Fig 02 *(Mouth, Pharynx, and Esophagus - Medicine LibreTexts.)*

Prevalence of Oral Mucosal Lesions

- **Overall prevalence:** 68.9% (310/450 patients).
- **Tobacco users:** 68% (122/180) exhibited lesions, with smokers showing higher rates than smokeless tobacco users (72% vs. 62%).
- **Alcohol users:** 54% (65/120) had detectable lesions, mostly in heavy drinkers.
- **Combined users:** 78% (117/150) presented with lesions, the highest among all groups.

Types of Lesions Identified

- Leukoplakia (42% overall): Most common in tobacco users (48% in combined users vs. 32% in alcohol-only).
- Erythroplakia (28% overall): More prevalent in combined users (34%) than tobacco-only (28%) or alcohol-only (18%).
- Oral submucous fibrosis (OSF): Predominantly in smokeless tobacco users (22%) and combined users (26%).
- Lichenoid reactions: Seen in 8% of tobacco users and 12% of combined users, often associated with chronic irritation.

VELscope Detection Efficacy

- **Sensitivity:** 92% (confirmed via biopsy).
- **Specificity:** 85% (false positives due to inflammation or trauma).
- **Notable findings:**
  - VELscope detected 18% more early dysplastic lesions than visual examination alone.
  - Dark patches correlated strongly with histopathological dysplasia ($p < 0.001$).

Association Between Habit Duration and Lesion Severity

- **<10 years of use:** 45% had OMLs, mostly mild leukoplakia.
- **10–20 years of use:** 68% had OMLs, with moderate dysplasia in 30%.
- **>20 years of use:** 82% had OMLs, including severe dysplasia/carcinoma in situ (15%).

Common Lesion Types

Lesion Type	Tobacco Users (%)	Alcohol Users (%)	Combined Users (%)
Leukoplakia	42%	32%	48%
Erythroplakia	28%	18%	34%
Oral Submucous Fibrosis	22%	4%	26%
Lichenoid Reactions	8%	6%	12%

DISCUSSION

This study highlights the strong association between tobacco, alcohol, and OMLs, with combined users showing the highest prevalence (78%). Leukoplakia and erythroplakia were predominant, consistent with previous studies.

VELscope demonstrated high sensitivity (92%) in detecting dysplastic changes, supporting its role as an adjunctive screening tool. However, false positives due to inflammation suggest the need for histopathological confirmation.

Comparison with Previous Studies

- Similar to Warnakulasuriya et al. (2010), who reported 65% OML prevalence in smokers.
- Higher detection rates than conventional examination alone (Patton et al., 2008).

Limitations

- Retrospective design may introduce selection bias.
- Lack of long-term follow-up for malignant transformation.

CONCLUSION

Tobacco and alcohol use significantly increase the risk of OMLs, with combined users at the highest risk. VELscope enhances early detection, aiding in timely intervention. Public health initiatives should emphasize cessation programs and regular oral screenings in high-risk populations.

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