

# Innovations

## A Literature Review on Various Gingival Lesions Caused by use of Tobacco Related Products

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**Abstract:** Periodontitis is a connective tissue consisting of 4 Components. 1. Gingiva, 2. Periodontal ligament, 3. Cementum, 4. Alveolar bone. Periodontium is also known as periodontal tissue and its main function is to support the teeth. The use of tobacco is a universal public health problem. Tobacco is consumed in different form, from smoking to smokeless. Cigarettes, E- cigarettes, cigar pipe, chillum, hookah and beedi are some of the smoking forms of tobacco. Plain tobacco, khaini, gutkha and pan masala are smokeless forms of tobacco. The use of tobacco leads to various systemic disorders, malignant and potentially malignant lesions. This article aims in classifying all the gingival related lesions caused by the use of tobacco.

**Keywords:** Gingiva, Tobacco, potentially malignant disorders, leukoplakia, OSMF, verrucous xanthoma, carcinoma.

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### Introduction:

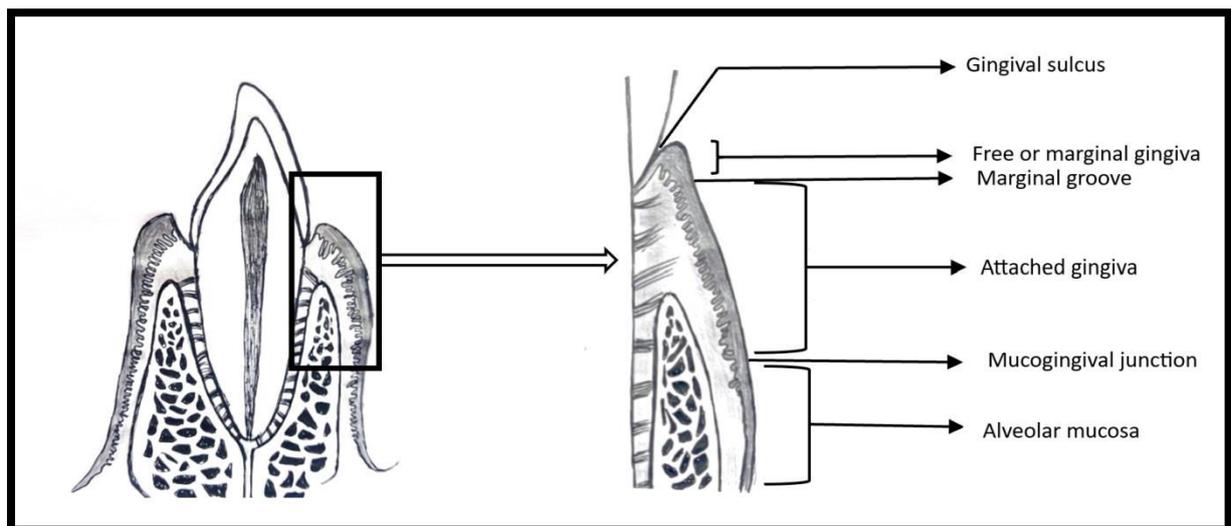
Direct or indirect association of tobacco use has been the most primary source affecting oral health. Tobacco consumption has been linked with malignancy (1). The correlation between the use of tobacco and local epithelial tissue damage exists (2). The use of tobacco has significantly increased over the past few decades particularly in young adults. Currently South Asia faces the highest health issues due to smokeless tobacco products. The use of tobacco in the form of smoking, smokeless, dip, chew are very common in Indian population. Approximately 17% of Southeast Asian population has been reported to use oral tobacco and out of which 82 % belongs to India the smokeless tobacco accounts for 35 % to 40 % of tobacco consumption (1).

Tobacco serves as a vehicle for delivering the addictive substance nicotine. The oral mucosa is composed of stratified squamous epithelium and

masticatory/keratinized (hard palate, dorsum of the tongue, and keratinized gingival) and lining mucosa (floor of the mouth, ventrolateral surface of the tongue, soft palate complex, labial vestibule, and buccal mucosa). Tobacco use affects the surface epithelium, resulting in changes in the appearance of the tissues. The changes may range from an increase in pigmentation to thickening of the epithelium (white lesion)(3). Tobacco smoke contains various hydrocarbons, potent carcinogens that can damage DNA. Chewing or snuff dipping with unburned tobacco also exposes individuals to powerful nitrosamines, contributing to the development of specific cancers like squamous-cell carcinoma and verrucous carcinoma(4).

Gingiva is part of oral mucosa that covers alveolar process of the jaws and surrounds the neck of the teeth. The gingiva is anatomically categorized into marginal, attached, and interdental regions. While each exhibits variations in histology, thickness, and differentiation based on functional needs, all types are specifically designed to effectively resist mechanical and microbial damage.

**Figure: 1**Diagram showing the anatomical land marks of gingiva



The marginal or unattached gingiva is the outermost border encircling the teeth in a collar-like manner. Typically, 1 mm wide, the marginal gingiva serves as the soft-tissue boundary for the gingival sulcus, with the gingival zenith marking its lowest point. Dimensions of the scallop range from 0.06 to 0.96 mm in both height and width. The gingival sulcus is a shallow V-shaped space around the tooth, bordered by the tooth surface and the epithelium lining the free margin of the gingiva. Under ideal conditions, it is nearly 0 mm deep, but the probing depth in humans is typically 2 to 3 mm. The attached gingiva, firmly bound to the alveolar bone, extends from the marginal gingiva to the mucogingival junction. Its width, varying across the mouth, is greatest in incisor regions (3.5-4.5mm maxilla, 3.3-3.9mm mandible) and narrower in posterior segments (1.9mm maxillary first

premolars, 1.8mm mandibular first premolars).The interdental gingiva, found in the space between teeth, can be pyramid-shaped or col-shaped. Its form depends on contact points between teeth, distance to the bone crest, and recession. Facial and lingual surfaces taper, while mesial and distal surfaces are slightly concave. Interdental papillae are shaped by adjoining teeth's marginal gingiva, with attached gingiva in between. In a diastema, gingiva binds over interdental bone, creating a smooth surface without papillae(5).

**Materials and Method:**

Multiple databases were systematically searched to locate articles discussing the frequency, features, and potential malignancy hazards of gingival lesions in individuals who use tobacco.

Data aggregation and analysis were undertaken to offer a comprehensive summary of the research outcomes.

**Results: Table 1**

**Gingival Lesions Induced by Tobacco: Characteristics and Occurrence Rates:**

<u>Lesion</u>	<u>Definition</u>	<u>Characteristics</u>	<u>% of occurrence on gingiva</u>	<u>Risk of malignancy</u>
Smoker's melanosis	Benign limited melanin pigmentation occurring in the attached gingiva of tobacco smokers(6)	A diffuse black-brown macule that can involve mainly the gingiva, followed by buccal mucosa, lips, and hard palate.(6)	95.2%(7)	NA
Tobacco induced lichenoid reaction	Oral lichenoid reactions (OLR) can occur as a result of contact of an irritant such as tobacco(8)	Presents as a unilateral, wavy, non-elevated, non-scrapable white lesion. (8)	17%(9)	2.43%(10)
Leukoplakia	A white patch/plaque that cannot be characterised		6-22%(13)	15.6-39.2%(14)

<p>Homogeneous</p> <p>Non-homogeneous</p> <p>Speckled</p> <p>Verrucous leukoplakia</p>	<p>clinically, pathologically as any other diseases(11)</p>	<p>Appears as a flat white lesion (12)</p> <p>Includes speckled, nodular and verrucous leukoplakia(12)</p> <p>Is a white and red lesion, with a predominantly white surface.(12)</p> <p>An elevated, proliferative or corrugated surface appearance(12)</p>		<p>18-47%(14)</p> <p>4-15% (14)</p>
<p>OSMF</p>	<p>Chronic, insidious disease that affects the lamina propria of the oral mucosa and as the disease advances it involves tissues deeper in the submucosa of the oral cavity with resulting loss of fibro-elasticity.(11)</p>	<p>Mucosal rigidity(14)</p>	<p>23.3%(retromolar trigone)(15)</p>	<p>7-26%(14)</p>

<p>Proliferative verrucous Leukoplakia</p>	<p>A distinct form of leukoplakia characterized by multifocal slow-growing lesions resistant to all forms of treatment, with a high rate of recurrence and a tendency to transform to oral cancer.(16)</p>	<p>Multifocal white patch or plaque + rough surface projections(14)</p>	<p>46.8%(16)</p>	<p>63.3%-100%(14)</p>
<p>Verrucous xanthoma</p>	<p>Is a rare benign mucocutaneous verruca papillary lesion.(17)</p>	<p>Clinically appear as a well demarcated solitary sessile or pedunculated lesion with a rough pebbled surface, yellowish – white or red appearance depending on the degree of keratinization and number of lipid-laden macrophages in the connective tissue papilla(17)</p>	<p>57.4%(17)</p>	<p>NA(14)</p>
<p>Verrucous carcinoma/snuff dipper's cancer/Ackerman's tumour</p>	<p>Is a low-grade variant of oral squamous cell carcinoma with specific</p>	<p>Extensive thick white plaque(14)</p>	<p>4.5%-9%(4)</p>	<p>20%(14)</p>

	morphologic, cytokinetic and clinical features(18)			
Squamous cell carcinoma	Malignant neoplasm derived from the stratified squamous epithelium of the oral mucosa(19)	May resemble a leukoplakia, a verrucous leukoplakia, an erythroleukoplakia, or an erythroplakia, any of which may eventually develop into a necrotic looking ulcer with irregular, raised indurated borders, or into a broad based exophytic mass with a surface texture which may be verrucous, pebbled or relatively smooth(20)	10%(4)	6.6% (21) (distant metastasis)

**Conclusion:**

The link between gingival lesions and tobacco usage is undeniable, as numerous studies have consistently shown a higher prevalence of oral health issues among tobacco users. The harmful substances present in tobacco products contribute to inflammation, impaired immune response, and delayed wound healing in the gingival tissues, leading to a spectrum of gingival lesions, from potentially malignant to carcinomas.

In this article it provides an overview of various gingival lesions associated with tobacco usage and the associated risk of malignancy. Smoker's melanosis, prevalent in 95.2% of cases among tobacco smokers, is noted for its benign nature. Vigilance is required due to the potential for malignant transformation in other lesions. Tobacco-induced lichenoid reaction, leukoplakia (homogeneous, non-homogeneous, speckled, verrucous), OSMF, proliferative verrucous leukoplakia, verrucous xanthoma, and verrucous carcinoma each exhibit distinct

characteristics and varying risks of malignancy. Notably, proliferative verrucous leukoplakia presents a high risk (63.3%- 100%) of transformation to oral cancer. Squamous cell carcinoma, a malignant neoplasm is associated with a 6.6% risk of distant metastasis, underscoring the aggressive nature of this condition. A comprehensive understanding of these lesions and their associated risks is crucial for early diagnosis, intervention, and improved patient outcomes. Regular surveillance, particularly for high-risk lesions, can contribute to timely therapeutic interventions and better prognosis.

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