



DISEASES OF HARD DENTAL TISSUES AND THEIR PREVENTION

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Abstract: Diseases of hard dental tissues are among the most prevalent oral health problems worldwide and represent a significant public health concern. These tissues, including enamel, dentin, and cementum, are essential for maintaining tooth integrity, function, and aesthetics. Damage to hard dental tissues can lead to pain, hypersensitivity, infection, and eventual tooth loss. This article provides a detailed review of the major diseases affecting hard dental tissues, such as dental caries, dental erosion, abrasion, attrition, and non-carious cervical lesions. In addition, current preventive strategies at the individual, professional, and community levels are discussed, emphasizing the importance of early diagnosis and preventive care in preserving oral health.

Keywords: hard dental tissues, dental caries, enamel, dentin, prevention, oral health

Introduction

Hard dental tissues constitute the mineralized structures of the tooth and include enamel, dentin, and cementum. These tissues provide mechanical strength, protect the dental pulp, and allow effective mastication and speech. Due to their constant exposure to mechanical, chemical, and microbial factors, hard dental tissues are susceptible to various pathological processes. Diseases affecting these tissues are highly prevalent across all age groups and may significantly impair quality of life. Despite advances in preventive and restorative dentistry, the global burden of hard dental tissue diseases remains high, highlighting the need for improved prevention and education strategies.

Structure and Function of Hard Dental Tissues

Enamel is the outermost layer of the tooth and is the hardest tissue in the human body, composed mainly of hydroxyapatite crystals. Its primary function is to protect the underlying dentin and pulp from mechanical damage and chemical insults. Dentin lies beneath the enamel and cementum and is less mineralized but more resilient. It contains microscopic tubules that transmit sensory stimuli, making it sensitive to thermal and chemical changes. Cementum covers the root surface and plays a crucial role in anchoring the tooth to the alveolar bone through the periodontal ligament.

Classification of Hard Dental Tissue Diseases

Dental Caries

Dental caries is a chronic, multifactorial disease resulting from the interaction between cariogenic microorganisms, fermentable carbohydrates, and susceptible tooth surfaces over time. Bacterial species such as *Streptococcus mutans* and *Lactobacillus* metabolize dietary sugars and



produce organic acids, which lower the pH of dental plaque and initiate enamel demineralization. If left untreated, caries progresses from enamel to dentin and may eventually involve the pulp, leading to pain and infection. Dental caries remains one of the most common diseases worldwide, affecting both children and adults.

Non-Carious Lesions

Non-carious lesions refer to the loss of hard dental tissues not caused by bacterial activity. These lesions are increasingly recognized due to changes in lifestyle and dietary habits.

Dental Erosion

Dental erosion is defined as the irreversible loss of hard dental tissues caused by chemical processes involving acids not derived from bacteria. Extrinsic sources of acids include carbonated beverages, citrus fruits, and sports drinks, while intrinsic acids may originate from gastric reflux or eating disorders. Clinically, erosion presents as smooth, shiny surfaces and increased dentin exposure.

Dental Abrasion

Dental abrasion results from mechanical wear caused by external factors, most commonly improper tooth brushing techniques and the use of abrasive toothpaste. Abrasion typically affects the cervical areas of teeth and may lead to hypersensitivity and aesthetic concerns.

Dental Attrition

Attrition is the wear of tooth structure caused by tooth-to-tooth contact during mastication or parafunctional habits such as bruxism. Excessive attrition can result in reduced crown height, occlusal disharmony, and temporomandibular joint disorders.

Non-Carious Cervical Lesions

Non-carious cervical lesions occur at the cementoenamel junction and are believed to result from a combination of erosion, abrasion, and occlusal stress. These lesions may compromise tooth strength and increase the risk of fracture if not properly managed.

Prevention of Hard Dental Tissue Diseases

Individual Preventive Measures

Individual prevention focuses on maintaining good oral hygiene and adopting healthy dietary habits. Twice-daily tooth brushing with fluoride toothpaste, daily interdental cleaning, and limiting the consumption of sugary and acidic foods are fundamental preventive measures. The use of fluoride enhances enamel remineralization and increases resistance to acid attack.

Professional Preventive Measures



Professional prevention includes regular dental examinations, professional cleaning, topical fluoride applications, and the placement of fissure sealants in high-risk patients. Early detection of lesions allows for minimally invasive treatment and prevents disease progression.

Community and Public Health Prevention

At the community level, preventive strategies include water fluoridation, school-based oral health programs, and public education campaigns. These measures have been shown to significantly reduce the prevalence of dental caries and improve overall oral health outcomes.

Conclusion

Diseases of hard dental tissues are widespread but largely preventable. A comprehensive preventive approach that integrates individual behavior, professional dental care, and public health initiatives is essential for preserving tooth structure and maintaining long-term oral health. Increased awareness and early intervention remain key components in reducing the global burden of these diseases.

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