

The Influence of Tobacco on Oral Health: A Review Study

Debjit Dhamali,¹ Desai Ankur,² Anirudh Singh,³ Mali Sheetal,⁴ Pawar Abhijit,⁵ Anita Thakur⁶

¹ Assistant Professor, Department of Dentistry, Iqcity Medical College and Narayana Multi Speciality Hospital, Durgapur, West Bengal, India

² Reader, Department of Conservative Dentistry and Endodontics, Vaidik Dental College and Research Centre, Daman, India

³ Consultant Orthodontist, Axiss Dental Pvt. Ltd., New Delhi, India

⁴ Assistant Professor, Department of Conservative Dentistry and Endodontics, Bharti Vidyapeeth Dental College and Hospital, Navimumbai, Maharashtra, India

⁵ Consultant, Oral and Maxillofacial Surgeon, Powai Hospital, Powai, Mumbai, India

⁶ Senior Lecturer, Department of Conservative Dentistry and Endodontics, Modern Dental College and Research Centre, Gandhinagar, Indore, Madhya Pradesh, India

Abstract

Tobacco is a major risk factor for oral cancer, oral mucosal lesions, periodontal disease, gingival recession, dental caries and success rate of periodontal surgery. Quitting tobacco results in decreased risk for oral diseases. This article reviews the effects of tobacco on oral health, including the impact of tobacco on periodontium, periodontal and orthodontic therapy. Smoking causes gingival recession and oral mucosal lesions. Smoking has an adverse effect on all forms of periodontal therapy. There is an alteration in the microflora and/or host response. There is a direct relationship with the prevalence of dental caries. Environmental tobacco smoke (ETS) also causes dental caries in children. Tobacco chewing is presumably a positive contributing factor for higher incidence of dental caries. The facts presented in this paper will help dental health professionals in treatment-planning decisions and provide them with important information to share with patients who use tobacco products.

Key Words

Tobacco; periodontium; caries; oral mucosal lesions; orthodontic therapy

INTRODUCTION

Tobacco use is one of the most important risk factors for oral cancer, oral mucosal lesions, periodontal disease, gingival recession, dental caries and success rate of periodontal surgery and orthodontic treatment. Available evidence suggests that the risks of oral diseases are directly proportional to the use of tobacco and that quitting tobacco can result in decreased risk. The magnitude of the effect of tobacco on the occurrence of oral diseases is high, with users having many times the risk compared to non-users. There is a definite benefit to quitting tobacco use. The risks of oral cancer and periodontal disease decline as time from cessation increases, and some oral mucosal lesions may resolve with cessation of smokeless tobacco use.^[1] India has one of the highest rates of oral cancer in the world; accounting for one third of the total cancers and unfortunately this figures continue to rise. According to World Health Organization, 40% of the oral cancers which were diagnosed

worldwide occurs in India, Pakistan, Bangladesh and Srilanka.^[2] Because tobacco accounts for such a high proportion of these diseases, comprehensive tobacco control policies are required to make progress in reducing the burden of tobacco-related oral diseases. Effective treatments to prevent tobacco use need greater implementation. Dental practices may provide a uniquely effective setting for tobacco prevention and cessation. All of the major forms of tobacco used in India -cigarettes, cigars, pipe tobacco, and smokeless tobaccos like chewable tobacco and snuff have oral health consequences. This review discusses the evidence for the effect of tobacco on each of the most prevalent oral diseases.

EFFECTS OF TOBACCO ON ORAL HEALTH Periodontal health

Smoking causes reduction in clinical signs of gingivitis.^[3] This could be attributed to vasoactive effects of nicotine on a local basis.^[4] It could be because of defective microvasculature^[5] causing

reduced oxygen saturation.^[6] There is a reduction in interleukin-I among smokers resulting in reduced signs of inflammation among smokers.^[7] Few studies have shown increased bleeding in young smokers this was mainly because of excess plaque and calculus accumulation.^[8] It was observed that smoking caused increased mean periodontal attachment loss compared to non smokers.^[9] There was greater amount of alveolar bone loss seen among smokers compared to non smokers. Clinical investigations also reported extensive periodontal destruction which simulated aggressive periodontitis or early onset periodontitis among smokers.^[10] Considering the host response of smokers it was observed that nicotine metabolites concentrates in the periodontium causing vasoconstriction which results in impairment of inflammatory response. There is impairment of functional activity of polymorphs and macrophages resulting in poor migration of neutrophils through capillary wall due to paralysis of the cell membrane. There is an increase in elastase causing cell damage.^[11] There is an increase in circulating monocytes and prostaglandin (PGE₂) level. There is an inhibition of antimicrobial activity and decrease in Helper B cell function.^[12] The above host responses make smokers more prone to infection by porphyromonas gingivalis, bacteriodal forrythus and Zikerella corrodens. There is a decrease in serum IgG level resulting in extensive periodontitis among smokers compared to nonsmokers. Smoking inhibits wound healing and smokers respond less favorably to periodontal therapy. There is an inhibition of collagen and fibronectin production among smokers. Nicotine binds with fibroblasts and interferes cellular functions. There is an inhibition of attachment and regrowth of periodontal fibroblasts.^[13] Cigarette smoking also inhibits revascularization.

Dental caries

There is a belief that smoking decreases dental caries^[14]. Thiocyanite in smokers' saliva is believed to be responsible for decrease in dental caries. On the other hand, decreased buffering effect and lower pH of smokers' saliva increases lactobacillus and streptococcus mutans count causing increased susceptibility to caries. Decreased salivary flow rate causes increased DMFT among smokers. Smoking is often accompanied by intake of tea, coffee and alcohol contributing to increased sugar intake causing dental caries.^[15] Tobacco contains sugar. Tobacco contains 20 percent of natural sugar and 4

to 13 percent of added sugar. Sucrose, glucose, fructose, invert sugars, fruit juices, honey, molasses extracts, cones, maple syrup and caramel are the sweeteners used. They mainly act as flavoring agent and humectants. Sugars generate acids that neutralize the harsh taste and throat impact of tobacco smoke. The sweetened taste is often appreciated by beginners.^[16] Environmental tobacco smoke and dental caries: Environmental tobacco smoke (ETS) created mainly by passive smoking acts as a predictor for dental caries among preschool children. Environmental tobacco smoke causes rhinitis which causes blockage of nose resulting in mouth breathing which eventually causes dental caries because of dry mouth.^[17] ETS affects the thin enamel of deciduous teeth more compared to permanent teeth.

Tobacco causes Oral Cancer

Cigarette smoking causes oral cancer. Cigarette smokers have 7 to 10 folds greater risk of oral cancer compared to non smokers, however it is dose and time dependent.^[18] Pipe smokers have 2 to 3.5 times greater risk.^[19] The risk of oral and pharyngeal cancer is 4 to 6 times more among smokers compared to non smokers. The carcinogens in smokers consists of tobacco specific nitrosamines, aromatic amines, polycyclic aromatic hydrocarbons.^[20] Smokeless tobacco contains nitrosamines which is formed during fermenting and curing of tobacco. There is a genetic predilection of oral cancer for genes coding for N- acetyl transferases, glutathione transferase and P450 pathway enzymes.^[21]

Oral mucosal lesions

Cigarette smoking causes oral mucosal lesions like nicotinic stomatitis and hairy black tongue. Tobacco causes white, opaque, furrowed and leathery white or gray mucosa called leukoplakia.^[22]

Effect of tobacco on orthodontic treatment

Nicotine causes an increase in the expression of Cox 2 gene and PGE₂ release from human gingival fibroblasts thereby increasing the pace of orthodontic tooth movement in a time and dose dependent manner, this was proved in rat experiment.^[23] Smokers have increased risk of recession which affects orthodontic treatment.^[24]

CONCLUSION

Tobacco is still the most significant preventable risk factor for oral diseases. Its effects are related to the duration and dosage of tobacco consumed. Besides having a range of systemic effects which can alter the host response cigarette smoking would also

appear to have considerable local effects which may account for the premature establishment of the disease process in susceptible individuals. While this review has primarily examined the effects attributed to nicotine and its metabolites it should be stated that various genetic polymorphisms might also contribute to disease status in susceptible individuals.

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