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Review Article

Smoking–The Perilous Voyage of Periodontal Disease

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Abstract

There is compelling epidemiological evidence, both from cross-sectional and longitudinal research, suggesting that smoking is associated with a significantly elevated risk of periodontal disease. The statistics derived from patients who give up smoking provide more support for this evidence. The risk levels of these patients are comparable to those of nonsmokers. Several investigations have been carried out to explore the possible pathways through which smoking tobacco could predispose to periodontal disease. The findings suggest that smoking may impact the vasculature, humoral immune system, cellular immune and inflammatory systems, as well as have effects across the cytokine as well as the adhesion molecule. This review article describes about the various treatment modalities that enhances the cessation of smoking and the positive results seen in periodontium in quitting smoking.

Keywords: Smoking, Periodontitis, Smoking Cessation, Periodontal Depth, Clinical Attachment Levels.

Introduction

Tobacco comes from a plant whose leaves go by the name *Nicotiana tabacum*. The earliest known use of tobacco is thought to date back to the first century before Christ, when the central American Mayan people smoked Nicotiana leaves for religious and ceremonial purposes.[2]However, tobacco intake has detrimental consequences on all living systems, regardless of the form it takes, as several research studies from around the globe have highlighted . Each year, tobacco smoke causes a staggering number of lives.[2]Results from cross-sectional and cohort studies indicate that smokers are more likely to get periodontitis that is more severe and extensive as a result of smoking. There is also a good chance that smoking and tooth loss are causally related. It is commonly recognized that smoking raises the risk of bone loss around dental implants and tooth loss related to periodontitis.[3]Nicotine, one of the toxic ingredients in tobacco products, can damage gingival tissue, reduce blood flow to the gums, and weaken the immune system.[4] A tobacco product that is used in ways other than smoking is called smokeless tobacco . To utilize them, the product is either chewed, smelled, or wedged between your gums and your lip or cheek. A variety of smokeless tobacco products, including chewing tobacco, snuff, snus, and dissolvable tobacco products, are manufactured. About 80% of the world's usage of smokeless tobacco comes from South Asia, where it is extensively consumed. Since nicotine is an ingredient in all smokeless tobacco products, they are all very addictive.[5]

Types of smokers

Smokers are frequently divided into groups according to their pack-years, which is a measure of their average daily pack count and number of years of smoking. The chance of health problems increases with pack-year number. Examples of pack-year categories are as follows:

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a. Never smokers: 0 pack-years

b. Light smokers: 1–20 pack-years

c. Moderate smokers: 1–40 pack-years

d. Heavy smokers: More than 40 pack-years

e. Extreme smokers: More than 26 pack-years[6]

Multiply the amount of packs you smoke each day by the total number of years you have smoked to get how many pack years you have smoked.[7]

Effect of Smoking in Prevalence and Severity of Periodontal Disease

Tobacco use is linked to a higher chance of alveolar bone loss, periodontal pocket development, and loss of periodontal attachment. There is a strong positive correlation between the amount of tobacco used daily and the length of time it has been smoking.[8]In contrast to non-smokers, smokers experienced more tooth loss, greater mobility of their teeth, deeper periodontal pockets, and higher alveolar bone loss in studies that controlled for oral hygiene practices, patient age, sex, and socioeconomic status. Additionally, there appears to be a significant interaction between tobacco smoking and mental stress and poor dental hygiene. Tobacco consumption is also highly linked with acute necrotizing gingivitis.[8]Because nicotine has a vasoconstrictive effect, in smokers' gingival bleeding is "less severe" than that of non-smokers. The gingival end-arterial vasculature is where nicotine's primary vasoconstrictive action is felt. Additionally, other tobacco products may cause the disease's characteristic ulceration and necrosis of tissue.[8]Also the gingiva appears more greyish in colour and the epithelium appears more hyperkeratotic and hyperplastic. Smoking is also an important predisposing factor in the development of Acute Necrotizing Ulcerative Gingivitis (ANUG), due to the continuous irritating effect of tar present in cigarettes on gingival epithelium.

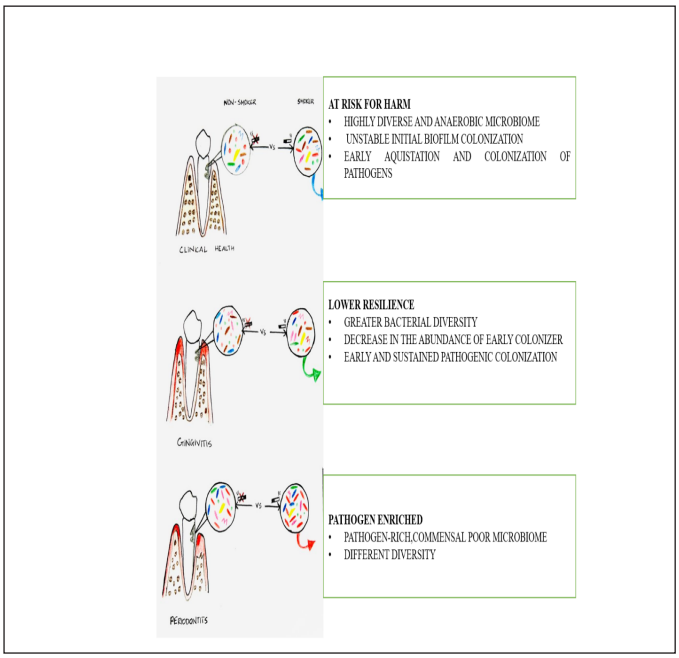

Figure 1. *Schematic representation of clinical findings of subgingival microflora in smokers*

Effect of smoking in etiology and pathogenesis of periodontal disease

The higher frequency and more severe periodontal destruction linked to smoking implies that the host-bacterial interactions typically observed in chronic periodontitis are modified, leading to more aggressive periodontal breakdown. This imbalance between bacterial challenge and host response could be caused by variations in the subgingival plaque composition, with more_pathogenic organisms and/or increased virulence; variations in the host response to the bacterial challenge; or a combination of both.[8]

Clinical Signs & Symptoms

- Soft tissue whitening in the mouth (also known as smoker's keratosis)
- Poor healing following extraction of the tooth (dry socket)

- Decaying teeth
- Tooth loss
- Inadequate recovery following gum and oral surgery
- Decreased taste
- Foul breath and foul taste in the mouth (called halitosis)
- Nicotina stomatitis, also known as smokers palate seen as a whitish patch on hard palate due to continuous smoke and heat exposure.

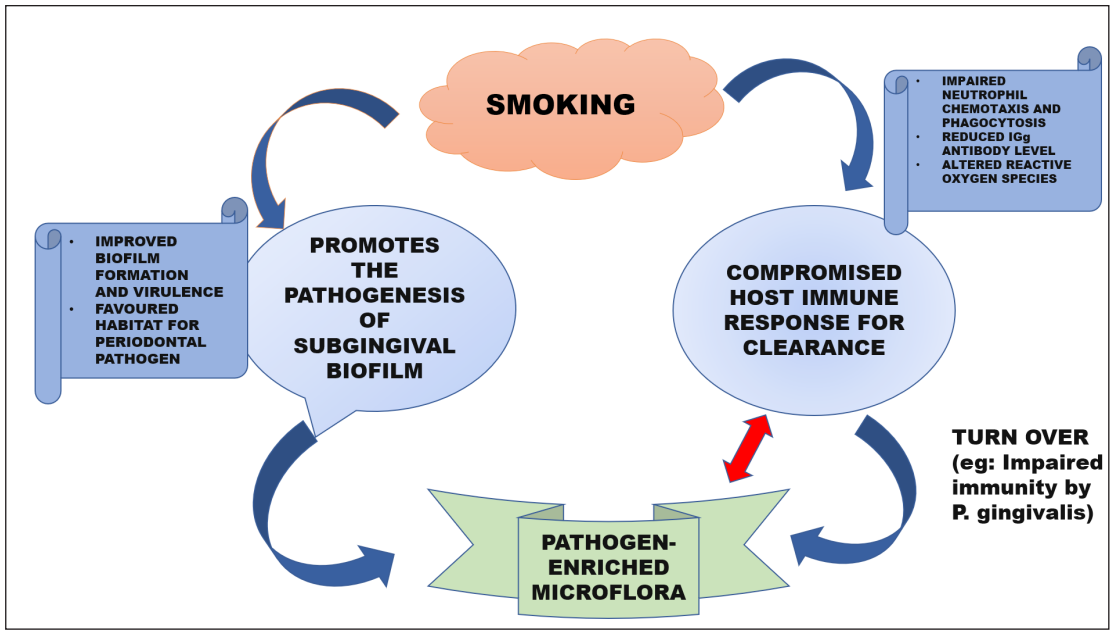

Figure 2. *Schematic diagram showing negative impact of smoking on subgingival flora*

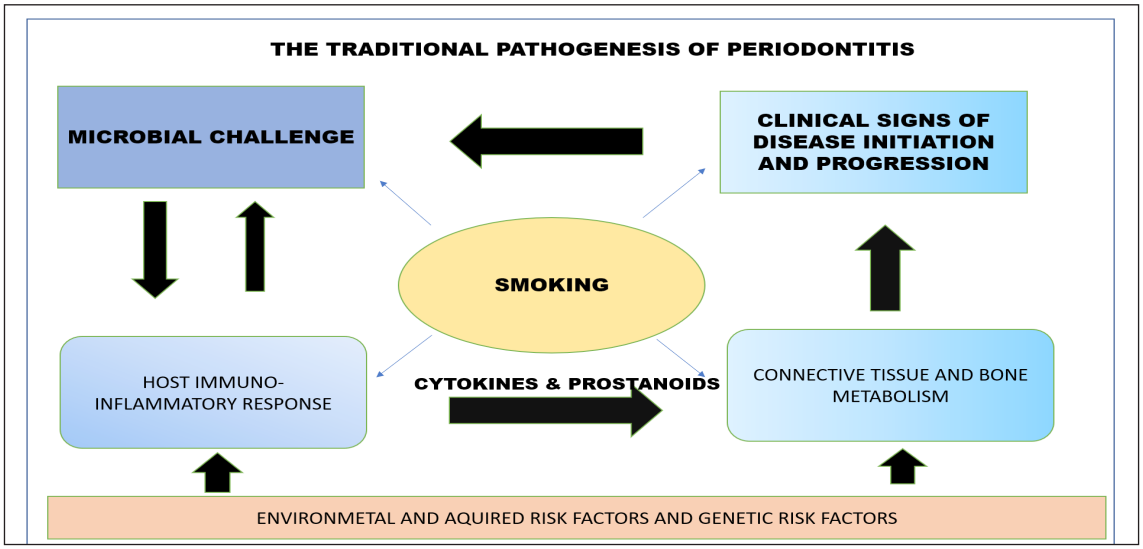

Figure 3. *Illustration depicting effect of smoking in traditional pathogenesis of periodontitis based on four compartments*

Effect of Smoking on Response to Periodontal Therapy

Since smoking affects up to 90% of patients with refractory periodontitis, it has been found to have a deleterious effect on all forms of periodontal treatment. Following nonsurgical and surgical therapies, researchers have shown that nonsmokers had much lower probing depths, less blood, and improved clinical attachment. When treating furcation lesions and after regeneration therapies, a similar observation has been made.[9]

Effect On Non-Surgical Treatment

- Research indicates that compared to nonsmokers or

former smokers, current smokers exhibit less notable changes in clinical responses, such as a decrease in PPD and an increase in CAL, following SRP.[9]

- The various effects include:

√ Decreased clinical response to scaling and root planning

√ Decreased reduction in pocket depth

√ Decreased gain in clinical attachment levels

- When compared to smokers, nonsmokers bleed more during the initial examination, but following phase 1 therapy, nonsmokers bled less, which was explained by smokers' slowed wound-healing process.[10]

Effect on Surgical Treatment

- Following non-surgical periodontal therapy, surgical periodontal therapy may be used. Numerous surgical procedures are part of this therapy. Patients with deep pockets may benefit from open flap debridement; those with gingival recession may benefit from periodontal plastic surgery; those with bone deficiencies may benefit from periodontal regeneration surgery; and those without teeth may benefit from implant surgery. Before the surgical intervention, the patient's non-surgical periodontal therapy must be finished, and the gingival tissues must be clear of inflammation.11

- Smoking contributes a deleterious effect on surgical periodontal treatment and it may include:

√ Decrease reduction in pocket depth after surgery

√ Increased deterioration of furcation after surgery

√ Decrease gain in clinical attachment levels

√ Decrease in bone fill

√ Decrease pocket depth reduction after bone graft surgery

√ Increase recession rate

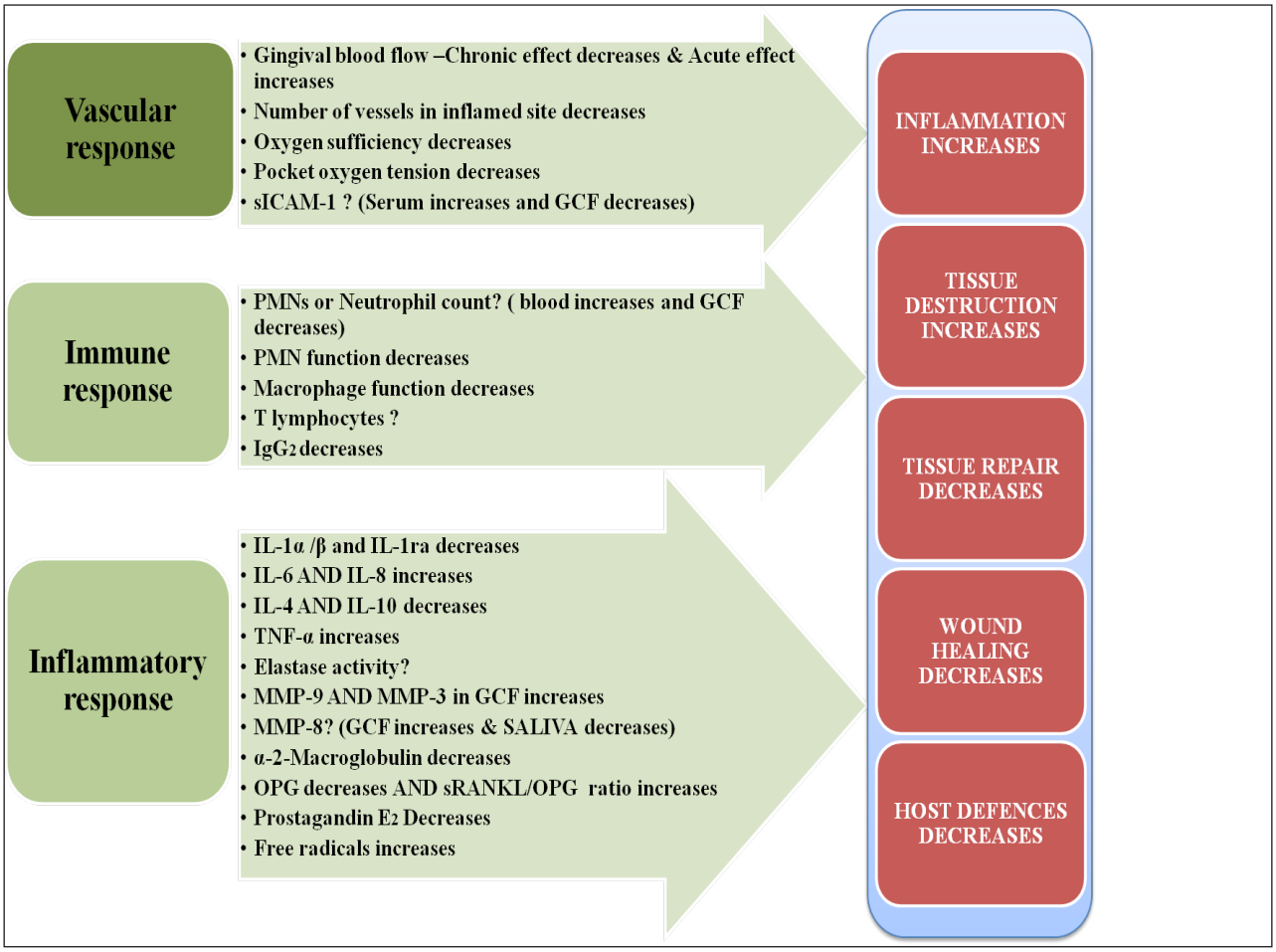

Figure 4. *Destructive effect of smoking on periodontal tissue*

Management and Cessation of Smoking

- Cessation of smoking: It includes 5As and 5Rs

5As

Ask: communicating with the patient to know about their smoking status

Advice: advice the smokers about the deleterious and long term side effects of smoking on oral health and ask them to quit smoking

Assess: asses the patient's mental attitude whether he/she is ready to quit smoking

Assist: help your patient in his attempt

Arrange: organize a follow-up or a recommendation for a professional smoking cessation service.

5Rs

Relevance: Ask the patient to explain why giving up is important to them personally, being as detailed as you can. Motivational information is most effective when it is pertinent to a patient's age, gender, health issues, family or social circumstances, illness status or risk, and other significant patient concerns.

Risks: When a patient uses tobacco, what are the possible drawbacks? The physician should inquire. If some appear to be more relevant to the patient, the physician may recommend and highlight them.

Rewards: The patient should be asked to list any possible advantages of quitting smoking by the therapist. The doctor could recommend and emphasize those that appear to be more relevant to the patient.

Roadblocks: The doctor should ask the patient to list any obstacles or hurdles to stopping, then offer a course of treatment that may help remove those obstacles.

Repetition: Every time a patient comes to the clinic lacking motivation, the motivating intervention should be repeated. It should be explained to tobacco users who have tried and failed to quit that most people have to try quitting many times before they are successful.

- Brief intervention for patients who are not willing to quit

√ Utilizing the 5Rs approach to encourage patients

√ presentation of symptoms unique to each patient that are related to smoking.

√ presentation of the possible advantages of quitting smoking for periodontal therapy.

- Brief and intensive interventions and assistance of referral program for patients who are willing to quit

√ The accessibility of materials for self-help

√ Behavioral strategies using or not using NRTs

√ Assistance through an alternate smoking cessation program that offers medically mediated nicotine dependence therapy

√ Interventions for patient follow-up during the short-term maintenance phase

Action Stage ⇒ Short-Term Maintanance Period ⇒ Maintanance Stage

- Nicotine replacement therapy:

To reduce cravings and minimize withdrawal symptoms after quitting smoking, nicotine replacement therapy (NRT) entails utilizing products (such as gum and patches) with low concentrations of nicotine. It's a kind of medication-assisted treatment (MAT) for tobacco use disorder sufferers who are dependent on nicotine. The additional pollutants that smoking exposes you to, including as carcinogens, are absent from the nicotine products for NRT .Using products with regulated, low amounts of nicotine during NRT helps prevent cravings and withdrawal symptoms after quitting smoking. Compared to regular cigarettes, NRT products have less nicotine in them, and their effects on the body happen more gradually.

Among the NRT products is:

√ Nicotine Gum.

√ Lozenges.

√ skin patches

√ Inhalers.

√ sprays for the nose.

- Medications include:

√ Bupropion: at low doses proves best in cessation of smoking. Most people often begin taking bupropion one to two weeks prior to their intended stop date. To lessen the chance of some side effects, most patients begin on a lower dosage initially:

√ Take one 150 mg tablet daily for the first three days.

√ Days three to the therapy's conclusion: Take two 150 mg pills daily, separated by at least eight hours: one in

the morning and one in the evening.

√ Make an effort to take bupropion every day at the same time. There should always be at least eight hours between the two dosages. Take no more than two pills in a 24-hour period.14

Effect of smoking cessation in periodontal treatment outcome

- Cigarette smoking can pose a higher risk of periodontal treatment failure and influence the risk of disease recurrence.12 Several cross-sectional studies have demonstrated the positive effects of quitting smoking on the overall health of the periodontium.
- These benefits include:
  - A greater decrease in pocket depth following surgical treatment
  - An increase in clinical attachment levels
  - A greater replacement of bone from the clinically lost areas.
  - Reduction in the recurrence of periodontitis
  - Reduction in gingival recession
  - Improvements in immune inflammatory responses of periodontium

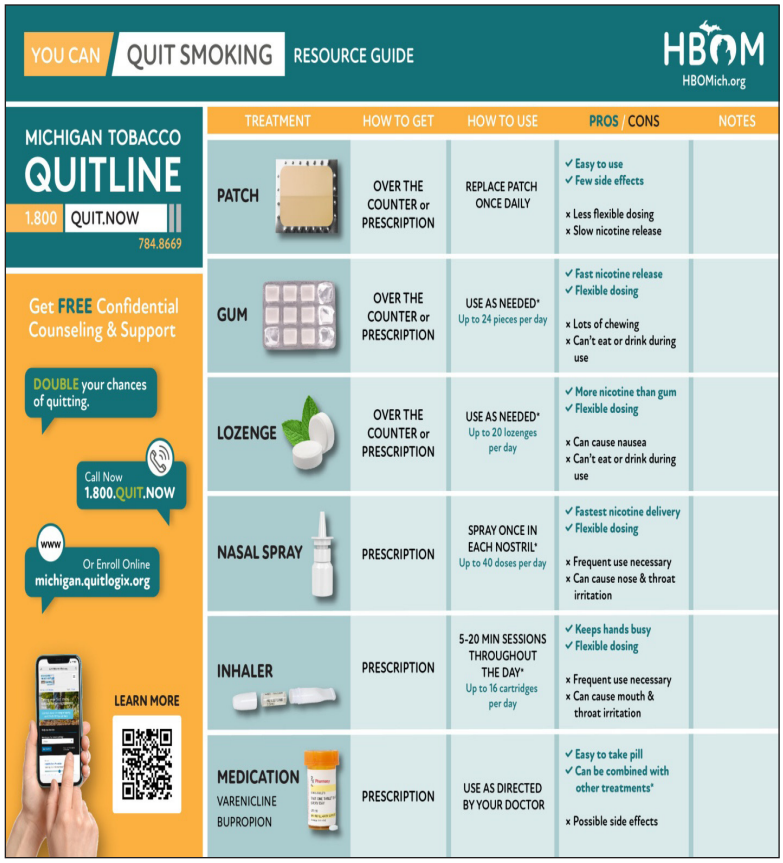

Figure 5. *Nicotine replacement therapy*

Conclusion

Since smoking is a biological factor, it interacts with the host and the bacterial challenge, making the patient more vulnerable to periodontitis and less likely to respond positively to therapy. According to new guidelines, dental practitioner's should evaluate their patients' smoking status and encourage those who smoke to give up the habit. One major risk factor for periodontitis is smoking. The quantity and duration of daily cigarette smoking determine the impact of smoking on periodontal tissues. Tobacco use appears to have a more noticeable effect on periodontal tissues in males than in women.[15]

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