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# Increases Risk Factors of Developing Periodontal Disease

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**Abstract** **Review Article**

Background: One of the most common diseases affecting humans is inflammatory periodontal disease. While gingival inflammation is common, advanced periodontitis only affects small populations. Microbial plaque deposits at the dentogingival interface cause gingivitis and a number of environmental, behavioral, biological, and healthcare variables can alter the course of periodontitis.

Objective: This paper aims to provide an overview of the research on the effects of risk factors on the development of periodontitis and providing strategies in preventing periodontitis.

Method: The current review was carried out in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Review (PRISMA-ScR) guidelines. Scientific papers available in electronic databases, such as PubMed, Scopus, and the WHO website for the African region, were retrieved for this review using search keywords such periodontal disease, risk factors, screening, and preventative measures from Google scholar from 2003 -2024 were obtained for this review.

Result: Risk elements for periodontal diseases are categorized as follows: Tobacco smoking, diabetes, microbiological tooth deposits, pathogenic microorganisms, age, gender, genetic variables, Stress, socioeconomic status, HIV/AIDs, Infrequent dental visits, Bleeding on probing were discussed as major risks factor.

Conclusion: we have examined literature concerning risk factors associated with the progression of periodontal disease. Furthermore, in order to control and prevent periodontal disease in the general population, it is imperative that one is aware of these components. It is essential to fully comprehend the risk factors because the risk factors that people have been exposed to can vary depending on the demographic.

**Keywords**: Increase. Factor, Developing Periodontal, Disease.



## OVERVIEW

According to the World Health Organisation (WHO) oral health refers to a state of being free from oral or facial pain, oral infection, sores, periodontal disease, tooth loss and other diseases that inhibit the capacity to chew, bite, smile or speak. Oral health is important as it enhances the quality of life. Oral diseases have been documented to contribute significantly to the global burden of disease [1, 2]. Periodontitis is a multifactorial, chronic inflammatory disorder, that can lead, if untreated, to the non-reversible damage of supportive tissues (periodontal ligament, cementum and alveolar bone) surrounding the teeth with consequent tooth loss [3, 4].

**Figure 1 healthy teeth**

Periodontal disease comprises of periodontitis and gingivitis. They start with by plaques that results in immune and leads to inflammatory responses of each [5]. Periodontitis is a chronic inflammatory disease that leads to bone and soft tissue destruction and, as a consequence, tooths loss. After dental caries, it is the major cause of tooth loss in adults. Moreover, it is also the 11th most common disease in the world, and is more prevalent than cardiovascular diseases [6,7, 8]. Periodontal disease is considered a public health issue due to its high prevalence at a worldwide scale, which oscillates between 35 and 51 %, even higher depending on the factors and study population [9]. It is estimated that untreated caries, severe periodontitis, and tooth loss affected around 3.9 billion people worldwide in 2010, According to earlier research, between 1990 and 2010, the worldwide burden of periodontal disease rose by 57.3%. [10,11, 12]. Inflammatory periodontal diseases constitute probably the most common type of human infections in the world. Gingivitis is present in the great majority of adults throughout the world but is most pronounced in developing countries [16].

**Figure 2 mild Gingivitis**

An imbalance of micro-organisms forming the dental plaque (dysbiosis) is the major triggering factor for chronic gingivitis and periodontitis [13]. Periodontitis is associated with altered dynamic interaction among specific sub gingival microbes, host immune responses, hazardous environmental exposure and genetic factors which are its probable cause [4]. To date, almost 800 different species of bacteria have been identified and characterized in human dental plaque. Of relevance, the putative pathogens include Gram-negative and -positive members, such as Treponema denticola, Tannerella forsythia, Prevotella intermedia, Agregatibacter actinomycetemcomitans, Campylobacter rectus, Eubacterium timidum, Parvimonas micra and Porphyromonas gingivalis [4]. Mechanistically, infections usually lead to gingival lesions with contamination of tissues surrounding the teeth [4, 13]. Then, the lesion progresses to periodontitis once bacterial infection, and the subsequent inflammatory response, tackles the root surface, penetrating the supporting structures of the teeth [4]. When microbial species continue to grow, or if there is a defective/altered immune response, the acute periodontal inflammation becomes chronic and additional mediators are produced [4, 14]

**Figure 3 periodontitis**

The main etiological agent of periodontal disease is plaque, which is a bio film that contains dominantly microorganisms. These organisms act directly through the release of toxins, enzymes and toxic metabolic product and indirectly through complement activation and hypersensitivity reactions causing periodontal disease. However, periodontal disease will only occur when the balance between the host resistance and the etiological agents has been disrupted [4, 14].

Important advances in understanding the infectious agents of periodontal disease have been made in the past three decades". Although before the 1970s bacterial plaque was considered the key aetiological factor of periodontal disease, no studies had shown a clear cause-and-effect relationship between specific bacterial species and destructive periodontal disease [16]. The most common oral inflammatory processes are caries and periodontal diseases (PD), which originate from oral bacteria growing unchecked and producing oral biofilms on the surfaces of teeth. [17, 18]. Periodontitis is the main cause of tooth loss in middle-aged and elderly people and counts for 28% of extractions [17]. Bacteria can also enter the blood stream during activities such as tooth brushing, flossing, and chewing, particularly among those with PD [18].

Periodontitis, periodontitis linked to systemic disorders, and necrotizing periodontitis are the three categories into which the pathophysiology of periodontitis can be divided. When left untreated, periodontal disease worsens over time and can lead to a number of local consequences, including the formation of deep periodontal lesions, loss of periodontal bone and teeth, and even masticatory failure. [19]. Periodontal disease has four stages. It starts with mild swelling and redness of the gums and can lead to bone damage and tooth loss.

***Gingivitis:*** At this early stage of periodontal disease, the gums may be reddish, swollen and bleed when brushed, though the bones are still in place. The gum disease can be reverse at this stage.

**Mild periodontitis**: Here the bacteria have reached the underneath of the gums and reached the bones. The gums might pull away from the teeth and create pockets. Plaque and bacteria fill these pockets and damage the teeth even more.

**Moderate periodontitis**: At this stage, the bacteria eat away at the gum and bone that hold the teeth in place. Here the gums might hurt with the pus around the gum line, which is a sign of infection.

**Advanced periodontitis:** At this point bone and tissue around the teeth are more damaged. With time the teeth may become loose and fall out. [20]. Eight categories of periodontal disease conditions exist; Gingival disease, Chronic periodontitis, Aggressive periodontitis, Abscesses of the periodontium, Necrotizing periodontal disease, Periodontitis as a manifestation of systemic disease, Periodontitis associated with endontic lesions, Developmental or acquired deformities or conditions. One of the above mention conditions, the chronic periodontitis (formally known as adult periodontitis or chronic adult periodontitis) is slowly progressing and one of the frequently occurring type in the middle age adults [22].


**Figure 4 stages of periodontal disease**

**Microbiology of periodontal disease** subgingival plaque contains between 300 and 400 different types of bacteria, although only 10 to 20 of these species may be involved in the pathophysiology of severe periodontal disease. [5].

The objective of this study is to highlight the risk factors, stress the value of abstaining from particular behaviours or activities to maintain good oral health, and aid in a better understanding of clinical situations.

## METHODOLOGY

The current review was carried out in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Review (PRISMA-ScR) guidelines. Scientific papers available in electronic databases, such as PubMed, Scopus, Google Scholar, and the WHO website for the African region, were retrieved for this review using search keywords such periodontal disease, risk factors, screening, and preventative measures. Review materials that contained scientific articles but could not be retrieved from electronic databases were not included.

## Risk factors of periodontal disease

Risk factors can expose the host to a disease or are a component of the chain of causation for a specific disease. If a risk factor is absent or removed, a reduction in the probability of the disease occurrence is achieved [21]. The risk factors can be environmental exposure, lifestyle, or biological factors. Based on epidemiological evidence it is known to be associated with a health related conditions. Risks factors may be associated with a disease but do not necessarily cause the disease. Therefore, risk factors are either a part of the chain of events that leads to a certain disease or can cause an individual to be exposed to an illness, hence the existence of risk factors indicates a direct rise in the likelihood that the disease will manifest. [5].

Risk factors can be changed or left unchanged. Since non-modifiable risk variables are usually innate, they are challenging to alter, whereas modifiable risk factors are typically behavioral or environmental in origin. Determinants are another name for risk variables that cannot be changed. The evidence required to identify risk variables is typically provided by cross-sectional, longitudinal, interventional, case reports, case series, and case control studies. Despite their limitations, all of these investigations are able to pinpoint the causes of a disease. The proof required to identify risk variables is typically provided by cross-sectional, longitudinal, interventional, case reports, case series, and case control studies. Despite their limitations, all of these investigations are able to pinpoint the causes of a disease. A causal relationship might be detectable by the longitudinal investigations. The interventional studies offer the advantage of an elimination factor in addition to the strongest proof of a causal relationship. [21].

The interplay of host, microbial, environmental, and genetic variables results in destructive periodontal disease. Socioeconomic factors, smoking, age, gender, and heredity are risk factors for periodontal disease. (e.g. smoking, poor dental hygiene among others) and some systemic diseases [5]. Indicators of risk are likely or potential risk variables that have been found in cross-sectional research but not validated by long-term investigations. The phrase "risk determinant" or "background" can occasionally be used in place of "risk factors," which are unchangeable. Risk indicators and predictors these factors have also been found in cross-sectional and longitudinal investigations, despite the fact that they are not the cause of the disease. [5, 22].

Although microbial plaque has a significant role in the inflammation of periodontal tissues, host-based variables play a significant part in the creation of gingivitis into periodontitis. A specific type of microbial film will cause chronic periodontitis. Some people are more susceptible to periodontal damage due to their host response and accumulated risk factors. Patients' systemic characteristics affect how well the host responds, which can lead to a markedly higher rate of periodontal deterioration [22].

The following categories apply to risk factors for periodontal diseases: Smoking tobacco Diabetes, HIV/AIDS; harmful bacteria, microbial tooth deposits, age, gender, socioeconomic status, stress, genetic variables, HIV/AIDS; infrequent dental appointments; bleeding when probed.

## Tobacco smoking

Numerous investigations have documented and validated a constant, positive correlation between smoking and the loss of periodontal attachment. More than half of instances of PD are caused by smoking alone. [5]. In addition to increasing the risk of developing periodontal disease, smoking reduces the efficiency of periodontal therapy. Many data points have been shown to suggest that, of all the risk variables found, smoking cigarettes may be the environmental risk most closely linked to periodontitis. Multivariate analysis showed that, in numerous studies, smoking remained a significant risk factor for periodontal disease even after socioeconomic, demographic, and oral hygiene variables had been adjusted. In addition to the fact that smoking is a risk factor for periodontal disease, studies have shown that smoking frequently or consuming a particular type of cigarette over time is positively connected with higher levels of periodontal disease risk among current smokers compared to ex-smokers, with the lowest risk being seen in those who have never smoked. [25]. since the majority of people with refractory periodontitis smoke heavily, smoking may contribute to the aetiology of the condition. There is enough proof that smoking hinders the quality of restoration and delays healing following periodontal therapy. [22, 25]. The condition is less common in people who have never smoked and more common, widespread, and severe in current smokers. It has been demonstrated that long-term smokers have significantly greater rates of periodontal disease, and that this effect is seen even while using cannabis, indicating that smoking itself, not any particular feature of tobacco, is to blame. [5]. Cigarette smoking and the severity of periodontal disease are correlated in a dose-effect manner, with heavy

smokers and individuals with a longer smoking history exhibiting greater tissue degradation than light smokers with a shorter smoking history. [22].

## Diabetes Mellitus

According to epidemiological research, people with diabetes mellitus have a higher risk of developing periodontitis than people without the disease. It is well established that diabetes, both type I and type II, greatly increases the risk of developing severe periodontitis. By impairing PMN function and causing the production of advanced glycosylation end products (AGEs), which attach to AGE receptors on important target cell surfaces and cause an excess of inflammatory mediators like prostaglandin E2, IL1, and tumor necrosis factor alpha, diabetes increases the risk of developing severe periodontitis. [22]. an elevated risk of periodontal disease has been associated with decreased polymorphonuclear leukocyte functions. Severe periodontitis is far more likely to develop in those with type I and type II D.M. In the example of cross-sectional Diabetes may potentially be a risk factor for periodontal disease, according to studies on control and longitudinal data. It is commonly known that periodontal disorders are a consequence of diabetes and are ranked as the sixth most common complication of the condition. [5].

## Pathogenic Bacteria

Research examining the possible relationship between specific types of probable periodontopathic bacteria and an increased risk of periodontal degradation can be divided into two categories: studies evaluating the degree to which the bacteria are associated with periodontal degradation and studies evaluating the frequency with which the bacteria are associated with periodontal status. Despite these obstacles, the majority of research shows a connection between several indicators of periodontal disease and the presence of particular suspected pathogens in the subgingival bacteria; sadly, little is known about the interactions of the bacteria with a variety of other factors, such as smoking, diabetes, and poor dental hygiene, all of which are connected to the illness complex [21].

## Microbial Tooth Deposits and Oral Hygiene

Oral hygiene can favorably influence the ecology of the microbial flora in shallow to moderate pockets. Oral hygiene alone has little effect on sub gingival micro flora in deep pocket [22]. Gingival inflammation in adults and children can be effectively stopped or reduced with comprehensive dental hygiene programs. It's possible that severe periodontitis won't be resolved by these therapies. Maintaining the level of oral hygiene required to prevent chronic periodontitis and periodontal tissue deterioration may be difficult for the general public. Anatomical features that may lead to the buildup of microbial plaque and predispose the periodontium to disease include subgingival and overhanging repair edges, bifurcation ridges, root concavities, developmental grooves, cervical enamel projections, enamel pearls, and furcations. Anatomical and restorative elements that affect plaque accumulation may contribute to a tooth's vulnerability to periodontitis, even if they are not known to be risk factors for the disease. [22].

## Factors related to genetics

An increasing amount of evidence points to hereditary characteristics as a risk factor for periodontal disease. This is particularly true for the more severe and uncommon types of the disease, such the newly identified gene mutation that result in pre-pubertal periodontitis. The equilibrium between homeostasis and periodontal tissue damage determines how a disease develops and advances.

## Age and gender

According to studies, periodontal disease is more common in elderly people than in younger people. Severe forms of periodontitis are frequently observed in elderly to younger populations. Men are more likely than women to suffer from periodontitis, which is a result of lifestyle choices, include drinking alcohol and smoking.

## Socioeconomic status

It has been demonstrated that a person's socioeconomic position affects his eating habits, knowledge of his own health and self-worth when speaking and smiling in public, and his ability to pay for dental care, which leads to regular dental appointments. Consequently, a person's lower socioeconomic position can be linked to gingivitis and poor dental hygiene. [22]. Research has indicated that nutritional deficits may be linked to periodontal disease in both developed and developing nations. However, there were no correlations between severe periodontal disease and lower socioeconomic or educational status when periodontal structure was corrected for smoking and poor dental hygiene. Therefore, the risk of periodontal disease is not increased by a lower socioeconomic position alone. [5, 22].

## Stress

Following its identification in troops during World War I, acute necrotizing ulcerative gingivitis was the first known finding to link stress to a periodontal illness. It has been proposed that overt inflammatory periodontal disease may appear if a patient's resistance was reduced by an inability to handle stressful life situations. [22]. PD is linked to stressful life events and marital issues, potentially as a result of physiological reactions that weaken the immune system and increase vulnerability. [5].

## HIV/AIDs

Patients with acquired immunodeficiency syndrome (AIDS) and those who are seropositive for the human immunodeficiency virus (HIV) have been shown to experience a severe, painful and Necrotizing ulcerative peridontitis (NUP) is a rapidly developing form of periodontitis. Indicating that changes in the normal cellular immune response may be linked to greater periodontal disease by altering normal regulatory systems, the NUP was correlated with the level of immune

suppression as assessed by a CD4 lymphocyte count below 200 cells/mm. [22].

## Rare dental appointments

It is debatable if infrequent dental visits are a risk factor for periodontitis alone, even though they may be linked to a lower socioeconomic position. One study showed that patients who had not seen a dentist for three or more years were at a higher risk of developing severe periodontitis, while another showed that people who did not seek dental care over a six-year period did not experience any greater loss of bone or attachment. Research on the same topic is still ongoing. [22]. `\

## Bleeding when probed

One of the best indicators of periodontal disease is bleeding when the periodontal pocket is probed. However, the absence of blood upon probing is not a reliable sign of periodontal health. [22].

## DISCUSSION

Periodontal disease includes both gingivitis and periodontitis. Plaque is the cause of both, and each person's immune and inflammatory systems have an influence. Risk factors influence an individual's vulnerability or resistance to the disease.
In this study, we have examined literature concerning risk factors linked to periodontal disease progression. Certain individuals who are at risk may have a progressive loss of connection, and it has been proposed that not all cases of gingivitis need to develop into periodontitis.

It has been demonstrated that a wide range of factors specifically affect how the disease advances. Furthermore, in order to control and prevent periodontal disease in the general population, it is imperative that one is aware of these components. It is essential to fully comprehend the risk factors because the risk factors that people have been exposed to can vary depending on the demographic. Risk factors can also be used to aid in the diagnosis of a disorder if a person possesses multiple established risk factors for a specific illness. Since the existence of risk factors raises the likelihood that the disease is present, professionals start to think about a particular diagnosis. An intervention may be able to prevent a disease if a risk factor can be changed. Risk variables may or may not be influenced by prognostic factors alone. Since periodontitis is known to have numerous etiologies, improving one risk factor may only partially lower the likelihood of the illness developing.

One of the several local and systemic risk factors for periodontal disease is smoking. Pathogenic microorganisms, illnesses, poorly controlled diabetes, maybe obesity, and stress are additional risk factors. None of them are sufficiently supported as risk factors by the available data.

Therefore, in order to achieve the common aim of preventing and controlling periodontal disease, doctors must identify high-risk patients and prescribe behavioral and lifestyle adjustments utilizing a thorough and holistic approach.

## RECOMMENDATIONS

It is essential to understand these elements in order to manage and prevent periodontal disease in the broader community. Understanding the risk variables in their entirety is crucial, as the risk factors to which an individual has been exposed can differ based on their demographic. This will be accomplished by including health promotion and health education in the curricula of elementary and secondary schools. Religious leaders should be encouraged to educate on health-related topics in order to raise awareness among their followers, and businesses or industries should be encouraged to host seminars and lectures on health-related topics.

Experts should start thinking about a certain diagnosis because risk factors raise the likelihood that the illness may manifest. An intervention may lead to the prevention of a disease if a risk factor can be changed. Risk variables are influenced by a variety of factors, not just prognostic ones. As periodontitis is known to have several etiologies, improving a risk factor may only partially lessen the possibility that the illness will develop.

To achieve the shared objective of preventing and controlling periodontal disease, doctors must thereby identify high-risk patients and prescribe behavioral and lifestyle adjustments using a comprehensive and systematic approach.

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