

# Role of Risk Assessment in Periodontology

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## ABSTRACT

Proper diagnosis along with the identification and modification of risk factors helps in prevention and successful treatment of periodontal disease. Patients who are considered to have a higher expectancy for developing the disease can be identified by the dental professionals by assessing the risk using the tools for risk assessment. Assessing the risk for developing periodontal disease in a patient reduces the need for complex treatment of the periodontium and improves oral health.

**Keywords:** Periodontology, Risk, Tools for risk assessment.

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## INTRODUCTION

Our knowledge on the etiopathogenesis of periodontal has increased rapidly over the past years. Evidence in literature demonstrates that risk varies for every individual.<sup>1</sup> The initiation of a disease in the periodontium could be prevented, and oral health can be maintained only by identifying the risk factors and indicators and the steps taken to eliminate or decrease the risk. Various factors of risk like smoking can be modified whereas risk factors like genetic involvement are non-modifiable.<sup>2</sup>

## CONTRIBUTING RISK FACTORS FOR PERIODONTAL DISEASE

Risks contributing to periodontal disease can be divided as risk factors, indicators, and predictors. A risk factor is said to cause a disease when it satisfies the following criteria: its biologic plausibility as causal agent for the disease.<sup>3</sup> Risk factors can be classified into systemic and local. Systemic risk factors alter the host microbial balance, and local risk factors are those factors local to the oral cavity that enhances plaque accumulation.<sup>4</sup>

### Diabetes Mellitus

There are numerous evidences for the link between type I and II diabetes mellitus and periodontal inflammation. Periodontitis is considered as the sixth complication of diabetes mellitus. Many other oral complications like xerostomia, dental caries, and burning mouth syndrome are also associated with diabetes. The host response of the patients affected with diabetes mellitus is impaired. Delayed wound healing and increased destruction of collagen are also found in the affected patients. Diabetes may also increase the bacterial growth and hence affects the pathogenesis of periodontitis. Hence, controlling of periodontitis improves the metabolism of the patient.<sup>5</sup>

### Tobacco

Numerous data claims that tobacco causes numerous ill effects to the oral cavity. The pathology of the periodontal disease is affected by the interrelationship between the number of cigarettes used and duration of smoking. Increased attachment loss and calculus deposition are the side effects from the heat generated by the smoke that leads to the increase in retention of plaque. Nicotine diminishes protein and collagen synthesis, reduces bone formation,

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and increases susceptibility to periodontal disease which might limit the outcome of the treatment.<sup>6</sup> The oral bacterial along with the nicotine by-products increases the production of cytokine leading to damage of periodontal tissue. Literature states that smokers are 11 times more likely than non-smokers to harbor the periodontal bacteria and four times more chance to acquire advanced periodontitis. Various other studies also suggest that the risk of developing periodontitis increases with the number of cigarettes smoked per day, and also 40% of the smokers had lost their teeth by the end of their lives.<sup>7,8</sup>

### Age

The age increases the risk of developing periodontitis. The risk for developing the disease is higher in the elderly. In a study which involves people over 70 years old, 86% of the people were affected with severe form of periodontitis and over one-fourth of them had their teeth lost. The data also showed that the disease accounted for a majority of tooth extractions in the patients older than 35 years old.<sup>9,10</sup>

### Pregnancy

The fluctuations of female sex hormone and the presence of receptors for these hormones in the periodontal cell subsets may render the target tissue to be periodontal soft tissue. The prevalence of periodontitis among pregnant women is found to be 61% in various studies. The mechanism which proposed inflammatory mediators of periodontal origin may cause a metastatic inflammation at the fetal placental unit which may cause the production of PGE2 in the chorion leading to cervical ripening and uterine contraction, thus resulting in preterm birth, and also,

the elevated C-reactive protein (CRP) levels in periodontitis may also be associated with the preeclampsia and preterm birth.<sup>11,12</sup>

### Cardiovascular Disease

The CRP which is the indicative of myocardial infarction and stroke is a systemic marker of inflammation. An increase in the levels of CRP is observed in untreated severe periodontal disease. It can be caused due to the inflammatory burden of periodontitis. Subclinical atherosclerosis and periodontal bacterial burden have also been found to be directly linked.<sup>13</sup>

### Genetics

The availability of genetic markers in recent times makes it possible to identify the genotype of patients susceptible to disease of the periodontium. The interleukin 1 (IL-1) genotype-positive patients show advanced periodontitis than IL-1 genotype-negative patients along with the increased bleeding on probing and loss of tooth. Genetic susceptibility to periodontal diseases can be strongly influenced by the environmental factors.<sup>14</sup>

### Poor Oral Hygiene

The decrease in gain in attachment, pocket depth, and inflammation of gingiva have been found in the patients with improvement in oral hygiene. The decrease in oral hygiene increases plaque formation and, hence, increases the pathogenic bacteria leading to more severe form of periodontal disease.<sup>15</sup>

### Stress

Many studies have correlated that stress and related body distress are important risk indicators for periodontal disease. Recent literature evidences relate that the patients under financial stress and also under physical and psychological stress pose an important risk indicator for periodontal diseases. These patients tend to have increased plaque levels. Furthermore, systemic diseases such as diabetes, cardiovascular diseases, preterm delivery, and osteoporosis may share psychosocial stress as a common risk factor via hypothalamoadrenal axis (HPA axis). Increased levels of stress elevate the chances of developing periodontal disease by twofolds.<sup>16</sup>

## RISK ASSESSMENT

Risk assessment is “the process by which qualitative or quantitative assessments are made of the likelihood for adverse events to occur as a result of exposure to specified health hazards or by the absence of beneficial influences.”<sup>17</sup> A multilevel assessment of risk is required to assess the risks related to the multifactorial periodontal disease. Hence, four levels of risk assessment is required to assess the risk which helps in grouping the risk factors which are responsible for initiating and progression of the disease leading to effective treatment.<sup>18</sup>

### Patient-level Risk Assessment

During the initial consultation of the patient, the patient-level risk is assessed through patient interrogation:

- Familial history and genetic gingival problems and early tooth loss within the family
- Medical history
- Dental history
- Social history
- Habits like bruxism.

### Mouth-level Risk Assessment

Post-patient-level interrogation is the mouth-level risk assessment which includes the performance of the following examinations of the oral cavity:

- Occlusal examination in static and dynamic relationship
- Age-related attachment loss examination
- Examination of oral hygiene and plaque retentive factors
- Presence of removable prosthesis
- Presence of recession, gingival inflammation, and depth of pockets.

### Tooth-level Risk Assessment

A complete clinical and radiographic examination should be done post-patient-level and mouth-level examinations. A tooth-level risk assessment must involve the following:

- Drifting of periodontally affected tooth
- The bone support remaining for a periodontally affected tooth with the help of radiograph to determine prognosis
- Individual tooth mobility
- Presence of furcation lesions
- Anatomy of individual tooth, tooth embrasures, and contact points
- Presence of premature occlusal contacts
- Analyzing the presence of subgingival calculus and soft tissue contours
- Presence of ledges or restorational deficiencies

### Site-level Risk Assessment

Assessment at the level of site involves the following examinations:

- Bleeding and exudation from periodontal pockets
- Probing pocket depth and clinical attachment levels
- Anatomical factors like root grooves and concavities and enamel pearls.

## CLINICAL RISK ASSESSMENT TOOLS

Due to the inconsistencies and complexity in the manual assessment of risk, various computer-assisted risk assessment tools like periodontal risk calculator (PRC), oral health information suite (OHIS), and American Academy of Periodontology self-assessment tool have been developed.<sup>19</sup>

### Periodontal Risk Calculator

The PRC is an online assessment tool to calculate the risk of a patient who is likely to develop periodontal disease and also to assess the risk of progression of a patient whose teeth are already compromised periodontally. The PRC analyzes the risk through mathematical calculation of nine risk factors including age of the patient, systemic disease like diabetes, history of smoking, depth of pocket, involvement of furcation, history of periodontal surgery, restoration of calculus below the gingival margin, amount of vertical bone loss measured, and radiographic height of the bone using a three-point scale. The risk score increases when the patient smokes over 10 cigarettes per day and has uncontrolled diabetes along with a history of periodontal surgery. Moreover, the presence of other local factors like involvement of furcation, subgingival restoration, vertical bone lesions, and the presence of calculus adds to the existing overall risk score.<sup>20</sup>

## Oral Health Information Suite

The oral health information suite is a system that comprises of a deck of tools which are uniquely used to assess the risk of development of caries, oral cancer, and periodontal disease along with the analysis of current state of periodontal disease. Various data including the medical, dental histories, and risk factors of a patient are recorded and entered into the assessment tool, which calculates the disease and risk score. Based on the scores, the treatment for a tooth is suggested by color codes indicating the successful outcome of the treatment. The system also updates the variations in risk and disease scores during the routine follow-up of the patient.<sup>21</sup>

## American Academy of Periodontology Self-assessment Tool

It is a web-based tool which consists a 13-point questionnaire that extracts information such as the age of the patients, oral hygiene habits, and various other yes/no-based questions on their familial, dental, and medical history. The answers are combined by an algorithm to classify the patient as high, medium, or low risk. This self-assessment tool helps in assessing the patient for the risk of having the disease or developing periodontal disease in the future.<sup>22</sup>

## GENETIC TESTS

Periodontal disease risk can be assessed by genetic tests. In this test, the individual who possesses a combination of alleles in two IL-1 genes can be identified.<sup>16</sup> Evidences state that there is an increased frequency of different IL-1 genotypes in people with advanced adult periodontitis compared with those with early or moderate disease. Patients undergoing periodontal maintenance do have an increased susceptibility for tooth loss due to specific IL1 genotype and the fact that the presence of composite genotype was not associated with progressive clinical attachment loss during the 2-year period after periodontal treatment is stated in various literature studies.<sup>3</sup>

## CONCLUSION

Risk assessment is a vital part of day-to-day routine periodontal practice. It is essential to include the risk factors in the patients case records. Assessing risk factors will provide an opportunity to improve dental care by focusing on the early identification and prevention of periodontal disease. The use of risk assessment tools might be helpful in identifying the patients in need of intervention and to minimize the development of more advanced and severe forms of periodontal disease.

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