



## Prevalence of Periodontal Diseases Among Patients with And Without Systemic Diseases – A Retrospective Study

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### ABSTRACT

Periodontal disease is the most common oral condition of the human population. Several risk factors such as smoking, poor oral hygiene, diabetes, medication, age, hereditary, and stress are related to periodontal diseases. Robust evidence shows the association of periodontal diseases with systemic diseases such as cardiovascular disease, respiratory diseases and diabetes. The aim of this study was to assess the prevalence of periodontitis among patients with and without systemic diseases. This was a retrospective cross-sectional study which was conducted using the patient records from the Department of Periodontics, Saveetha Dental College and Hospitals, Chennai. 1000 patients were chosen by non-probability sampling and were categorized into two groups; Group 1 (n=500): patients without systemic diseases and Group 2 (n=500): patients with systemic diseases. Data regarding the study participant's periodontal status was collected and then subjected to statistical analysis. It was observed that out of 500 systemically healthy patients, 135 patients suffered from periodontitis, 365 patients suffered from gingivitis and out of the 500 systemically compromised patients, 412 patients suffered from periodontitis and 88 patients suffered from gingivitis. In the present study it was observed that 82.4% of systemically compromised patients had periodontitis and 27% of systemically healthy patients had periodontitis. From this, it was concluded that systemically compromised patients are more prone to periodontitis in comparison to systemically healthy patients.

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### INTRODUCTION

Periodontal diseases have previously been perceived as continuously progressive disorders, with gingival inflammation unequivocally developing into periodontitis by means of a constantly active disease process leading to a continuous loss of periodontal attachment, and to

loss of teeth in due time.[1] However, inferences about the natural history of periodontal diseases, anchored in the body of knowledge accumulated during the last few decades, were inconsistent with the traditional concept of disease progression. [2] Periodontal disease is perhaps the most common disease of humans. It is the result of a chronic

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inflammatory response to the accumulation of dental plaque.[3,4] Periodontal disease is a chronic inflammatory disease of periodontium and its advanced form is characterized by periodontal ligament loss and destruction of surrounding alveolar bone. It is the main cause of tooth loss and is considered one of the two biggest threats to oral health. [5] Although the severity of disease is associated with poor oral hygiene, it is now well recognised that despite the ubiquitous nature of plaque and very high prevalence of gingival inflammation, the majority of the population is not affected by progressive chronic periodontitis that is sufficiently severe to result in periodontal morbidity and tooth loss. [6,7] Thus, the major determinants of susceptibility to moderate-to-severe chronic periodontitis include factors such as tobacco smoking, genetic factors and systemic factors, particularly diabetes mellitus.[8][9]

Systemic factors modify periodontitis principally through their effects on the normal immune and inflammatory defences.[10] Good examples of systemic factors are a reduction in number or function of polymorphonuclear leukocytes (PMNs), which results in an increased rate, and severity of periodontal destruction.[11,12] Effects of other systemic factors are less clear cut and are often difficult to causally link to periodontitis. In many cases the literature is insufficient to make definite statements on links between certain systemic factors and periodontitis.[13,14] The possible role of systemic diseases in initiating or modifying the progress of periodontal disease is clearly complex. [15] It is generally agreed that several conditions may give rise to an increased prevalence, incidence or severity of gingivitis and periodontitis and these are categorised. Many conditions fall within more than one category.[16]

Previously we have focused our research on various invitro and invivo studies [17–32] We have currently shifted our focus to this retrospective analysis. Determining the role a systemic disease plays in the pathogenesis of periodontal disease is very difficult as several obstacles affect the design of the necessary studies. This study aims to shed light on the prevalence patterns of the periodontitis and aims to pave an avenue for further studies regarding the severity of periodontitis and its associated link to systemic condition of patients. The aim of this study was to assess the prevalence of periodontitis among patients with and without systemic diseases.

## MATERIALS AND METHODS

This retrospective study was conducted among outpatients who visited Saveetha Dental College and Hospitals, Chennai from June 2019-March 2020. 1000 patients were chosen by non-probability sampling and were categorized into two

groups; Group 1 (n=500): patients without systemic diseases and Group 2 (n=500): patients with systemic diseases. Data regarding the study participant's periodontal status was collected and then subjected to statistical analysis. The study protocol was approved by the Institutional Ethical and Review Board, Saveetha Dental College and Hospitals, Chennai.

Data obtained was recorded in Microsoft Excel 2016 (Microsoft Office 10) and later exported to the SPSS software for Windows (Version 20.0, SPSS Inc, IBM, Chicago Ill., USA) and subjected to statistical analysis. Frequency distribution and percentage was calculated for data summarization and presentation. Descriptive statistics and Chi square test was done.

## RESULTS AND DISCUSSION

The study consisted of 1000 patients. Out of the 1000 patients chosen, 500 of them were systemically healthy and 500 were systemically compromised. In each group 250 patients were males and 250 patients were females.

On running further statistics, it was observed that out of 500 systemically healthy patients 135 patients suffered from periodontitis, 365 patients suffered from gingivitis; out of the 500 systemically compromised patients, 412 patients suffered from periodontitis and 88 patients suffered from gingivitis. (Table 1) The association between patients systemic status and periodontal status was observed to be significant (Figure 1).

It was also observed that among the 500 systemically compromised patients, nearly 310 patients suffered from diabetes, 100 patients suffered from hypertension and 90 patients suffered from cardiac disorders, thereby indicating that diabetes was the most common systemic disease in the chosen population. It was also observed that 260 patients out of the 310 diabetic patients, suffered from periodontitis, which thereby proves that patients with diabetes are more prone to periodontitis.

Periodontal disease is the most common oral condition of the human population. Periodontal diseases are prevalent in both developed and developing countries and can affect about 20-50% of global population. There is a high prevalence of periodontal disease in adolescents, adults, and older individuals since it makes it a public health concern. [33,34] Several risk factors were present, such as smoking, poor oral hygiene, diabetes, medication, age, hereditary, and stress which were proven to be related to periodontal diseases. The concrete evidence shows the relationship between periodontal diseases and systemic diseases like cardiovascular disease, diabetes, and adverse pregnancy outcomes. [35,36]

Periodontitis is a disease induced by biofilm, it is initiated and progressed by different bacterial species, which are present in the dental plaque. The periodontal pathology causing bacteria are basically gram-negative in nature and they are present in the periodontal pockets, which are placed at low oxygen tension. [37] The putative periodontal pathogenic bacteria expresses noxious toxins which are instrumental for the periodontal destruction. The consensus regarding the pathogenesis of periodontitis has undergone an immense change. According to this concept, periodontitis is not only the result of adverse microbial activity but as an interaction among various other factors like genetics, systemic health, immunity, environmental factors like tobacco and stress. The above mentioned factors play a pivotal role in altering the host response to the disease process. Thus, sometimes the periodontal disease may exhibit various expressions.[38,39]

Albandar et al. studied a periodontally high risk group, which was comprised of 156 young subjects who were examined twice during the six years so as to analyze the relationship between the presence of overt gingival inflammation and gingival bleeding, and the occurrence of clinical attachment loss, the results showed that there was a significant relationship between the presence of gingivitis and the development and progression of periodontitis, but also revealed that not all the sites affected with gingival inflammation developed periodontitis during the six year study period.[40]

Systemic factors modify periodontitis principally through their effects on the normal immune and inflammatory mechanisms. Several conditions may give rise to an increased prevalence, incidence or severity of gingivitis and periodontitis. [41,42] The effects of a significant number of systemic diseases upon periodontitis are unclear and often it is difficult to causally link such diseases to periodontitis. Systemic factors modify periodontitis principally through their effects on the normal immune and inflammatory defenses. [43]

In the present study, patients with systemic diseases had more prevalence of periodontitis than patients without systemic diseases. In a study conducted by D'Auito et.al, it was observed that continued inflammation in the case of systemic diseases plays a role in setting up a foundation of diseases affecting the periodontium. It was observed that, in some individuals when the inflammatory process continued and expanded, the collagen of the periodontal ligament broke down and bone resorption occurred, thus resulting in periodontitis.[44] This view was supported by another study conducted by Rautemma et.al where he observed that the, T cells that reacted with both *P. gingivalis* GroEL antibodies and human HSPs have been shown to exist in the peripheral blood of

patients with systemic disease as well as in the diseased periodontal tissues. This strongly suggests a role for immune cross-reactivity in linking periodontal disease with the pathogenesis of systemic disease. [45]. On analysing the studies conducted, a synchrony was observed between their findings and the findings in our present study, thereby substantiating the link between systemic disease and its predilection to periodontal diseases. Loe [46] had declared periodontal disease as the sixth complication of diabetes mellitus, a view acknowledged and supported by Rees [47] who, conducted a systematic review, in which he concluded the bulk of evidence indicated that there was a direct relationship between diabetes mellitus and periodontal disease. Grossi et al had also reported diabetes mellitus was the only systemic disease that was positively associated with attachment loss. [48]

It was also noticed that in a study by Seppala et.al, it was reported that patients with poor control of diabetes experience more gingivitis and periodontitis than well-controlled diabetics. [49] This is synonymous with the present study where it was noted that out of the 500 systemically compromised patients, 310 were affected by diabetes and 260 diabetic patients suffered periodontitis, thereby establishing the relation between diabetes and its predilection to periodontitis.

In this study, it was noticed that patients who suffered from diabetes were mainly prone to periodontitis which may be explained using the factors mentioned in prior literature by Tervonen et.al, [50] which specified the relation between increased periodontal pathogens in presence of high glycation, due to aggressive PMN activity.

Other systemic conditions, cardiac disorders, hypertension are also found to aggravate periodontal diseases. [51] Danesh et al have performed an analysis on all available data on these new risk factors. This analysis revealed a combined risk for *H.pylori* and coronary heart disease. Thereby indicating the correlation of periodontitis and cardiac disorders. [52] This is in synchrony to the present study where it was observed that all the patients who suffered from cardiac disorders suffered from periodontitis as well. It was also observed that hypertensive patients were prone to periodontitis similar to the study by Tsiofis et al. [53]

## CONCLUSION

In the present study it was observed that 82.4% of systemically compromised patients had periodontitis and 27% of systemically healthy patients had periodontitis. From this, it was concluded that systemically compromised patients

are more prone to periodontitis in comparison to systemically healthy patients.

### AUTHORS CONTRIBUTION

Trinaina Somas Kandhan carried out the retrospective study, participated in the sequence alignment, statistical analysis and drafted the manuscript. Dr. Arvina Rajasekar conceived the study, participated in its design and coordinated and provided guidance to draft the manuscript. All authors read and approved the manuscript.

### CONFLICT OF INTEREST

There were no conflicts of interest as defined by the authors.

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Self.

### ETHICAL CLEARANCE

It is taken from "Saveetha Institute Human Ethical Committee" (Ethical Approval Number-SDC/SIHEC/2020/DIASDATA/0619-0320)

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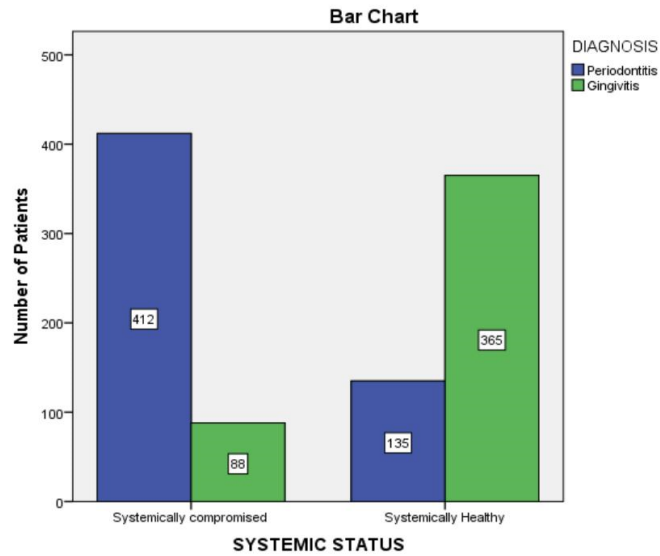
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**Table 1: This table depicts the periodontal status of patients with and without systemic diseases. It is observed that out of 500 systemically compromised patients, 412 had periodontitis and 88 patients had gingivitis; and out of 500 systemically healthy patients 135 patients had periodontitis and 365 had gingivitis.**

		PERIODONTAL STATUS		Total
		Periodontitis	Gingivitis	
SYSTEMIC STATUS	Systemically compromised	412	88	500
	Systemically Healthy	135	365	500
Total		547	453	1000



**Figure 1: Bar graph depicting the association between patients systemic status and their periodontal status. X axis represents systemically compromised and systemically healthy patients and Y axis represents the number of patients suffering from periodontal disease. It was observed that out of 500 systemically compromised patients, 412 had periodontitis (blue) and 88 patients had gingivitis (green); and out of 500 systemically healthy patients 135 patients had periodontitis (blue) and 365 had gingivitis (green). Patients who were systemically compromised were diagnosed with periodontitis more often. (Pearson Chi Square test-p value= 0.000;  $p < 0.05$ ; statistically significant)**