



PERIODONTAL STATUS AMONG MEDICALLY COMPROMISED PATIENTS VISITING A DENTAL HOSPITAL, CHENNAI

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Abstract: Individuals with systemic conditions are at more risk of dental disease, have a greater prevalence and incidence of periodontal diseases. The aim of the study is to assess the periodontal status in medically compromised patients. It is a retrospective study regarding the association of periodontal disease status with systemic conditions in patients visiting a university dental hospital in Chennai in between June 2019 March 2020, the data of 86000 patients were reviewed and analysed. It included parameters - age, gender, periodontal disease status, systemic conditions. Chi-square test was used to detect the significance between the periodontal disease status and systemic conditions. In this study we observed that patients who were medically compromised were more prone to periodontal diseases. The most affected age group with systemic conditions and periodontal diseases was 46-90 years (74%). Males were found to be more affected (56%). Patients with diabetes and hypertension were more prone to periodontal diseases when compared with the other systemic conditions. Within the limits of this study, it is concluded that patients who were medically compromised were more prone to periodontal diseases. Patients with diabetes and hypertension were more prone to periodontal diseases when compared with the other systemic conditions.

Keywords: Cardiovascular disease; Diabetes; Hypertension; Periodontal disease; Prevalence

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INTRODUCTION

Periodontal disease refers back to the inflammatory approaches that occur in the tissues surrounding the teeth in response to bacterial accumulations, or dental plaque, on the teeth. The bacterial accumulations motivate an inflammatory response from the body. The chronic and progressive bacterial infection of the gums results in destruction of alveolar bone and loss of tissue attachment to the teeth. Periodontal disease has many states or stages, ranging from easily treatable gingivitis to irreversible severe periodontitis. (Kim and Amar, 2006; Prabakar, John and Srisakthi, 2016; Prabakar, John, Arumugham, Kumar and Srisakthi, 2018; Neralla *et al.*, 2019)

The maximum prevalent feature of periodontal disease is a mild form referred to as gingivitis. (Amar *et al.*, 2003) and is characterized by infection of the gums, redness, swelling, and common bleeding. (Genco and Grossi, 1998; Prabakar, John, Arumugham, Kumar and Sakthi, 2018a) More advanced forms of periodontitis are also prevalent. The signs are just like the ones of gingivitis, however are more severe because of higher accumulations of micro organism/bacteria and more potent inflammatory responses. (Kumar and Preethi,

2017; Kumar, Pradeep Kumar and Vijayalakshmi, 2017; Prabakar, John, Arumugham, Kumar and Sakthi, 2018b; Khatri *et al.*, 2019; Mebin George Mathew *et al.*, 2020)

Periodontitis is a multifactorial disease with various systemic or local risk factors playing an important role in its clinical sequences. Periodontal diseases are stimulated by numerous risk factors including race, smoking, ageing, gender, genetics, oral hygiene, psychosocial stress, socioeconomic status, osteopenia, osteoporosis, and several medical conditions including diabetes mellitus, hypertension, and cardiovascular disease. (Taylor and Borgnakke, 2008; Prabakar, John and Srisakthi, 2016; Indiran, 2017; Prabakar, John, Arumugham, Kumar and Sakthi, 2018a; Prabakar, John, Arumugham, Kumar and Srisakthi, 2018; Harini and Leelavathi, 2019; Neralla *et al.*, 2019; Pavithra and Jayashri, 2019) signifying that periodontitis does no longer arise merely due to plaque accretion but is also coupled with numerous host factors which could alter the consequence of the plaque on a particular individual. (Chaffee and Weston, 2010; Indiran, 2017; Mohapatra *et al.*, 2019; Samuel, Acharya and Rao, 2020)

Recent findings have suggested that chronic low-grade inflammation is directly involved not only in the pathogenesis of diabetes and the complications related to diabetes but also within the pathogenesis of periodontal diseases (Genco *et al.*, 2005; Mohapatra *et al.*, 2019; Pratha and Prabakar, 2019), wherein cytokines play an important role in the host's responses to the periodontal biofilms. (Mealey and Rose, 2008; Khatri *et al.*, 2019; Pavithra and Jayashri, 2019) A number of diverse studies have indicated that periodontal diseases may additionally be associated with a wide array of systemic diseases and conditions. The primary putative facts that aid the biological connection between periodontitis and systemic diseases are, usual implication of infection in the pathogenesis of both diseases, transient and low-grade bacteremia and endotoxemia due to periodontal diseases, systemic immune responses and inflammation induced by periodontal diseases,

expression of virulence factors by various periodontal pathogens, and presence of periodontal pathogens in non oral tissues like atheromatous plaques (Paquette, 2002; Bansal, Rastogi and Vineeth, 2013; Shangase *et al.*, 2013; Kumar and Preethi, 2017; Kumar, Pradeep Kumar and Vijayalakshmi, 2017; Prabakar, John, Arumugham, Kumar and Sakthi, 2018b; Mebin George Mathew *et al.*, 2020). Although the specific mechanisms underlying this association are nonetheless unclear, available reports evidently demonstrate a bidirectional link among the mechanism of periodontal diseases and systemic/metabolic diseases where both conditions could aggravate each other (Mealey and Rethman, 2003; Abe *et al.*, 2006; Harini and Leelavathi, 2019). Previously our team has a rich experience in working on various research projects across multiple disciplines (Ramesh Kumar *et al.*, 2011; Jain, Kumar and Manjula, 2014; Krishnan, Pandian and Kumar S, 2015; Keerthana and Thenmozhi, 2016; Sivamurthy and Sundari, 2016; Felicita, 2017a, 2017b; Kumar, 2017; Sekar *et al.*, 2019; Johnson *et al.*, 2020). Now the growing trend in this area motivated us to pursue this project. The aim of the study is to assess the periodontal status among medically compromised patients.

MATERIALS AND METHODS

This is a retrospective study regarding the association of periodontal disease status with systemic conditions in patients visiting a university dental hospital in Chennai in between June 2019 March 2020. The approval was obtained from the Institution Ethical committee Board. Out of the patient records of 86000 patients who visited the hospital between June 2019 to March 2020 was used to identify 4119 patients who were medically and periodontally compromised. Inclusion criteria was patients with periodontal diseases, systemic conditions patients such as diabetes, hypertension, asthma, epilepsy, cardiovascular diseases. The data of these patients was retrieved and tabulated. It included parameters such as age, gender, periodontal disease status, systemic conditions.

Statistical analysis

After further verification by an external reviewer, it was imported to the SPSS version 20 software by IBM for statistical analysis. Percentages, frequency of parameters were employed in the analysis. Chi-square test was used to detect the significance between the periodontal disease status and systemic conditions and p value less than 0.05 was considered to be statistically significant.

RESULTS AND DISCUSSION

In the present study, a total of 4119 patients were screened. Out of them, the percentages of patients between 0-45 years & 46-90 years are 26% and 74% respectively. (Figure 1). Figure 2 depicts distribution of study population based on gender. It is found that 56.03% were male and 43.97% were females. (Figure 2) Periodontal disease status was mild marginal gingivitis(26%), generalised gingivitis(26%), localised chronic gingivitis(24%), and generalised chronic periodontitis(24%) among the study population. (Figure 3). Out of the 4119 patients, diabetes was more frequent (56.4%), followed by hypertension(35.2%), asthma(5.8%), epilepsy(2.4%), and cardiovascular diseases(0.1%). (Figure 4). The present study showed 26% patients having mild marginal gingivitis, were diabetic patients(15.29%), followed by hypertension(8.72%), asthma(1.36%), and epilepsy(0.51%). (Figure 5 & Table 1). Patients having generalised chronic gingivitis(26%), most of them were diabetic patients(14%), followed by hypertension(9.3%), asthma(1.6%), epilepsy(0.8%), and cardiovascular disease(0.07%). (Figure 5 & Table 1). It was also found that patients with localised chronic periodontitis (24%), were diabetic (13.1%), followed by hypertension(8.6%), asthma(1.2%), epilepsy(0.7%), and cardiovascular disease(0.02%). (Figure 5 & Table 1) Similarly, patients having generalised chronic periodontitis, most of them were diabetic (13.8%). (Figure 5 & Table 1)

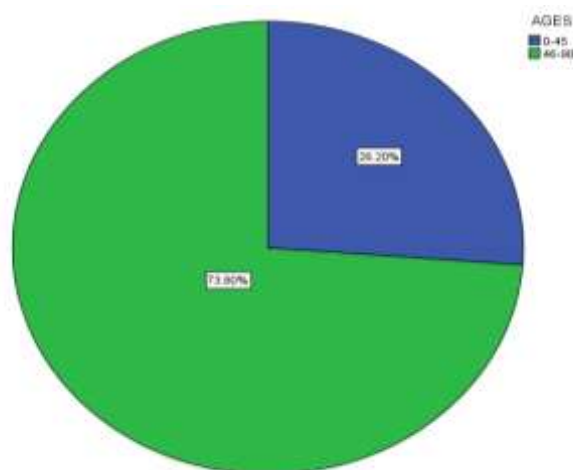


Figure 1: Distribution of Study population based on Age

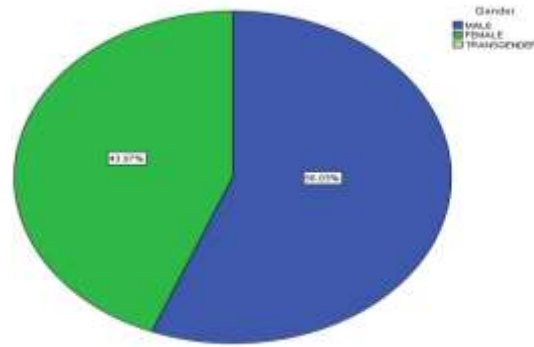


Figure 2: Distribution of study population based on gender

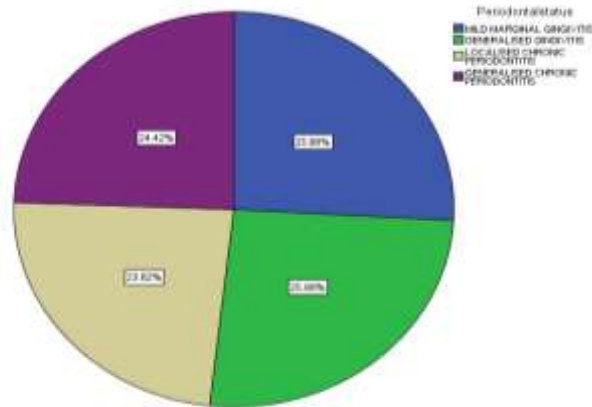


Figure 3: Distribution of study population based on periodontal status

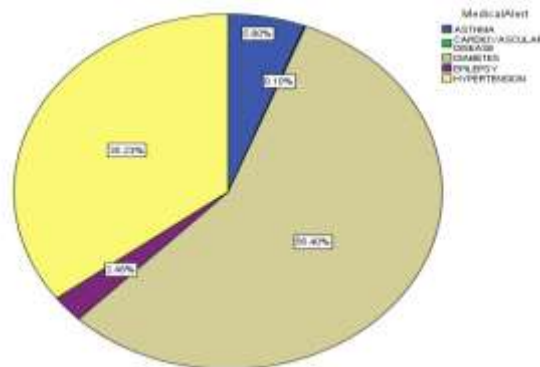


Figure 4: Distribution of study population based on systemic medical conditions

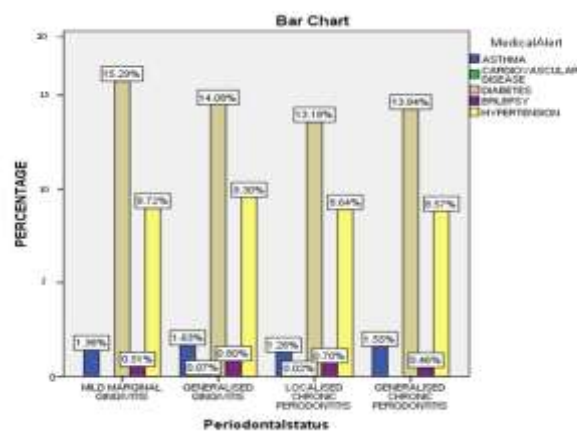


Figure 5: Periodontal status among patients with medical complication ($\chi^2=16.2$, $df=12$, $p<0.05$, statistically significant)

Table1: Periodontal status among patients with medical complication($\chi^2=16.2$, $df=12$, $p<0.05$, statistically significant)

Periodontal Status	Asthma		Cardiovascular disease		Diabetes mellitus		Epilepsy		Hypertension		Total
	N	%	N	%	N	%	N	%	N	%	N
Mild marginal gingivitis	56	1.36%	0	0%	630	15.29%	21	0.51%	359	8.72%	1066
Generalised gingivitis	67	1.63%	3	0.07%	580	14.08%	33	0.8%	383	9.3%	1066
Localised chronic periodontitis	52	1.26%	1	0.03%	543	13.18%	29	0.7%	356	8.64%	981
Generalised chronic periodontitis	64	1.55%	0	0%	570	13.84%	19	0.46%	353	8.57%	1006
Total	239	5.8%	4	0.1%	2323	56.4%	102	2.48%	1451	35.23%	4119

Periodontal disease refers to the inflammatory response that occurs in the tissues surrounding the teeth in response to bacterial accumulations, or dental plaque, on the teeth. Periodontitis is a multifactorial disease with various systemic or local risk factors playing an important role in its clinical sequences. Periodontal diseases are influenced by various risk factors including smoking, ageing, gender, race, genetics, oral hygiene, and several medical conditions including obesity, hypertension, cardiovascular disease and diabetes .

The present study was done to determine the relationship between periodontal diseases and systemic conditions. Majority of the patients (74%) with periodontal diseases were within 46-90 years of age group, which is similar to a study done by (Grodstein, Colditz and Stampfer, 1996). The risk of periodontal disease increases with the advancing age. Researchers have identified that age is associated with periodontal disease, and clinical attachment loss was significantly higher among individuals older than 50 years of age when compared with a group of young adults. (Rheu *et al.*, 2011)

A potential explanation for this could be that several secondary factors associated with age affect clinical attachment loss. (Van Dyke and Sheilesh, 2005). It has been documented that poorer oral hygiene with increasing age is associated with an increase of exposure time to causative diseases and an increase in aging-related factors.

In the present study the difference in periodontal disease status between males (56%) and females (44%) was significant. Hence there could be strong evidence to support the higher incidence of damaging periodontal disease in men than women. (Shiau and Reynolds, 2010; Alam, Mishra and Chandrasekaran, 2012)). The reasons for those gender differences have not been explored in detail, but are thought to be related to poorer oral hygiene, much less positive attitude towards oral health, and dental visits behaviour among males than to any genetic factor. The crucial factor to be considered is that females nevertheless have varied periodontal problems due to various hormonal fluctuations in various decades of life. (Shiau and Reynolds, 2010; Alam, Mishra and Chandrasekaran, 2012)

Prevalence of periodontal disease in diabetic patients was found to be 56.4% in the current study. Literature consistently showed that diabetes mellitus is one of the systemic risk factors for periodontal diseases that can play a primary role in initiation and progression of the disease. (Casanova, Hughes and Preshaw, 2014) Diabetes mellitus is related to periodontal ligament destruction which can eventually cause tooth loss. (Patel, Kumar and Moss, 2013) Gingival crevicular fluids and saliva have higher concentrations of inflammatory mediators along with different kinds of cytokines among diabetic patients with

periodontitis as compared to non-diabetic patients with periodontal disease.

Prevalence of periodontal disease in cardiac patients was found to be 0.1% in this study. Also a systematic review identified that periodontitis is a potential risk factor for coronary heart disease, and the affiliation is independent of other risk factors such as diabetes, smoking, and socioeconomic status. (Humphrey *et al.*, 2008)

In this study prevalence of periodontal disease in asthmatic patients was found to be 5.8%. An association between asthma and periodontitis seems to be related to inflammatory and immunological responses common to both diseases. Activation of inflammatory and immune responses triggered by dental plaque biofilms often result in a periodontal breakdown. Similarly, complex interactions among inflammatory cells, chemical mediators in bronchial tissues can lead to the signs and symptoms of asthma. Therefore, it is attainable that asthma and periodontitis may affect each other. (Arbes and Matsui, 2011)

Prevalence of periodontal disease in patients suffering from epilepsy was found to be 2.48% in this study. Several studies have shown the association of epilepsy and increased likelihood of having poor oral hygiene, gingivitis and periodontal diseases. (Karlohyazy *et al.*, 2005) .

The present study showed the prevalence of periodontal disease in hypertensive patients was found to be 35.2%. Periodontal diseases and hypertension share multiple common risk factors. Several recent studies have shown that systolic and diastolic pressures are higher among periodontally compromised patients. (Tsakos *et al.*, 2010).

Periodontal disease is entering a new era. Research now suggests that far from being just an oral malady, periodontal diseases and oral infections have been linked with systemic diseases and conditions. Hence, Understanding this correlation is a crucial step for both dental and medical professionals in determining the best approach to patient care. Our institution is passionate about high quality evidence based research and has excelled in various fields (Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; M. G. Mathew *et al.*, 2020). We hope this study adds to this rich legacy.

CONCLUSION

Within the limits of this study, it is concluded that patients who were medically compromised were more prone to periodontal diseases. This study revealed that patients with diabetes and hypertension were more prone to periodontal diseases when compared with the other systemic conditions.

This study will further pave the way for better diagnosis and treatment planning.

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