



Correlation of Blood Sugar Levels and Chronic Periodontitis in Out-Patients Visiting a Dental Hospital

N. Naveena^a and Pratiba Ramani^{b#*}

^a Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences [SIMATS], Saveetha University, Chennai – 600077, India.

^b Department of Oral Pathology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences [SIMATS], Saveetha University, Chennai – 600077, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Introduction: Periodontitis is the inflammation of the periodontium including periodontal ligament and alveolar bone. It is a multifactorial disease which is caused by the activity of microbial invasion followed by destruction of periodontal tissues. The major risk factor involved is smoking which increases the severity of the disease and other conditions like diabetes, immunocompromised state, medication and also genetic factors. Diabetes mellitus is a disorder which is characterized to have altered glucose or impaired lipid and carbohydrate mechanisms. Diabetes has been confirmed as a major risk factor for causing periodontitis.

Aim: To assess the correlation of blood sugar levels and chronic periodontitis in out-patients visiting a dental hospital.

Materials and Methods: The study was conducted among the outpatients of Saveetha dental college. The data was collected and analysed from a total number of 5,35,951 patients between June 2019 - February 2021 and the sample size was 65. The data was collected from DIAS (Dental Information Archiving Software) and statistically analysed using SPSS software.

Results: 52.3% of female population has chronic periodontitis where it was 47.7% in male population. From the age group of 21-30 years 20% of the chronic periodontitis individuals were

Dr., Associate Professor;

*Corresponding author: E-mail: pratibharamani@saveetha.com;

diabetic, which was highest when compared to other age groups. The male population with 30.77% had diabetes and female population with 33.85% had diabetes.

Conclusion: Within the limitation of the study, there exists a positive correlation between increased blood sugar levels and chronic periodontitis. And the presence of increased blood sugar levels were seen in the age groups 61-70 years and more commonly seen in the female population. So people with poorly glycaemic controls must be considered as a risk factor for periodontitis and people with diabetes must be informed of the risk factors.

Keywords: Periodontitis; diabetes mellitus; attachment loss.

1. INTRODUCTION

Periodontal disease includes gingivitis where the inflammation is restricted to gingiva and is a reversible one on the other hand periodontitis is the inflammation that results in tissue destruction and alveolar bone resorption. Chronic periodontitis is a multifactorial inflammatory disease which is associated with dental plaque biofilms and is characterized by destruction of the periodontium and the tooth supporting structures [1]. The destruction of the tissues results in breaking down the collagen fibers of the periodontal ligament which results in pocket formation between the tooth and the gingiva. It is an irreversible, non reversible, slowly progressing and major public health problem as the disease remains asymptomatic at the early stages without pain, which makes the patient totally unaware until the disease has progressed and could result in tooth mobility. The severe conditions are characterized to have oedema, gingival bleeding, tooth mobility, drifting of teeth and finally loss of tooth. It is also found to have greatly associated with the quality and daily living of life [2]. The major risk factor involved is smoking [3] which increases the severity of the disease [4] and other conditions like diabetes, immunocompromised state, medication (calcium channel blockers, phenytoin) and also genetic factors [5]. There are relative risks in developing cancer [6,7,8] and cyst [9] for those with severe periodontitis among which oral squamous cell carcinoma [10,11] is highly characteristic [12,13].

Diabetes mellitus is a disorder which is characterized to have altered glucose or impaired lipid and carbohydrate mechanisms. Type1 diabetes is insulin dependent and is developed before the age of 30 and is dependent over insulin supply, on the other hand Type2 diabetes which is insulin independent occurs in later life and is mainly due to diet modification. It has been confirmed as a major risk factor for causing periodontitis [14]. Periodontitis is known to be the sixth complication of diabetes [15]. The

risk of periodontitis in diabetic individuals increases by three folds when compared to non diabetic individuals [16]. The uncontrolled diabetes and hyperglycemia [17] results in reduced defence mechanisms and higher chances of acquiring infection leading to periodontal disease. The deep pockets, severe gingival inflammation [18], rapid bone loss and periodontal abscess is commonly seen in diabetic individuals with poor oral hygiene.

The knowledge and importance of diabetes in relation to periodontitis became evident in the 1900s where a cross sectional study was done over the Pima Indian population. The incidence and prevalence of periodontitis was created in the individuals who had diabetes when compared to those who didn't have diabetes [16] with a threefold increase in risk factor [19]. It's important that dentists must be aware and must have appropriate knowledge to diagnose the oral conditions [20,21] which are associated with conditions like diabetes. So the aim of the study is to correlate the blood sugar levels and chronic periodontitis visiting private dental hospitals.

2. MATERIALS AND METHODS

This retrospective study was done in a university setting and predominantly covered Saveetha dental college. The main advantage could be the availability of the data and similar ethnicity and the disadvantage could be due to geographical limitations and the isolated population. The data collection was done from a total number of 5,35,951 case sheets from June 2019 - February 2021 where the case sheets are reviewed and analysed individually. The data was collected from DIAS(Dental Information Archiving Software) and statistically analysed using SPSS software. The sample size was 65 with the population of all patients with chronic periodontitis with normal or increased blood sugar levels. Inclusion criteria for the study were mainly the patients with periodontitis with or without any medical history like diabetes, from age group

21-70 years. The blood sugar levels were determined by considering the random blood sugar levels of the patients, which was obtained from the patient's case sheet. The exclusion criteria for this study were other medical complications, patients below 21 years, incomplete and censored data. To minimise sampling bias simple random sampling was done. The collected data was verified and was subjected to statistical analysis using SPSS software by IBM. The type of analysis used here is correlation and association using Chi square and the values were found to be significant with (p-value > 0.05).

3. RESULTS

(Fig. 1) represents the correlation between gender and chronic periodontitis where Female population has 52.3% and male population with 47.7%. This implies that chronic periodontitis is more commonly seen in the female population in our study. (Fig. 2) represents the correlation between population with chronic periodontitis and

age where the mean value of the age group belonging to 21-30 years, 20% were diabetic and 4.62% were non diabetic. From the age group 31-40 years 18.46% were diabetic and 1.54% were non diabetic. From the age group 41-50 years 12.31% were diabetic and 6.15% were non diabetic. From the age group 51-60 years 10.77% were diabetic and 10.77% were non diabetic. From the age group 61-70 years 3.08% were diabetic and 12.31 were non diabetic. So diabetes in association to population chronic periodontitis was more commonly seen in the age group of 21-30 years with 20%. (Fig. 3) represents the association between gender and population with chronic periodontitis with or without diabetes were the mean value of male population, 30.77% were diabetic with chronic periodontitis and 16.92% were non diabetic with chronic periodontitis. With the mean value of the female population, 33.85% were diabetic with chronic periodontitis and 18.46% were non diabetic with chronic periodontitis. So female population with chronic periodontitis were more susceptible to diabetes.

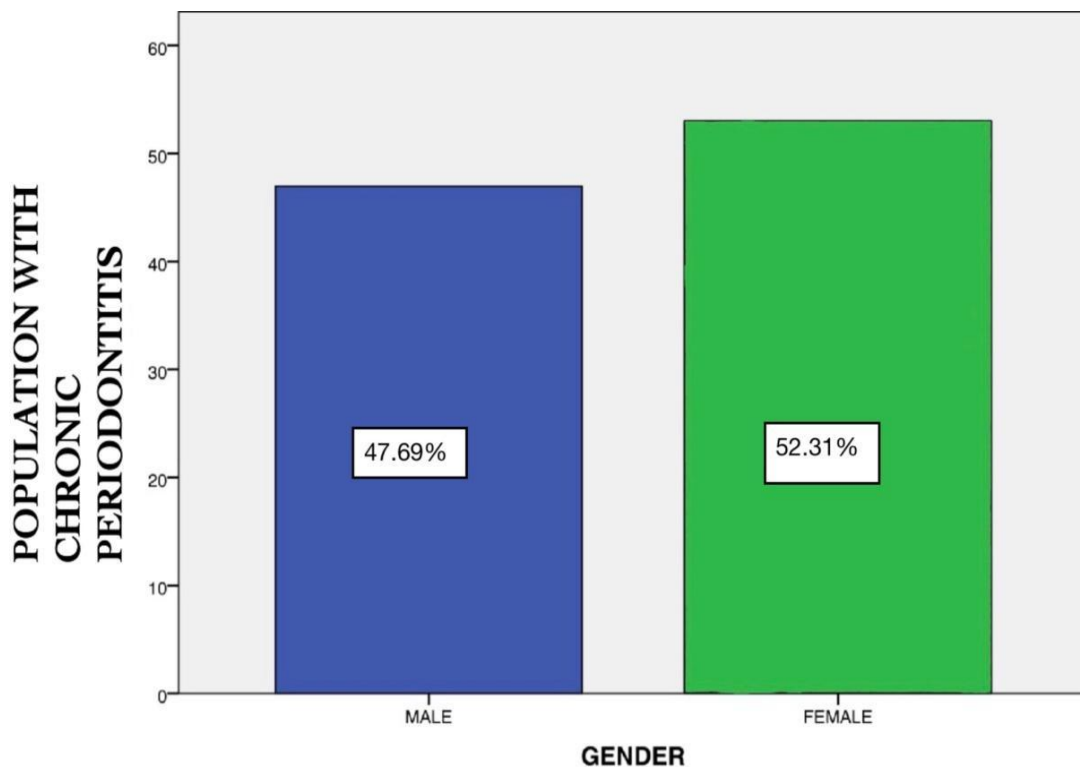


Fig. 1. Represents the association between gender and populations with chronic periodontitis. With the mean value of 47.7% of male population has chronic periodontitis and 52.3% of the female population has chronic periodontitis

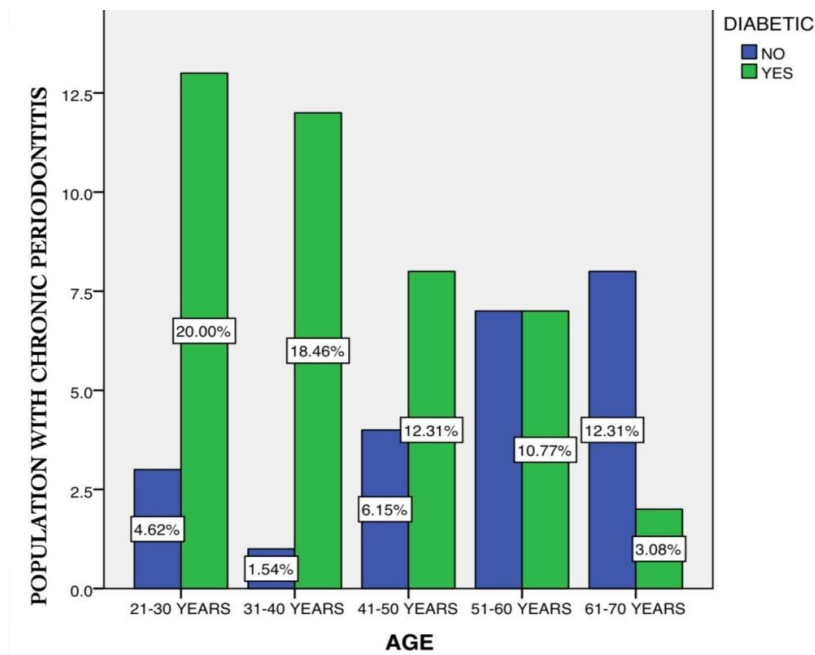


Fig. 2. Represents the association between different age groups and populations with chronic periodontitis with or without diabetes. With the mean value of the age group belonging to 21-30 years, 20% were diabetic and 4.62% were non diabetic. From the age group 31-40 years 18.46% were diabetic and 1.54% were non diabetic. From the age group 41-50 years 12.31% were diabetic and 6.15% were non diabetic. From the age group 51-60 years 10.77% were diabetic and 10.77% were non diabetic. From the age group 61-70 years 3.08% were diabetic and 12.31 were non diabetic. However this is statistically not significant with chi-square value - 16.33 and p-value = 0.3 (p-value > 0.05) hence insignificant

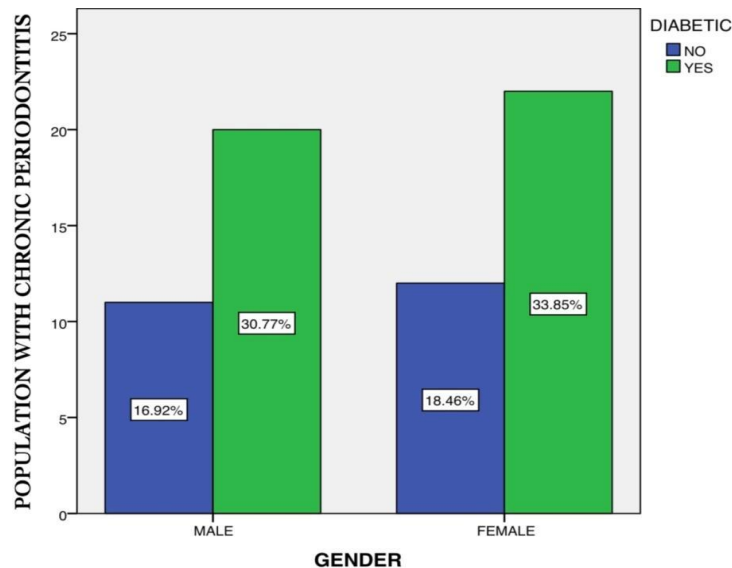


Fig. 3. Represents the association between gender and population with chronic periodontitis with or without diabetes. With the mean value of male population, 30.77% were diabetic with chronic periodontitis and 16.92% were non diabetic with chronic periodontitis. With the mean value of the female population, 33.85% were diabetic with chronic periodontitis and 18.46% were non diabetic with chronic periodontitis. However this is statistically not significant with chi-square value - 10.97 and p-value = 0.2 (p-value > 0.05) hence insignificant

4. DISCUSSION

Various studies have compared the periodontal status in individuals with or without diabetes mellitus. A case control study done over a population aged 6 to 18 years reported that there is an early periodontal destruction which can start early in life for the subjects with type 1 diabetes mellitus and also a positive association was found between diabetes mellitus with an increased risk of periodontal disease [22]. The prevalence of periodontal disease in the population aged 11 to 18 years old teenagers with diabetes was found to be 9.8% and 1.7% in those without diabetes mellitus [23]. Also there was an increased destruction of periodontium with diabetes who has poor metabolic controls [24].

A cross sectional study done over a population of age 29 years reported that there was an increased bone loss found in the subjects with complicated diabetes mellitus at an early stage [25]. Poorer the glycemic control, higher risk of acquiring periodontitis. A study was carried out over a group of 46,191 participants which includes 2548 diabetic patients from age group 2.6 to 20 years of age. Out of them 6361 participants had periodontitis. There was an increased incidence of 34% in acquiring periodontitis with diabetes mellitus [26].

There were 5 different studies conducted to correlate the periodontal health in groups of mixed ages with diabetes out of which three studies have provided a positive correlation [27–29] whereas two studies done by Arrieta-Blanco and Karikoski, murtomaa did not cause any effective interference in the periodontal health [30,31]. Study done over population age 25 to 74 years provided that periodontal disease is independent of incidence of diabetes mellitus [32]. A cross sectional study provided no significant difference in oral health was found between the control group and the ones with diabetes mellitus.

A study was done with type 1 diabetes mellitus and its association with periodontal destruction did not provide any association between periodontal destruction and the degree of glycemic control but there was a positive correlation with poor oral hygiene measures [33]. Studies have shown that oral hygiene was better in diabetic than non-diabetic individuals. Only 22% of the diabetic had poor oral hygiene whereas 37% of non-diabetic had poor oral

hygiene [34]. This was contradicted in a study done where non diabetic had better oral status [35].

Previous studies have reported that the prevalence of diabetes is only 1.8% more in male than in females but the prevalence of moderate-severe diabetes is more in male by 11.95% [36]. A study was done which investigated periodontal health in relation to diabetic and non diabetic individuals along with their oral hygiene. The periodontal health was apparently poor in male comparatively but diabetes remained an independent factor [37]. Majority of the studies have confirmed that diabetes has a significant risk factor for causing periodontitis. But periodontitis in correlation with diabetes was more commonly seen in male which was contradictory [38].

The study was geographically limited and predominantly consisted of the South Indian population. So the limitation of the study is uni-centric with a limited demographic area of smaller sample size. By investigating the cause and prevalence of chronic periodontitis and its association with diabetes and also its association with the pathological conditions as this might help in broadening the existing knowledge about chronic periodontitis and its association with diabetes.

5. CONCLUSION

Within the limitation of the study, there exists a positive correlation between increased blood sugar levels and chronic periodontitis. And the presence of increased blood sugar levels were seen in the age groups 21-30 years and more commonly seen in the female population. It is important to improve gender specific strategies and oral home care must be enriched in order to reduce periodontal disease. So people with poorly glycemic controls must be considered as a risk factor for periodontitis and people with diabetes must be informed of the risk factors. Importantly early diagnosis and prevention are important to avoid huge irreversible loss of tissues in periodontitis. Oral health must be encouraged in people with diabetes so as to prevent oral disease like periodontitis. A positive collaboration between medical and dental teams can be done to provide joint management in treating diabetes and periodontitis. Very importantly as dentists appropriate diagnosis of periodontitis must be done in order to prevent diabetes.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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