

Original Research Article

CORRELATION OF BLOOD SUGAR LEVELS AND CHRONIC PERIODONTITIS VISITING PRIVATE DENTAL HOSPITAL

Running Title: Correlation of blood sugar levels and chronic periodontitis visiting private dental hospital

ABSTRACT:

INTRODUCTION: Periodontitis is a common inflammatory disease which is characterised by destruction of supporting structures of the teeth. 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 characterised to have altered glucose or impaired lipid and carbohydrate mechanism. Diabetes has been confirmed as a major risk factor for causing periodontitis. The risk of diabetes has increased by threefolds in diabetic individuals.

AIM: To assess the correlation of blood sugar levels and chronic periodontitis visiting private dental college.

MATERIALS AND METHOD: The study was conducted among the outpatients of Saveetha dental college. The data was rewired 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 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 diabetic, which was highest when compared to other age groups. Out of 47.7% male population 30.77% had diabetes and out of 52.3% of female population 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 glyceimic controls must be considered as a risk factor for periodontitis and people with diabetes must be informed with the risk factors.

KEYWORDS: Periodontitis, Diabetes mellitus, Attachment loss

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

Comment [DUKU1]: The present title is very vague and not specific. The authors may prefer to revise the title to better reflect the study. They may prefer a title like "Correlation of blood sugar levels and chronic periodontitis in out-patients visiting a dental hospital". Or the authors may modify it to reflect the same wording it differently.

Comment [DUKU2]: Correlation of blood sugar levels chronic periodontitis in out-patients

Comment [DUKU3]: Need to specify site of affliction. Periodontitis is a common inflammatory disease affecting the gums characterized by destruction of supporting structures of the teeth.

Comment [DUKU4]: Replace with 'by'

Comment [DUKU5]: Did the authors mean that the risk if chronic periodontitis is increased three folds in diabetic individuals?

Comment [DUKU6]: Again please specify "patients with chronic periodontitis" as only patients can visit the hospital and this cannot be implied in the current statement.

Comment [DUKU7]: What does this mean? Does it mean reviewed?

Comment [DUKU8]: Please indicate what is the acronym DIAS. This is the first instance of the use of an acronym, so please ensure the full expansion.

Comment [DUKU9]: In

Comment [DUKU10]: We do not need to mention the proportion of the male and female population with CP (Chronic Periodontitis). Just the proportion of patients with diabetes will suffice or it is an unnecessary repetition.

Comment [DUKU11]: Use plural, 'Limitations'

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disease which is associated with dental plaque biofilms and is characterised by destruction of the periodontium and the tooth supporting structures [1]. The destruction of the tissues results in breaking down the collagen fibres 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 results in tooth mobility. The severe conditions are characterised 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 characterised to have altered glucose or impaired lipid and carbohydrate mechanism. 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 mechanism 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.

MATERIALS AND METHODS:

This retrospective study was done on 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 sample size was 65

Comment [DUKU17]: Both terms are the same. So, being superfluous, use any one term – irreversible being the preferred term!

Comment [DUKU18]: progressive

Comment [DUKU19]: in

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Comment [DUKU25]: It was also found to have been greatly associated with impacting daily life and a decreased quality of life.

Comment [DUKU26]: cysts

Comment [DUKU27]: develops

Comment [DUKU28]: on a decreased insulin supply owing to pancreatic insufficiency. On the other hand,

Comment [DUKU29]: Begin a separate sentence.

Comment [DUKU30]: Really? Diet modification is the way to treat Type 2 diabetes, not the cause.

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Comment [DUKU33]: Better to refine this sentence if referring to the Pima Indian Diabetes dataset. It refers to the risk of developing diabetes and risk of periodontitis. So reword this sentence.

Comment [DUKU34]: So, is that the only reason what prompted the study? Any other reason like inadequate local data etc.

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Comment [DUKU37]: Yes, this is the very reason what may have prompted you to undertake this study in Saveetha DC. So, this needs to be included in the last paragraph of the Introduction section above.

which includes 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 with any medical history like diabetes, from age group 21-70 years. 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.

Comment [DUKU39]: Please specify...like what complications? Stroke? You cannot afford to be vague in a publication. Everything has to be specified.

Comment [DUKU40]: Great that SRS was done, but, what was the method and how did you pick out the sample. Just draw of lots, random number generation, random envelopes or any other method?

Comment [DUKU41]: Need to specify the company location and version of SPSS in parentheses.

RESULTS

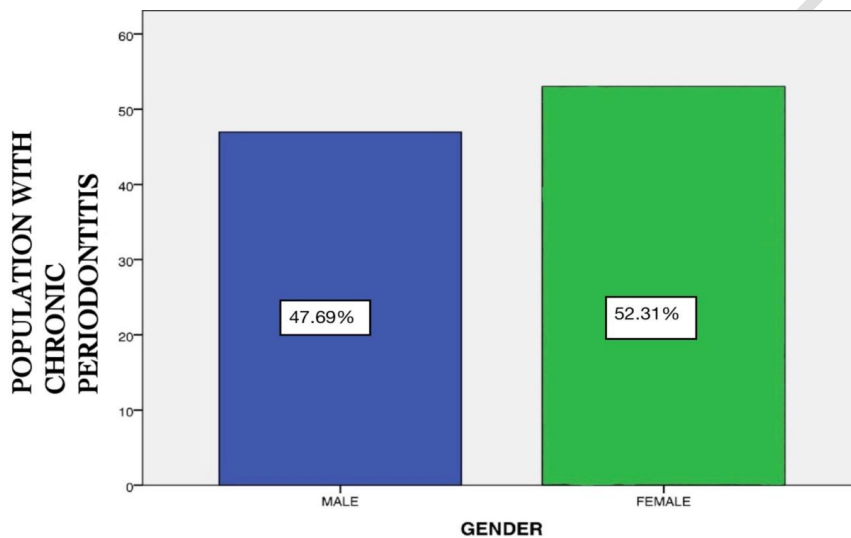


Figure1: Represents the association between gender and populations with chronic periodontitis. The X-axis represents the gender and Y-axis represents the total no of people with chronic periodontitis. Blue colour represents male individuals with chronic periodontitis and Green colour represents female individuals with chronic periodontitis. With the mean value of 47.7% of male population has chronic periodontitis and 52.3% of female population has chronic periodontitis.

Comment [DUKU42]: Self-explanatory. Can omit.

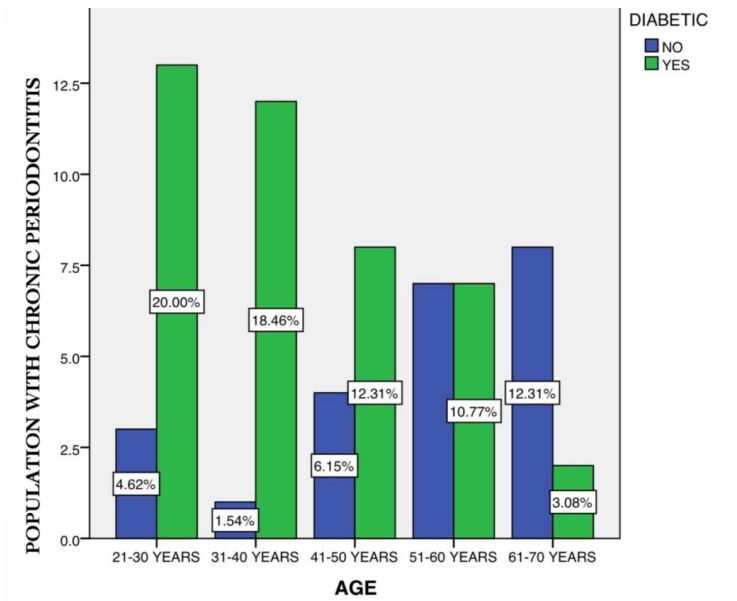


Figure 2 represents the association between different age groups and populations with chronic periodontitis with or without diabetes. The X-axis represents the different age groups between 21-70 years and Y-axis represents the total no of people with chronic periodontitis. Blue colour represents individuals with chronic periodontitis but without diabetes and Green colour represents individuals with chronic periodontitis and diabetes. With the mean value of age group belonging to 21-30 years, 20% were diabetic and 4.62% were non diabetic. From age group 31-40 years 18.46% were diabetic and 1.54% were non diabetic. From age group 41-50 years 12.31% were diabetic and 6.15% were non diabetic. From age group 51-60 years 10.77% were diabetic and 10.77% were non diabetic. From 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.

Comment [DUKU43]: What do the numbers on the Y-axis represent? It says Population with CP. But what about the numbers? Please specify. Total number of people in what units? Tens, hundreds, percentages? I can't understand.

Comment [DUKU44]: Please change the diabetes legend to Blue: Non-diabetic Green: Diabetes instead of Yes & No.

Comment [DUKU45]: Self-explanatory

Comment [DUKU46]: Explanation not required as legend is there.

Comment [DUKU47]: This has to be in the results section. Not in the description for the figure.

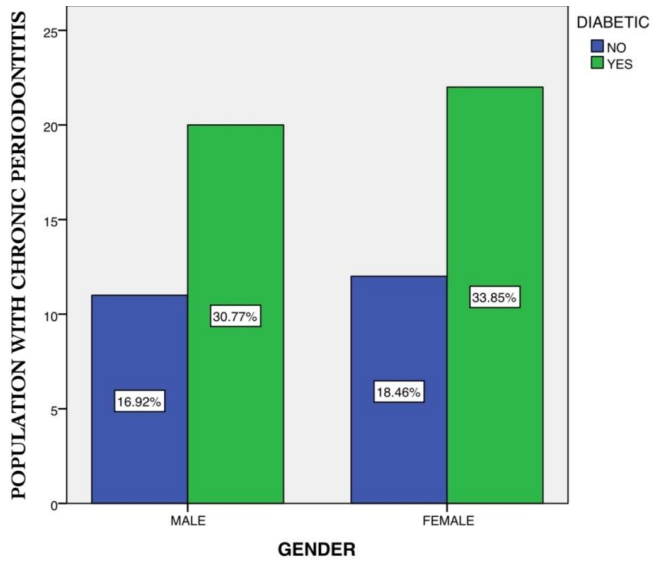


Figure 3: Represents the association between gender and population with chronic periodontitis with or without diabetes. The X-axis represents the gender and Y-axis represents the total no of people with chronic periodontitis. Blue colour represents individuals without diabetes and Green colour represents individuals with 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.

Comment [DUKU48]: Self-explanatory. Can omit.

Comment [DUKU49]: Again, need to shift these observations to results section.

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].

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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].

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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-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.

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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 there is a prevalence of diabetes is only 1.8% more in male than in female 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.

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 with 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.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. 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.

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Comment [DUKU62]: The limitations of this study were never specified in the first place. Please specify the limitations as the last paragraph in the 'Discussion' section.

Comment [DUKU63]: There was absolutely no explanation in the materials & methods as to how the investigators discerned that the patients had high blood sugar levels? Did they get this info from the case records? Why wasn't this mentioned. What was looked at...was it the actual blood sugar levels, HbA1C levels or just the remark that they were diabetic.

Comment [DUKU64]: ??? what does this mean?

Comment [DUKU65]: About

Comment [DUKU66]: Very importantly, as dentists, early and appropriate screening for CP must be carried out periodically in diabetic patients in order to assess the individual risks and to undertake procedures to mitigate these risks and prevent long term complications that may arise as a result of diabetes.

<http://dx.doi.org/10.1902/jop.1995.66.1.23>

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