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Assessment Of The Association Of Periodontal Disease Among Diabetic And Non Diabetic Patients - A Retrospective Study

Research Article

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Abstract

Chronic periodontitis is a common cause of poor oral health globally. Diabetes has been unequivocally confirmed as a major risk factor for periodontitis. The risk of periodontitis is increased by approximately threefold in diabetic individuals compared with non-diabetic individuals. Those at higher risk of this preventable and easily treatable condition need to be identified so that efforts can be taken to decrease disease burden and subsequent consequences. The aim of the study was to compare the prevalence of chronic periodontitis among patients with and without diabetes visiting a private dental institution. Data was collected from 86,000 patient case sheets who visited a private dental college from June 2019 to March 2020 of the patients visiting OP. The data was tabulated and the statistics were done using Chi-square test in SPSS software. Prevalence of chronic periodontitis was high among diabetic patients when compared to individuals without diabetes among the Chennai population and showed a female predilection and more occurrence in older age (36-52 years) (Chi-square test, $p=0.000<0.05$). Individuals with diabetes have a higher prevalence for periodontitis especially females. As diabetes mellitus is a strong risk factor for periodontitis, there is a need for targeted education regarding dental hygiene and proper management of diabetic conditions to reduce this preventable condition.

Keywords: Association; Chronic Periodontitis; Diabetes; Prevalence.

Introduction

Anatomical variations impose certain limitations to the chemico-m Diabetes mellitus is a complicated metabolic disorder characterized by hypofunction or lack of function of the beta cells of the islets of Langerhans in the pancreas, leading to high blood glucose levels and excretion of sugar in the urine [1]. Diabetes is the commonest among metabolic disorders and its incidence is on the increase all over the world [2]. Diabetes is an important public health problem, affecting 245 million people worldwide. Each year, seven million individuals develop diabetes and the projection for the year 2030 expects that 366 million people will have the disease worldwide [3]. Periodontitis is a slowly progressing disease but the tissue destruction that occurs is largely irreversible. In the early stages, the condition is typically asymptomatic; it is not usually painful, and many patients are unaware until the condition has progressed enough to result in tooth mobility. Periodontitis is one of the main oral health problems, which is predominantly a Gram-negative infection resulting in severe inflammation, with potential for vascular dissemination (via the sulcular epithelium) of microorganisms and their products such as Lipopolysaccharides (LPS) throughout the body [4]. Other lifestyle factors such as obesity, physical activity and diet are also likely to affect the risk of periodontitis. The worldwide prevalence of periodontal disease varies from 5 to 20% of the adult population [5]. By far, it is the most common oral infection in India, with a prevalence rate of 66.2% among individuals of age 15 years and about 89.2% among adults in the age group of 35-44 years [6]. The association between diabetes and periodontal diseases has been recognised in dental literature for many years. [7] Periodontitis is considered one

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of the main, oral health problems encountered in patients with diabetes. With the increase in the incidence of diabetes worldwide, its negative impact on oral health should be considered. Scientific evidence has shown for some time that diabetes is a risk factor for the development of periodontitis. Recent revisions confirm that type 2 diabetes can be considered a risk factor for periodontitis [8]. Moreover, the increased severity of periodontal disease in diabetes mellitus may reflect an alteration in the pathogenic potential of bacteria, enhancing the breakdown of periodontal tissues, resulting in more frequent and severe periodontal-tissue destruction [9]. Previously our team has a rich experience in working on various research projects across multiple disciplines [10-24]. The link between periodontitis and diabetes is stemmed from the increased number of diabetic patients with other infections and conditions but these are to be researched upon. The aim of the present study was to investigate the association of periodontal diseases among diabetic and non diabetic patients in the Chennai population and evaluate the prevalence of diabetes among different age groups and gender.

Materials And Methods

This retrospective study was conducted in the university setting . Data chosen for evaluation were patients who reported to a private dental college for any dental treatment. The details of the patients were obtained from analysis of 86,000 patients from June 2019 to March 2020 from private dental records for the purpose of preservation and efficient analysis of the patients details including intraoral and extra oral pictures and treatments done, which is maintained in a confidential manner. These served as records for the retrospective study. The study was conducted after getting ethical approval from the Institutional Ethical Committee (Ethical approval number: SDC/SIHEC/2020/DIASDATA/0619-0320). Cross verification was done with the help of dental records data. To minimise sampling bias all data were included. Inclusion criteria: Individuals with diabetes Both Type 1 and 2, on medication/ diagnosed with medical history), aged between 18–82 years were included in the study. Control group for comparison included individuals without diabetes or any other systemic diseases with the same age group. Exclusion criteria: Participants who had less than 10 teeth currently, or those who had undergone any periodontal treatment within the past 1 year, or patients with any other systemic condition apart from diabetes were excluded from the study. A total number of 1090 patients were randomly selected with 545 diabetic patients and 545 non diabetic patients. The data was tabulated in MS-Excel and descriptive statistics analysis was performed on the data and the results were obtained.

Results And Discussion

The study on the association of diabetes mellitus with periodontitis on 1090 patients, with 545 patients who were diabetic and 545 were non diabetic. Among the non diabetic patients (Figure 1), 60.73% of non diabetic patients were affected with gingivitis while 21.83% were affected with periodontitis and 17.83% were having healthy gingiva. Among the diabetic patients (Figure 2), 61.36 % of diabetic patients were affected with periodontitis while 25.27% were affected with gingivitis and 13.37% were having healthy gingiva. This reveals an association between diabetes and chronic periodontitis among the population of Chennai. In (Figure 3), the percentage of diabetic patients were found to be higher in the age group of 36-53 years (23.6%), followed by 54-71 years (20.29%), 71-89 years (4.41%) and lower in 18-35 years (5.79%). The Chi-square test showed p value: 0.000(<0.05). Hence statistically significant, which on interpretation reveals that older age influences the presence of diabetes among patients. From Figure 4, diabetes was found to be more prevalent in females (20.55%) when compared males (29.54%). Chi-square value: p value: 0.007(<0.05). Hence statistically significant , proving gender influences the presence of diabetes among patients and is found to be prevalent among females rather than males. In Figure 5, the percentage of diabetic patients who were found to be affected with periodontitis was (30.73%), gingivitis (12.66%) and patients who had healthy gingiva (6.70%). The Chi-square test showed p value: 0.000(<0.05). Hence, statistically significant, which on interpretation reveals that the presence of diabetes influences the occurrence of periodontitis among patients which is similar to other studies [25].

The number of older patients affected were much higher than the younger groups which is similar to other studies which reveals a higher incidence among the older age group [26], another study had clinical attachment loss significantly higher among individuals aged 60-69 years compared with groups of adults 40-50 years [27]. In another study , males were found to be more prone to diabetes and chronic periodontitis when compared to females [28] but our study showed a predominance among females.This maybe due to hormonal changes in women increase the likelihood of periodontal disease [29]. Females may experience gingival inflammation before menstruation and during ovulation due to a

Figure 1. This bar graph represents the association between the periodontal status and non diabetic patients. X-axis represents the periodontal status and Y-axis represents the number of non diabetic patients.The percentage of patients with gingivitis(60.73%) (pink) was found to be more than the patients with healthy gingiva(17.83%) (orange) or with periodontitis(21.83%) (yellow).

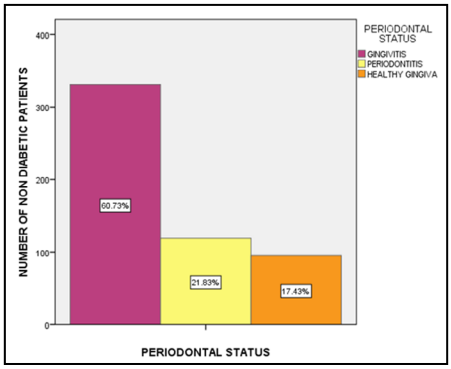


Figure 2. This bar graph represents the association between the periodontal status and diabetic patients. X-axis represents the periodontal status and Y-axis represents the number of diabetic patients.The percentage of patients with periodontitis(61.36%) (yellow) was found to be more than the patients with gingivitis(25.27) (pink) or healthy gingiva (13.37%)(orange).

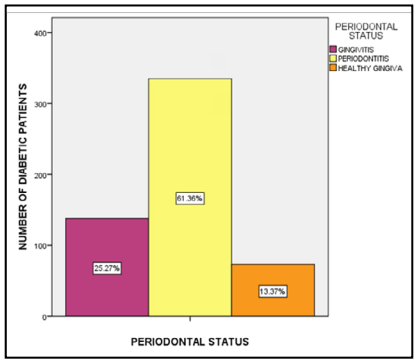


Figure 3. This bar graph represents the association between age groups and the number of patients. X-axis represents the age distribution and Y-axis represents the total number of patients (Presences of diabetes-YES-Green, NO-Blue). From the graph, diabetics were found to be higher among the older age groups when compared to the younger age group. Chi-square test was done and association was found to be statistically significant. Pearson's Chi square value: p value: 0.000(<0.05) Hence it was found to be statistically significant.

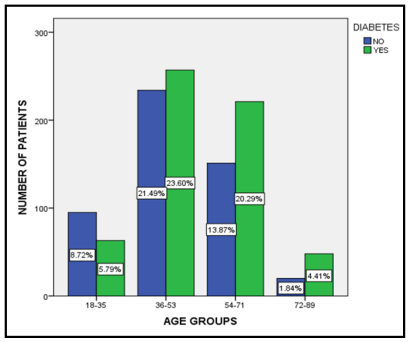
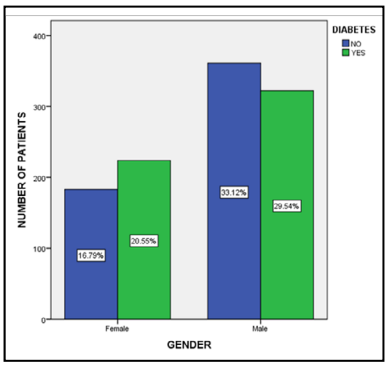
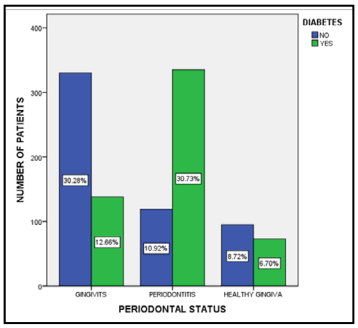


Figure 4. This bar graph represents the association between gender and diabetic patients. X-axis represents the gender distribution and Y-axis represents the total number of patients(Presences of diabetes-YES-Green,NO-Blue). From the graph, the presence of diabetes was found to be prevalent among females rather than males. Chi-square test was done and association was found to be statistically significant. Pearson's Chi square value: p value: 0.007(<0.05). Hence statistically significant.



high level of progesterone which blocks the repair of collagen fibers and causes the dilation of blood vessels [30]. Saito et al. [31] conducted a retrospective cohort study identifying the increased likelihood of periodontal pocket development in patients with impaired glucose tolerance which is a hallmark of type 2 diabetes mellitus. An increase in pocket formation perpetuates the progression of periodontitis by providing greater surface area for the proliferation of the bacterial biofilm responsible for clinical attachment and bone loss. It also increases periodontal inflamed surface area (PISA), which in turn can provide systemic access to microorganisms and their products [32]. Periodontitis or pyorrhea is a Gram-negative infection which may lead to severe inflammation with potential intravascular dissemination of micro-organisms and their products throughout the body. However, periodontitis tends to be an inconspicuous disease until destruction results in acute symptoms. Most patients, as well as many medical professionals do not recognize this potential source of infection that may exist within the oral cavity [33]. There is a worldwide increase in incidence and prevalence of diabetes mellitus, which is prevalent. This has been attributed to westernization, urbanization, and mechanization with a risk resulting from lifestyle change. [34] Among 1090 patients ,545 were diabetic and 545 were non diabetic. A significant number of diabetic patients were found in the age group 36-53 years and the number of patients affected by

Figure 5. This bar graph represents the association between periodontal status and the number of patients. X-axis represents the periodontal status and Y-axis represents the total number of patients (Presences of diabetes-YES-Green,NO-Blue). From the graph, the presence of periodontitis was found to be prevalent among diabetic patients rather than non daibetic patients.Chi-square test was done and association was found to be statistically significant . Pearson's Chi square value: p value: 0.000(<0.05). Hence, it is statistically significant.



periodontitis in diabetic patients were higher than non diabetic patients. Although many studies support the prevalence of periodontitis among diabetic patients [6, 35, 36] many studies have also shown to have had the opposite results [37-39]. According to them the cause of periodontitis is due to accumulation of local irritants in the oral cavity such a smoking, poor oral hygiene etc which increases the risk of periodontitis. All levels of treatment needs were found to be lower in diabetics than in non-diabetics in another study, which shows less correlation between periodontitis and diabetes which may be due to other factors such as genetics in the study population and lifestyle changes [40]. In another few study ,there were no significant differences between the whole diabetic group and the control group as regards the frequency of pockets and alveolar bone level. A comparison between the controls and the diabetic subgroups revealed that the well-controlled diabetic patients had better periodontal health than the controls. [41]When the diabetic patient suffered periodontitis it was due to factors (such as genetic predisposition) other than impaired glucose metabolism [39]. The socioeconomic status of patients may also play an important role in oral hygiene, a relatively low socioeconomic status may be a factor for chronic periodontitis [42]. This may be related to poor oral hygiene as well as poor access to dental care. Smoking was also found to be associated with chronic periodontitis in this study, similar to the results from previous studies, indicating the need to target this modifiable risk factor for promoting oral health [43, 44]. A review article, examining the relationship between diabetes and chronic periodontitis, concluded that the relationship is bidirectional, and more understanding is required regarding the impact of periodontal diseases on diabetes. [45] This study shows the prevalence of periodontitis among the population of Chennai with diabetes which doesn't mean there isn't a correlation between diabetes and periodontitis but maybe said to be a lower incidence of such manifestations. It must be clearly stated that the variations among the different studies on diabetes and periodontitis may be attributed to different study population around the world. These differences may be linked to genetic background, dietary consistency, diverse criteria and subjective interexaminer disparity. There is an absolute necessity for adopting preventive dental health care. Our institution is passionate about high quality evidence based research and has excelled in various fields [46-56].

Conclusion

Within the limits of the study,we can conclude that diabetes is more favorable to occur in the older age group most commonly in the age range of (36-52 years) and females were found to be predominantly affected by diabetes and were found to have a higher association with periodontitis compared to males. In future studies, larger sample size with multicentered and multiple ethnic groups should be involved to get reasonable and relevant results.

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