

Prevalence Of Periodontitis In Patients With Controlled And Uncontrolled Diabetes Mellitus

Research Article

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Abstract

Diabetes mellitus is recognized as an important risk factor for more severe and progressive periodontitis, infection or lesions resulting in the destruction of tissues and supporting bone that form the attachment around the tooth. Periodontal disease has been reported as the sixth complication of diabetes mellitus, along with neuropathy, nephropathy, retinopathy, and micro- and macrovascular diseases. The main objective was to find out the prevalence of periodontitis in patients with controlled and uncontrolled diabetes mellitus (DM). This is an institutional based retrospective study conducted among 100 outpatients with controlled DM and 100 patients with uncontrolled DM who reported to Private Dental College and Hospitals, Chennai from June 2019 to March 2020. Data regarding the periodontal status was collected and analysed. Differential and inferential statistics were done for data summarization and presentation. The present study showed that out of 200 patients with DM, 50 (25%) had gingivitis and 150 (75%) had periodontitis. Also, periodontitis was more prevalent in patients with uncontrolled DM (91%) than patients with controlled DM (59%). There was a statistically significant association between systemic health status and periodontal disease status. Within the limits of the present study, periodontitis was more prevalent in patients with uncontrolled DM than patients with controlled DM.

Keywords: Diabetes Mellitus; Gingivitis; Oral Health; Periodontitis; Periodontium.

Introduction

Diabetes mellitus is a clinically and genetically heterogeneous group of disorders affecting the metabolism of carbohydrates, lipids and a protein, in which hyperglycemia is a main feature. These disorders are due to a deficiency in insulin secretion caused by pancreatic β -cell dysfunction and/or insulin resistance in liver and muscle [48, 38]. Diabetes mellitus affects about 21 million people in the United States, or more than 9% of the adult population, and has a dramatic impact on the health care system through high morbidity and mortality among affected individuals [24, 50]. In Ontario, population-based data have revealed that the prevalence of diabetes mellitus increased by 69% over a recent 10-year period (from 5.2% in 1995 to 8.8% in 2005), which exceeded the global rate of increase of 39% that was predicted for the period 2000 to 2030. Furthermore, the rates of increase rose to a greater

extent in the younger population. This increase was attributable to both a rise in incidence and a decline in mortality [4, 20, 29]. Similarly, in the First Nations community of Kahnawake, Quebec, the prevalence rates of type 2 diabetes mellitus increased over the period 1986 to 2003, from 6.0% to 8.4% among males and from 6.4% to 7.1% among females [14].

Diabetes mellitus is a heterogeneous group of disorders with different causes but all characterized by hyperglycemia. Type 1 diabetes mellitus is due to destruction of the insulin-producing cells. Type 2 diabetes mellitus is the result of insulin resistance coupled with relative beta-cell failure [12].

Periodontitis is a chronic inflammatory disease affecting both soft and hard tissues of oral cavity. The primary etiology of the disease is bacterial plaque however the disease is modified by a

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variety of risk factors like age, gender, smoking, stress, systemic diseases, malnutrition, medication and genetic factors[25,18,42]. Numerous studies discuss the relationship between periodontitis and type 2 diabetes mellitus, focusing on the mechanisms through which periodontal infections contribute to the diabetes mellitus-related inflammatory state, the influence of periodontal infections on insulin resistance and the ways in which treatment of these infections can influence glycemic control [7, 17, 22].

Diabetes mellitus is recognized as an important risk factor for more severe and progressive periodontitis, infection or lesions resulting in the destruction of tissues and supporting bone that form the attachment around the tooth [15, 38, 41]. Periodontal disease has been reported as the sixth complication of diabetes mellitus, along with neuropathy, nephropathy, retinopathy, and micro- and macrovascular diseases [21]. It is well proved that there exists a dual relationship between periodontitis and diabetes [33, 40]. Previously our team has a rich experience in working on various research projects across multiple disciplines [2, 8, 10, 11, 13, 26-28, 30, 31, 35, 45, 53]. Now the growing trend in this area motivated us to pursue this project.

The purpose of this retrospective study was to determine the prevalence of periodontitis in patients with controlled DM and uncontrolled DM among the Chennai population.

Materials and Methods

This retrospective study was undertaken using a convenience sample of 200 patients with diabetes mellitus reported to Private Dental College and Hospitals, Chennai from June 2019 to March 2020. They were categorized into patients with controlled diabetes mellitus (n=100) and uncontrolled diabetes mellitus (n=100). Data regarding their periodontal status was collected and was analyzed. Ethical approval for the study was obtained from Saveetha

University Ethical Review Board(SDC/SIHEC/2020/DIASDA-TA/0619-0320).

Results & Discussion

Data collected were entered in SPSS version 20 and was subjected to statistical analysis. Differential and inferential statistics were done for data summarization and presentation. Results were tabulated and represented graphically. The present study showed that out of 200 patients with DM, 50 (25%) had gingivitis and 150 (75%) had periodontitis (Figure 1). Also, periodontitis was more prevalent in patients with uncontrolled DM (91%) than patients with controlled DM (59%) (Figure 2). There was a statistically significant association between systemic health status and periodontal disease status (Pearson’s Chi-Square test - 27.307, df - 1 , p=0.000 (p<0.05) ; statistically significant)(Figure 2).

DM and periodontitis are chronic diseases with a higher incidence at increased age. Both of the morbidities negatively affect periodontal health and systemic health, thus affecting the quality of life [5]. An abundance of recent evidence has consolidated a bi-directional correlation between diabetes and periodontitis. While diabetes is an independent risk factor for periodontitis[47], periodontitis as a chronic inflammation has a negative impact on the metabolic control of diabetes [12]. In particular, periodontitis ranks sixth among all complications of diabetes [21].

The global prevalence of DM is increasing in an accelerated manner; the number of deaths per year as a result of diabetic complications is about 5 million, which is significantly higher than the number of deaths per year from AIDS, tuberculosis, and malaria [3].

In this study, among 100 controlled DM patients, 41% were gingivitis and 59% were periodontitis and among 100 patients with

Figure 1: Bar chart depicts the distribution of periodontal disease among the study population. X axis represents the periodontal disease status and Y axis represents the percentage of study population. 25% of them had gingivitis (blue) and 75% of them had periodontitis (red).

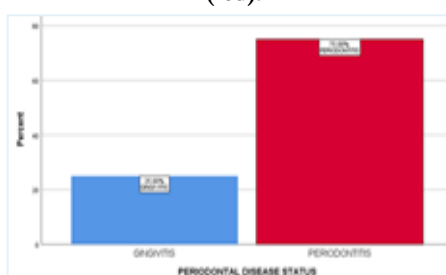
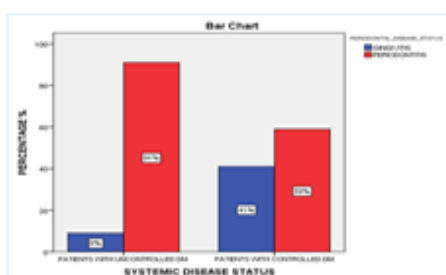


Figure 2: Bar chart depicts the association between systemic health status and periodontal disease status. X axis represents the systemic disease status and Y axis represents the percentage of number of patients suffering from periodontal disease. Among patients with uncontrolled DM, 91% had periodontitis(red) and 9% had gingivitis(blue) whereas among patients with controlled DM , 59% had periodontitis and 41% had gingivitis. There was a significant association between systemic health status and periodontal disease status as determined by Pearson’s Chi-Square test. (Pearson’s Chi-Square test - 27.307, df - 1 , p=0.000 (p<0.05); statistically significant).



uncontrolled DM, 9% were gingivitis and 91% were periodontitis. Our study showed that prevalence of periodontitis in patients with uncontrolled DM were more than patients with controlled DM. Similar results were observed in previous studies. Alshwaimi E et al shows the association between diabetes mellitus and periodontal disease [1]. Sut yee tse et al showed that dental practitioners showed increased awareness about the association between diabetes mellitus and periodontal disease [49]. Ying ying wu et al showed that diabetes mellitus can cause bone related metabolism and periodontal disease [54, 36]. Our institution is passionate about high quality evidence based research and has excelled in various fields [6, 9, 23, 32, 34, 39, 44, 46, 51, 52]. We hope this study adds to this rich legacy.

The limitation of this study is its smaller sample size. A similar study should be conducted on a larger scale involving a large number of samples for more reliable results. Therefore, extensive long-term studies need to be conducted to assess the periodontal status of the diabetic patients.

Conclusion

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References

- Alshwaimi E, Idrees M, Berri Z, El-Sakka H, Kujan O. Association between diabetes mellitus and periodontal diseases: a survey of the opinions of dental professionals. *Med Princ Pract.* 2019;28(2):141-9.
- Ashok V, Ganapathy D. A geometrical method to classify face forms. *J Oral Biol Craniofac Res.* 2019 Jul 1;9(3):232-5.
- Atlas, I. D. *International Denture Federation 7th Edition*, 2015 Nov.2016.
- Avinash K, Malaippan S, Dooraiswamy JN. Methods of Isolation and Characterization of Stem Cells from Different Regions of Oral Cavity Using Markers: A Systematic Review. *Int J Stem Cells.* 2017 May 30;10(1):12-20. Pubmed PMID: 28531913.
- Brown LJ, Brunelle JA, Kingman A. Periodontal status in the United States, 1988–91: prevalence, extent, and demographic variation. *J. Dent. Res.* 1996 Feb;75(2_suppl):672-83.
- Chandrasekar R, Chandrasekar S, Sundari KKS, Ravi P. Development and validation of a formula for objective assessment of cervical vertebral bone age. *Prog Orthod.* 2020 Oct 12;21(1):38. Pubmed PMID: 33043408.
- Ervasti T, Knuutila M, Pohjamo L, Haukipuro K. Relation between control of diabetes and gingival bleeding. *J. Periodontol.* 1985 Mar;56(3):154-7.
- Ezhilarasan D. Oxidative stress is bane in chronic liver diseases: Clinical and experimental perspective. *Arab J Gastroenterol.* 2018 Jun;19(2):56-64. Pubmed PMID: 29853428.
- Ezhilarasan D, Apoorva VS, Ashok Vardhan N. Syzygium cumini extract induced reactive oxygen species-mediated apoptosis in human oral squamous carcinoma cells. *J Oral Pathol Med.* 2019 Feb;48(2):115-121. Pubmed PMID: 30451321.
- Ezhilarasan D, Sokal E, Najimi M. Hepatic fibrosis: It is time to go with hepatic stellate cell-specific therapeutic targets. *Hepatobiliary Pancreat Dis Int.* 2018 Jun;17(3):192-197. Pubmed PMID: 29709350.
- Govindaraju L, Neelakantan P, Gutmann JL. Effect of root canal irrigating solutions on the compressive strength of tricalcium silicate cements. *Clin Oral Investig.* 2017 Mar;21(2):567-571. Pubmed PMID: 27469101.
- Grossi SG, Genco RJ. Periodontal disease and diabetes mellitus: a two-way relationship. *Ann. Periodontol.* 1998 Jul;3(1):51-61.
- Gupta P, Ariga P, Deogade SC. Effect of Monopoly-coating Agent on the Surface Roughness of a Tissue Conditioner Subjected to Cleansing and Disinfection: A Contact Profilometric In vitro Study. *Contemp Clin Dent.* 2018 Jun;9(Suppl 1):S122-S126. Pubmed PMID: 29962776.
- Horn OK, Jacobs-Whyte H, Ing A, Bruegl A, Paradis G, Macaulay AC. Incidence and prevalence of type 2 diabetes in the First Nation community of Kahnawá:ke, Quebec, Canada, 1986-2003. *Can J Public Health.* 2007 Nov-Dec;98(6):438-43. Pubmed PMID: 19039878.
- Kavarthapu A, Thamaraiselvan M. Assessing the variation in course and position of inferior alveolar nerve among south Indian population: A cone beam computed tomographic study. *Indian J Dent Res.* 2018 Jul-Aug;29(4):405-409. Pubmed PMID: 30127186.
- Ke Y, Al Aboody MS, Alturaiki W, Alsagaby SA, Alfaiz FA, Veeraraghavan VP, et al. Photodynamically synthesized gold nanoparticles from *Catharanthus roseus* induces caspase-mediated apoptosis in cervical cancer cells (HeLa). *Artif Cells Nanomed Biotechnol.* 2019 Dec;47(1):1938-1946. Pubmed PMID: 31099261.
- Khalid W, Varghese SS, Lakshmanan R, Sankari M, Jayakumar ND. Role of endothelin-1 in periodontal diseases: A structured review. *Indian J Dent Res.* 2016 May-Jun;27(3):323-33. Pubmed PMID: 27411664.
- Khalid W, Varghese SS, Sankari M, Jayakumar ND. Comparison of Serum Levels of Endothelin-1 in Chronic Periodontitis Patients Before and After Treatment. *J Clin Diagn Res.* 2017 Apr;11(4):ZC78-ZC81. Pubmed PMID: 28571268.
- Krishnan RP, Ramani P, Sherlin HJ, Sukumaran G, Ramasubramanian A, Jayaraj G, et al. Surgical Specimen Handover from Operation Theater to Laboratory: A Survey. *Ann Maxillofac Surg.* 2018 Jul-Dec;8(2):234-238. Pubmed PMID: 30693238.
- Lipscombe LL, Hux JE. Trends in diabetes prevalence, incidence, and mortality in Ontario, Canada 1995-2005: a population-based study. *Lancet.* 2007 Mar 3;369(9563):750-756. Pubmed PMID: 17336651.
- Löe H. Periodontal disease: the sixth complication of diabetes mellitus. *Diabetes care.* 1993 Jan 1;16(1):329-34.
- Loos BG. Systemic markers of inflammation in periodontitis. *J. Periodontol.* 2005 Nov;76:2106-15.
- Mathew MG, Samuel SR, Soni AJ, Roopa KB. Evaluation of adhesion of *Streptococcus mutans*, plaque accumulation on zirconia and stainless steel crowns, and surrounding gingival inflammation in primary molars: randomized controlled trial. *Clin Oral Investig.* 2020 Sep;24(9):1-6. Pubmed PMID: 31955271.
- Mealey BL, Oates TW. Diabetes mellitus and periodontal diseases. *J. Periodontol.* 2006 Aug;77(8):1289-303.
- Mootha A, Malaippan S, Jayakumar ND, Varghese SS, Toby Thomas J. The Effect of Periodontitis on Expression of Interleukin-21: A Systematic Review. *Int J Inflamm.* 2016;2016:1-8. Pubmed PMID: 26998377.
- Muthukrishnan A, Warnakulasuriya S. Oral health consequences of smokeless tobacco use. *Indian J Med Res.* 2018 Jul;148(1):35-40.
- Padavala S, Sukumaran G. Molar incisor hypomineralization and its prevalence. *Contemp Clin Dent.* 2018 Sep;9(Suppl 2):S246-S250.
- Palati S, Ramani P, Shrelin HJ, Sukumaran G, Ramasubramanian A, Don KR, et al. Knowledge, Attitude and practice survey on the perspective of oral lesions and dental health in geriatric patients residing in old age homes. *Indian J Dent Res.* 2020 Jan-Feb;31(1):22-25. Pubmed PMID: 32246676.
- Panda S, Jayakumar ND, Sankari M, Varghese SS, Kumar DS. Platelet rich fibrin and xenograft in treatment of intrabony defect. *Contemp Clin Dent.* 2014 Oct;5(4):550-554.
- Pandian KS, Krishnan S, Kumar SA. Angular photogrammetric analysis of the soft-tissue facial profile of Indian adults. *Indian J. Dent. Res.* 2018 Mar 1;29(2):137-143.
- Paramasivam A, Vijayashree Priyadharsini J, Raghunandhakumar S. N6-adenosine methylation (m6A): a promising new molecular target in hypertension and cardiovascular diseases. *Hypertens Res.* 2020 Feb;43(2):153-154. Pubmed PMID: 31578458.
- Pc J, Marimuthu T, Devadoss P, Kumar SM. Prevalence and measurement of anterior loop of the mandibular canal using CBCT: A cross sectional study. *Clin Implant Dent Relat Res.* 2018 Apr 6;20(4):531-4.
- Priyanka S, Kaarthikeyan G, Nadathur JD, Mohanraj A, Kavarthapu A. Detection of cytomegalovirus, Epstein-Barr virus, and Torque Teno virus in subgingival and atheromatous plaques of cardiac patients with chronic periodontitis. *J Indian Soc Periodontol.* 2017 Nov-Dec;21(6):456-460. Pubmed PMID: 29551863.
- Ramadurai N, Gurunathan D, Samuel AV, Subramanian E, Rodrigues SJ. Effectiveness of 2% Articaine as an anesthetic agent in children: randomized controlled trial. *Clin. Oral Investig.* 2019 Sep;23(9):3543-50.
- Ramamurthy JA, Mg V. Comparison of effect of Hiora mouthwash versus Chlorhexidine mouthwash in gingivitis patients: A clinical trial. *Asian J Pharm Clin Res.* 2018 Jul 7;11(7):84-8.
- Ramamurthy JA, Mg V. Comparison of effect of Hiora mouthwash versus Chlorhexidine mouthwash in gingivitis patients: A clinical trial. *Asian J Pharm Clin Res.* 2018 Jul 7;11(7):84-8.
- Ramesh A, Varghese SS, Jayakumar ND, Malaippan S. Chronic obstructive pulmonary disease and periodontitis—unwinding their linking mechanisms. *J. Oral Biosci.* 2016 Feb 1;58(1):23-6.
- Ramesh A, Varghese SS, Doraiswamy JN, Malaippan S. Herbs as an antioxidant arsenal for periodontal diseases. *J Intercult Ethnopharmacol.* 2016 Jan 27;5(1):92-6. Pubmed PMID: 27069730.

- [39]. Ramesh A, Varghese S, Jayakumar ND, Malaiappan S. Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - A case-control study. *J Periodontol.* 2018 Oct;89(10):1241-1248. Pubmed PMID: 30044495.
- [40]. Ramesh A, Vellayappan R, Ravi S, Gurumoorthy K. Esthetic lip repositioning: A cosmetic approach for correction of gummy smile - A case series. *J Indian Soc Periodontol.* 2019 May-Jun;23(3):290-294. Pubmed PMID: 31143013.
- [41]. Ramesh A, Ravi S, Kaarthikeyan G. Comprehensive rehabilitation using dental implants in generalized aggressive periodontitis. *J Indian Soc Periodontol.* 2017 Mar;21(2):160.
- [42]. Ravi S, Malaiappan S, Varghese S, Jayakumar ND, Prakasam G. Additive Effect of Plasma Rich in Growth Factors With Guided Tissue Regeneration in Treatment of Intrabony Defects in Patients With Chronic Periodontitis: A Split-Mouth Randomized Controlled Clinical Trial. *J Periodontol.* 2017 Sep;88(9):839-845. Pubmed PMID: 28474968.
- [43]. R H, Ramani P, Ramanathan A, R JM, S G, Ramasubramanian A, et al. CYP2 C9 polymorphism among patients with oral squamous cell carcinoma and its role in altering the metabolism of benzo[a]pyrene. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2020 Sep;130(3):306-312. Pubmed PMID: 32773350.
- [44]. Samuel SR. Can 5-year-olds sensibly self-report the impact of developmental enamel defects on their quality of life? *Int J Paediatr Dent.* 2021 Mar;31(2):285-286. Pubmed PMID: 32416620.
- [45]. Samuel SR, Acharya S, Rao JC. School Interventions-based Prevention of Early-Childhood Caries among 3-5-year-old children from very low socioeconomic status: Two-year randomized trial. *J Public Health Dent.* 2020 Jan;80(1):51-60. Pubmed PMID: 31710096.
- [46]. Sridharan G, Ramani P, Patankar S, Vijayaraghavan R. Evaluation of salivary metabolomics in oral leukoplakia and oral squamous cell carcinoma. *J Oral Pathol. Med.* 2019 Apr;48(4):299-306.
- [47]. Taylor GW. Bidirectional interrelationships between diabetes and periodontal diseases: an epidemiologic perspective. *Ann Periodontol.* 2001 Dec;6(1):99-112. Pubmed PMID: 11887478.
- [48]. Thamaraiselvan M, Elavarasu S, Thangakumaran S, Gadagi JS, Arthie T. Comparative clinical evaluation of coronally advanced flap with or without platelet rich fibrin membrane in the treatment of isolated gingival recession. *J. Oral Pathol. Med.* 2015 Jan;19(1):66.
- [49]. Tse SY. Diabetes mellitus and periodontal disease: awareness and practice among doctors working in public general out-patient clinics in Kowloon West Cluster of Hong Kong. *BMC Fam Pract.* 2018 Dec 17;19(1):199. Pubmed PMID: 30558542.
- [50]. Varghese SS, Thomas H, Jayakumar ND, Sankari M, Lakshmanan R. Estimation of salivary tumor necrosis factor-alpha in chronic and aggressive periodontitis patients. *Contemp Clin Dent.* 2015 Sep;6(Suppl 1):S152-6. Pubmed PMID: 26604566.
- [51]. Vijayashree Priyadharsini J. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J Periodontol.* 2019 Dec;90(12):1441-1448. Pubmed PMID: 31257588.
- [52]. Vijayashree Priyadharsini J, Smiline Girija AS, Paramasivam A. In silico analysis of virulence genes in an emerging dental pathogen *A. baumannii* and related species. *Arch Oral Biol.* 2018 Oct;94:93-98. Pubmed PMID: 30015217.
- [53]. Vikram NR, Prabhakar R, Kumar SA, Karthikeyan MK, Saravanan R. Ball Headed Mini Implant. *J Clin Diagn Res.* 2017 Jan;11(1):ZL02-ZL03.
- [54]. Wu YY, Xiao E, Graves DT. Diabetes mellitus related bone metabolism and periodontal disease. *Int. J. Oral Sci.* 2015 Jun;7(2):63-72.