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Prevalence of Class I Caries Among Out Patients with Diabetes Visiting A Private Dental Hospital - A Retrospective Analysis

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Abstract: Diabetes is a metabolic disorder that is common among all ages of people worldwide. Whereas Dental caries is one of the most prevalent and preventable diseases. Both diabetes and caries are associated with carbohydrate intake.Diabetic patients have increased sucrose level and less amount of fluoride content that promotes demineralisation thereby providing the favourable environment for caries progression.However there is still some controversy regarding the relationship between diabetes and caries. Hence the aim of the present study was to assess the prevalence of class 1 dental caries in patients with type 2 diabetes mellitus. We reviewed patient records and analysed the data of 86000 patients between June 2019 and march 2020 from which 600 diabetic patients were included in the study and assessed for age,gender and presence of class 1 caries in each tooth. Collected data was tabulated in excel sheet and imported in SPSS version 17 for statistical analysis. Among 600 diabetic patients, 55.9% showed presence of caries and 44% were without class 1 caries. The result was highly significant (t-test; P<0.001). 40 to 50 years age group patients showed high prevalence of caries(64%) and 20 to 30 age groups showed minimal prevalence(17.6%). Males showed higher prevalence than females with 56.4% and 43.5%. This result was not significant (Chi-square test; P=0.013). Tooth number 37(15.5%) showed high incidence followed by 38(7.1%) and 47(6.8%). Mandibular posteriors(60.3%) showed higher prevalence than maxillary posteriors (30.3%).

Keywords: Class 1 caries, Type 2 diabetes, prevalence, gender

INTRODUCTION

Diabetes is a metabolic disorder that is common among all ages of people worldwide. Currently India reveals the highest incidence of diabetes with 32 million patients((Malvania *et al.*, 2016)). The count is expected to rise furthermore in upcoming years. Diabetes is of two types i.e., type 1 and type 2. Type 2 is characterised by increased blood sugar level with obesity((Bangash, Khan and Tariq, 2012)). Whereas Dental caries is one of the most prevalent and preventable diseases. Oral health is dramatically affected by diabetes and hence a complex relationship was found between diabetes and dental caries((Vasquez and Sacsaquispe-Contreras, 2014)). Diabetes and dental caries are the most prevalent conditions associated with carbohydrate intake.

Iqbal Singh et al.,((Singh *et al.*, 2016)) in his study proved that the prevalence of dental caries is found to be higher in diabetic patients than non diabetic patients. Many previous literature assessed the caries frequency among children, adult and elder populations((Wegner, 1971; Bacic *et al.*, 1989; Bhardwaj, 2014)). A study of 42 older adults showed statistical significance of higher DMFT index with poorly controlled/well controlled diabetics compared with non diabetics((Lin *et al.*, 1999)).

Diabetic patients have increased sucrose level and less amount of fluoride content that promotes demineralisation thereby providing the favourable environment for caries progression. Also the insulin deficiency in diabetic leads to hyposalivation and increased salivary glucose level which may put the diabetic patients at a high risk of developing caries((Moin and Malik, 2015)).This makes the researchers and oral health professionals think that the above reasons could be a barrier for improving general and oral health.However there is still some controversy regarding the relationship between diabetes and caries.Since the occlusal surface of posteriors are easily prone to caries irrespective of diabetic and nondiabetic,class 1 is taken into account for this research. Though many previous studies assessed diabetes and dental caries, they all are conducted in small sample sizes. Hence the present study addresses this limitation.

Para1. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J *et al.*, 2018; Menon *et al.*, 2018; Prabakar *et al.*, 2018; Rajeshkumar *et al.*, 2018, 2019; Vishnu Prasad *et al.*, 2018; Wahab *et al.*, 2018; Dua *et al.*, 2019; Duraisamy *et al.*, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu *et al.*, 2019; Mehta *et al.*, 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma *et al.*, 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi *et al.*, 2020; Samuel, Acharya and Rao, 2020)
The aim of the study was to assess the prevalence of class 1 dental caries in patients with Type 2 diabetes mellitus.

MATERIALS AND METHODS

Study setting

The study was conducted with the approval of the Institutional Ethics Committee[SDC/SIHEC/2020/DIASDATA/0619-0320]. The study consisted of one reviewer,one assessor and one guide.

Study design

This study was designed to include all diabetes patients above 18 years of age. The patients who did not fall into this category were excluded.

Sampling technique

This study was based on retrospective sampling. analyses of class 1 caries among diabetic patients predominantly South Indian population. To minimise sampling bias, all case sheets of diabetic patients who visited the private dental hospital were reviewed and included.

Data collection and Tabulation

Data collection was done using the patient database with the time framework between 01 June 2019 and 31 March 2020. 600 diabetic patients were included in the study and assessed for age,gender and presence of class 1 caries in each tooth. Patients associated with any other systemic conditions were excluded from the study. All relevant case sheets were cross verified by another examiner. Data was downloaded from DIAS and imported to excel sheet and tabulated.

Statistics

The data was imported and transcribed in Statistical Package for the Social Sciences, version 17(SPSS, IBM corporation). Descriptive analyses were based on quantitative variables and frequencies for categorical variables. Variables were compared using the Chi-square test. P less than or equal to 0.05 was considered statistically significant with a confidence interval of 95%.

RESULTS

From the present study, the percentage of patients with caries were 55.9%(336) and without caries were 44%(264) which is statistically significant(t-test; $P<0.001$). The mean age is found to be 50 years with a range of 20-76 years. Percentage of males and females with caries were 56.4%(189) and 43.6%(147) and without caries were 62.5%(165) and 37.5%(99) respectively. The result was not significant(Chi-square test; $P=0.013$).From figure 3, tooth number 37(15.5%) shows high incidence followed by 38(7.1%) and 47(6.8%). The least prevalence was seen in tooth number 34(0.9%).

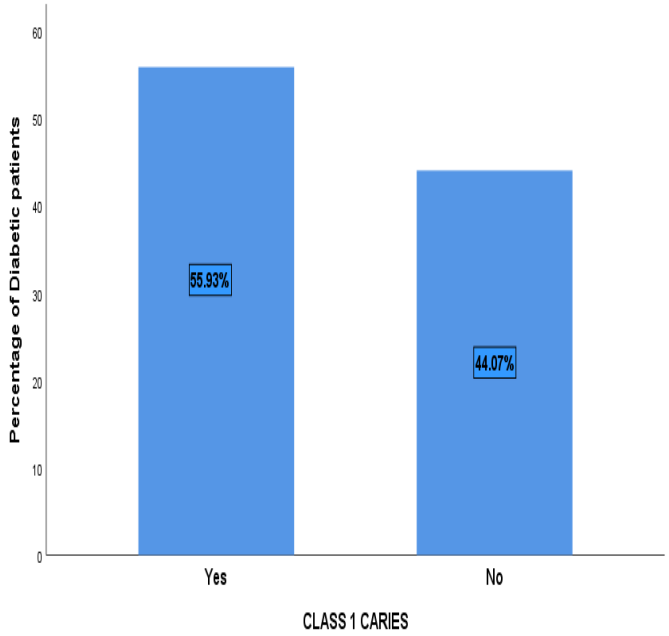

Fig.1: Bar graph depicts the prevalence of class 1 caries among diabetic patients. X axis represents the presence and absence of caries and Y axis represents the percentage of patients involved in this study. The percentage of patients with caries were 55.9%(336) and without caries were 44%(264).

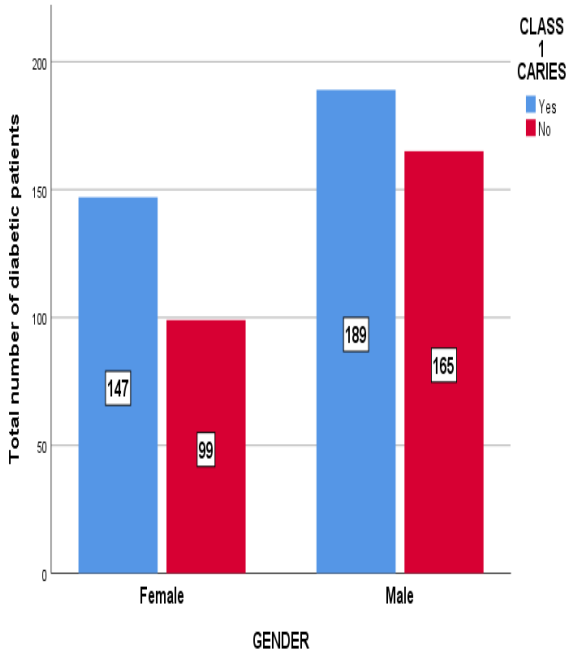

Fig.2: Bar graph represents the association between gender and diabetic patients with or without class 1 caries.Blue colour denotes presence of caries and red denotes absence of caries. Percentage of males and females with caries were 56.4%(189) and 43.6%(147) respectively. Percentage of males and females without caries were 62.5%(165) and 37.5%(99). The result was not significant(Chi-square test; P=0.013 - not significant), thus implying that gender has no influence on caries prevalence of diabetic patients.

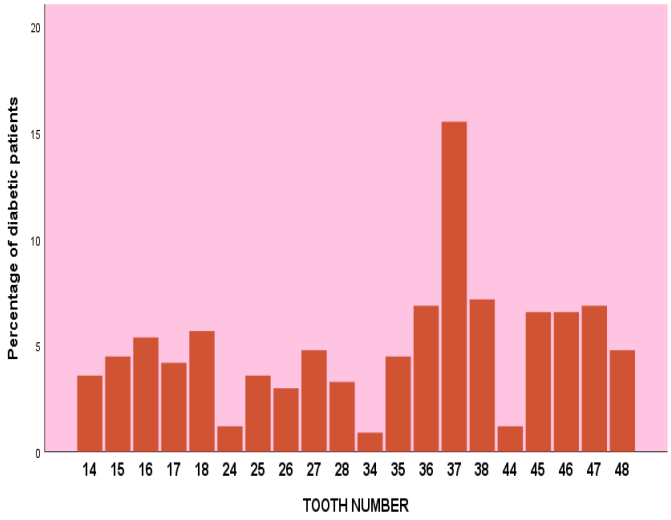

Fig.3: Bar graph shows the tooth wise distribution of prevalence of class 1 dental caries among type 2 diabetes mellitus patients. X axis represents the individual tooth number and Y axis represents the percentage of diabetic patients. From the chart, tooth number 37(15.5%) shows high incidence followed by 38(7.1%) and 47(6.8%). The least prevalence was seen in tooth number 34(0.9%).

DISCUSSION

In the current study, prevalence of dental caries was higher among diabetic patients. Reduction of untreated dental caries and delayed extraction leads to the consequence of an increase in prevalence of decayed teeth upto 15% among the adult population. Several authors reported the higher rate of dental caries among diabetic patients((Kanjirath, Kim and Rohr Inglehart, 2011; Sadia *et al.*, 2011; Moin and Malik, 2015)). In contrast, Gupta et al. and Bassir et al. reported low prevalence of dental caries among diabetics((Bassir *et al.*, 2014; Gupta *et al.*, 2014)). Also a study conducted by Bacic et al((Bacic *et al.*, 1989)) mentioned no significant difference in prevalence of caries between diabetic and non diabetic patients.

The prevalence of caries varies among different age groups. This study shows high prevalence among 40 to 50 years and least prevalence among 20-30 years of age group. Since elder patients are affected with diabetes for a long period of time , the prevalence could be high at this age group. Miralles et al((Miralles *et al.*, 2006)) proved in his study that patients affected with diabetes for more than 10 years show high incidence of dental caries and Malvania et al((Malvania *et al.*, 2016)) also reported patients with diabetes for more than 5 years showed high possibility of caries. Many studies prove the prevalence of caries increases with age((Malvania *et al.*, 2016)). But still the consensus is contradictory since both the study results are not statistically significant. In contrast, a study showed lower prevalence of dental caries above 50 years of age((Karthikeyan *et al.*, 2016)).

Analysing the gender wise distribution of class 1 caries among diabetic patients , males show higher prevalence than females.The result is consistent with Rajeshwari((Rajeswary, 2013)), which proves the higher prevalence in males though it is not statistically significant.This can be the impact of lifestyle in each gender. Also the difference in frequency of meal consumption and variation of saliva secretion that is associated with caries development.

In the present study, Mandibular posteriors showed higher prevalence than maxillary posteriors with 60.3%(203) and 39.7%(203) respectively with a significant result of $P<0.005$ done using t-test. There was a higher prevalence rate of class 1 caries in mandibular molars compared to maxillary molars. According to Lulëjeta Ferizi et al((Ferizi *et al.*, 2018)), commonly occlusal surfaces of molars are prone to class 1 caries easily if not proper maintenance is achieved but in diabetic patients the rate is even more. Previous literature showed molars are chiefly associated with caries followed by premolars((Rajeswary, 2013)).Another study conducted by Mustafa Demirci et al((Demirci, Tuncer and Yuceokur, 2010)) reported both maxillary and mandibular molars show equal prevalence of decayed teeth among diabetic patients. But the latter study was done with limited samples and also conducted among the turkey population.

Coming to the tooth wise distribution of class 1 caries, tooth number 37 shows maximum prevalence followed by 38. On seeing the maxillary arch separately, 18 showed high susceptibility. Third molars can get affected easily due to impaction. Hence we cannot conclude that it is because of diabetes.No other studies showed tooth wise distribution of caries among diabetic patients. This may vary with each individual depending upon the salivary glucose level and buffer capacity((Gupta *et al.*, 2014)). As a diabetic, frequent intake of carbohydrates and sugars highly affects the oral health than the non diabetic((Bassir *et al.*, 2014)). Certain diabetic patients

maintain controlled sugar level and in those the caries prevalence may differ((Miralles *et al.*, 2006)). They are so involved in managing diabetes and are completely unaware of the dental caries associated with diabetes following which the dental health status worsens even more.

Though some studies reported the accumulation of microflora in the root canal system is high in case of diabetic patients thereby leading to increased susceptibility of periapical and pulpal infections((Noor, S Syed Shihaab and Pradeep, 2016; Kumar and Antony, 2018; Ravinthar and Others, 2018; Rajendran *et al.*, 2019; R, Rajakeerthi and Ms, 2019; Siddique *et al.*, 2019; Janani, Palanivelu and Sandhya, 2020; Jose, P. and Subbaiyan, 2020)). Further the diabetic patient's outcome is unsatisfactory in routine endodontic practice causing frequent postoperative pain((Ramamoorthi, Nivedhitha and Divyanand, 2015; Ramanathan and Solete, 2015; Hussainy *et al.*, 2018; Manohar and Sharma, 2018; Nandakumar and Nasim, 2018; Teja, Ramesh and Priya, 2018; Teja and Ramesh, 2019)). It must be accepted that the result of the present study may not be directly comparable with other studies. 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; Mathew *et al.*, 2020)

This is due to various population, sample size, inclusion and exclusion criteria taken up by each study. Whereas this study is conducted only among Indian population and hence further studies should be done on the generalised population to keenly observe the diabetic patients regarding oral health care and to emphasize the oral education among them.

CONCLUSION

Within the limits of this study, prevalence of class 1 caries was found to be 55.9% with males showing high prevalence at the age group of 40-50 years. Caries association was comparatively higher in tooth number 37 followed by 38.Mandibular posteriors were commonly affected than maxillary posteriors. In conclusion, health education about oral health must be emphasized among diabetic patients. Close collaboration between diabetics and oral health professionals could be the way for improving the general and oral health. Combined effect of dentists and patients must be ensured to reduce the prevalence of class 1 caries.

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