Prevalence Of Dental Caries With Pulpitis Among Diabetic Patients : A Retrospective Study

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Abstract: Aim: The aim of the present study was to assess the prevalence of diabetes in patients with dental caries associated with pulpitis in diabetic patients attending Saveetha Dental Hospital, Chennai.

Materials and Method: This study was done by analysing the archived case records of Saveetha Dental College. From the existing records a total of 2268 patients with pulpitis were recorded in the time interval between June 2019 and March 2020. Each of the case records were analysed and patients with diabetes mellitus were segregated noted down. The presence of diabetes mellitus as recorded was based on the self reporting by patients. The study was approved by the Institutional Ethics Committee.

Results: A total of 2268 patients with pulpitis were identified and 248 patients had self declared diabetes. The overall prevalence of diabetes in the patients was 10.93%. There was a slight male occurrence of the disease and an increase in incidence of diabetes was noted with advancing age in the given sample. The highest number of diabetics were seen in the 41-60 age group. Data analysis was done using a chi-square test between the presence of diabetes and gender (chi-square-0.256;df-1;p-0.032) we found the results were statistically significant(P<0.05). Data analysis was done using a chi-square analysis between the presence of diabetic conditions and age groups (chi square - 31.888,df - 4,p-0.02) we found the results were statistically significant (P<0.05).

Conclusion: From the study it is noticed that there is an increase in the incidence of diabetes in patients with pulpitis signifying that the diabetic patients are prone to infections. However all the diabetic patients in this study were self reported diabetic patients.

Keywords : Diabetes mellitus, pulpitis, dental caries, epidemiology

INTRODUCTION

Diabetes Mellitus (DM) is a highly rising common chronic metabolic disorder that affects millions of people each year. According to the World Health Organization (WHO), any disease having a prevalence of more than 1% should be considered as a disease of public health importance.(Wysham and Sue Kirkman, 2011)The prevalence of diabetics for all age groups worldwide was estimated to be 2.8% in 2000 and may reach 4.4% by 2030 (Wild et al., 2004) According to Roglic et al almost 3 million deaths a year are attributed to diabetes, which is equivalent to 5.2% of all the deaths India, with 32 million diabetic individuals, currently has the highest incidence of diabetes worldwide; these numbers are predicted to increase to 80 million by the year 2030.(Roglic et al., 2005; Sharma et al., 2015) The two broad categories of DM are type I and type II. Type II DM which is categorized by increased blood glucose level and obesity is mostly seen after the age of 30.(Llambés, Arias-Herrera and Caffesse, 2015)

Diabetes can dramatically affect the oral cavity, nose, throat, lungs and the heart which may cause multiple local and systemic diseases to arise due to this condition. These complications have severe consequences in regards to the quality of life of the patients and also can be either directly or indirectly affecting glyceric controls in regards to the oral cavity and lead to oral health problems.(Subashri and Maheshwari, 2016; Rohini and Kumar, 2017) Oral lesions and conditions associated with diabetes are as follows, they include xerostomia, burning mouth syndrome, gingival inflammations, diseases involving the periodontium and its related structures as well as, dental caries and candidal infection. (Kudiyirickal and Pappachan, 2015),(Misra et al., 2015) The correlation between diabetes and dental caries among adults has received less attention so far despite the fact both diseases are associated with due to the increased consumption of starch and glucose which causes the irregular changes

of insulin and breakdown of its components by patients with insulin-deficiency in diabetes mainly due to hyposalivation and elevated salivary glucose level, which may put cause a higher prevalence of dental caries among diabetic patients.(Al-Maskari, Al-Maskari and Al-Sudairy, 2011),(Singh et al., 2016), (Steele et al., 2015)

Taylor et al (Taylor, Manz and Borgnakke, 2004) concluded in their literature review that there were insufficient evidence to determine whether a relationship exist between diabetes and coronal or root caries risk and recommended that further investigations should be carried out   Published literature clearly suggests that previous caries experience is one of the best predictor to know about future caries development.(Catanzaro et al., 2006) So far no studies attempted to assess the burden of dental caries with pulpitis among diabetic individuals in Chennai. The presence of DM also alters the salivary composition leading to the occurrence of dental infections.(Venugopal and Uma Maheswari, 2016; Maheswari et al., 2018) The immune responses to infection is also altered in diabetics.(Chaitanya et al., 2017)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)

Hence, the presence study was done to assess the prevalence of dental caries with pulpitis among self reported diabetic adults in the private institute.

MATERIALS AND METHODS:

In order to assess the condition, we took data from the patients visiting the dental OP of Saveetha Dental College, Chennai. All patients who had pulpitis were chosen for data extraction. Ethical approval for this study was obtained from the institutional ethical committee (ethical approval number:SDC/SIHEC/2020/DIASDATA/0619-0320).

The upside of the study was the presence of the validated data. The downside however is geographic restrictors as the study was obtained by the institutional ethics committee in Saveetha Dental College.

There were two reviewers involved in the study with data taken from patients visiting Saveetha Dental College from June 2019 to March 2020. Cross-checking of data is done by random verification. Patients with incomplete follow ups are called on the telephone. Random verification is done for 10% of the patient samples.

The internal validity is done by creating a study design followed by complete data collection and validation of the data. The external validity is done by creating a study design followed by setting up a clinical setup and a creation of duplicatable data.

Data collection and followed by data entry was done into the excel sheets and copied into SPSS software for statistical results. Data analysis was done using a chi-square test between the presence of diabetes and gender (chi-square-0.256;df-1;p-0.032) we found the results were statistically significant(P<0.05). Data analysis was done using a chi-square analysis between the presence of diabetic conditions and age groups (chi square - 31.888,df - 4,p-0.02) we found the results were statistically significant (P<0.05).

Data analysis was done by the SPSS system with independent variables such as dental caries with pulpitis and diabetes. Dependent variables present are age and gender. The basic descriptive statistics were done and a basic correlation analysis between different variables were performed.

The internal validity of the study was established as the data was collected from a verifiable and standardised database. The external validity is established as the data is from a clinical setup which is duplicatable.

RESULTS

A total of 2268 patients having pulpitis in the age group of 18-81 years were present in the archived patient case sheets during the time period of June 2019 to March 2020. All the case records were analysed and a total of 248 patients were identified to have diabetes purely on the basis of a self declaration by the patients. There were 1141 (50.31%) patients in the 21-40 age group followed by 774 (34.13%) patients in 41-60 age group, 184 (8.11%) patients in the 1-20 age group, 164 (7.23%) patients in the 61-80 age group and 5 (0.22%) patients in the 81-100 age group. The ages of the patient when plotted on a bar graph comparing age group and percentage of cases. Figure 1.

The gender distribution of the patients with pulpitis had 1196 (52.7%) of them being males and 1072 (47.3%) were females.Fig 2. Out of the patients with diabetes 135 were males and 113 were females. Figure 2

The prevalence of dental caries with pulpitis showed that in diabetic patients 134(5.91%) were males and 113(4.96%) were females. In non diabetic 1062(46.83%) were males and 959(42.38%) were females. On a chi square analysis between the presence of diabetes and gender (chi-square-0.256;df-1;p-0.032) we found the

results were statistically significant (P<0.05) which implies that there were less self reported diabetics in this study.The overall prevalence of self declared diabetics in patients with dental pulpitis was 10.93%. Figure 3
The prevalence of diabetes is the highest in patients in the 41-60 age group with 157 (6.92%) followed by 61-80 age group with 53 (2.34%) patients, 0-20 year old age group 36 (1.59%) patients and 1(0.04%) patient in the 81-100 age group whereas in the non-diabetic group, the highest patient count having dental caries with pulpitis is the 21-40 age group with 1105 (48.72%) of patients followed by 41-60 age group 617 (27.20%) patients, 0-20 age group with 184 (8.11%), 111 (4.89%) patients in the 61-80 age group and 4 (0.18%) patients in the 81-100 age group. On a chi-square analysis between the presence of diabetic conditions and age groups (chi square - 31.888,df - 4,p-0.02) we found the results were statistically significant (P<0.05) which implies there were no significance between diabetic and age in this study. Figure 4

DISCUSSION
DM is bound to make the patient prone to infections. Various periodontal infections that are seen in the oral cavity is due to DM. Apart from this it can also cause dry mouth or xerostomia, halitosis, poor wound healing, burning mouth syndrome as well as dysphasia,dysphagia, tooth decay, lichen planus, geographic tongue and dental implants failures.(İlgüy et al., 2005) DM has also found to be associated with an increased prevalence of potentially malignant disorders.(Steele et al., 2015; Muthukrishnan and Bijai Kumar, 2017) The host response to infections is also altered as was observed in a case of osteonecrosis. (Muthukrishnan, Kumar and Ramalingam, 2016)
One of the risk factors of pulpitis is the co-existence with DM as its prevalence and degree of pulpal destruction are altered in patients with DM. Also earlier studies have shown that rate of occurrence of dental caries is high in diabetics (34-68%). This may be due to the co-existence of xerostomia in patients with pulpitis and altered immune response (Reich, Lussi and Newbrun, 1999). it has also been observed that in patients with DM that is an increased usage of tobacco products. This could account for poor oral hygiene which in turn can lead to an increased occurrence of dental caries. Usage of tobacco products can affect economic well being of the individual leading to poor oral hygiene. (Warnakulasuriya and Muthukrishnan, 2018) The poor oral hygiene has also been associated with an increased occurrence of oral malignancies.(Misra et al., 2015)
A high prevalence of dental caries with pulpitis is found in diabetic patients compared to non-diabetics and this is condescending with our study that revealed only 10.93% of the patients were diabetic. There is a probability that patients with diabetes who were not reporting for endodontic treatments had opted for extractions. The high prevalence of dental caries among diabetic patients done by Tweetman et al is due to the accumulation of microbial plaque flora causing demineralisation and dental caries. In diabetic patients, decreased flow of saliva reduces cleansing and buffer capacity as well as diminishes the level of calcium content that promotes tooth decay.(Twetman et al., 2002),(Patil et al., 2018) The reduction of saliva flow also decreases the resistance to caries producing bacteria. Moreover saliva contains high glucose levels in diabetic patients that increases the amount of fermentable oral bacteria.(Twetman et al., 2002)
SMF Lima et al, pulps in patients with diabetes has a tendency present limited dental collateral circulation, impaired immune response, increased risk of acquiring pulp infection or necrosis of pulp necrosis that are caused by ischaemia.(Lima et al., 2013) Segura Egea revealed that diabetic patients have a higher prevalence of root filled teeth than those of controls Diabetes plays a critical factor in diabetics and has a profound effects on oral tissues.(Segura-Egea et al., 2016)
Patients with DM had an altered immune response and hence steroids have to be used with caution.Corticosteroids are not exclusively reserved for infections and are used for a variety of reasons. (Dharman and Muthukrishnan, 2016; Chaitanya et al., 2018)
The limitations faced in the study are geographic restrictions as the patients are from around the same region. Besides, there was only a single ethnicity group. However several studies by the authors earlier had proved that the database is unique and has a good potential for scientific analysis.(Choudhury et al., 2015; Misra et al., 2015; Subha and Arvind, 2019)
There was a lesser number of diabetic patients reported as only self-reported patients were taken into account.(Dharman and Muthukrishnan, 2016),(Muthukrishnan, Kumar and Ramalingam, 2016),(Subha and Arvind, 2019)
The future scope of exploration in regards to diabetics are by conducting screening on all patients instead of only self-reported patients with pulpitis. Diabetes is currently the third most prevalent chronic medical condition among dental patients. Endodontic treatment providers should be well aware of the outcomes of endodontic treatment and diabetes. (Fouad and Burleson, 2003) Our institution is passionate about high quality evidence based research and has excelled in various fields ((Vijayashree Priyadharsini 2019; Ezhilarasan, Apoorva, and Ashok Vardhan 2019; Ramesh et al. 2018; Mathew et al. 2020; Sridharan et al. 2019; Pc, Marimuthu, and Devadoss 2018; Ramadurai et al. 2019)

CONCLUSION

Diabetes mellitus third most common disease in our country and diabetes mellitus is associated with an increased tendency for oral infection. In our study also we have found out that there is no significant increase in the number of self reported diabetes in patients with pulpitis. We can observe that there is a positive correlation between the age and occurrence of diabetes mellitus in pulpitis patients. In this regard it will be better to advise a routine blood sugar analysis for all patients reporting with dental infections.

Acknowledgement

Conflict of Interest

This research project is self funded.There is no conflict of interest.

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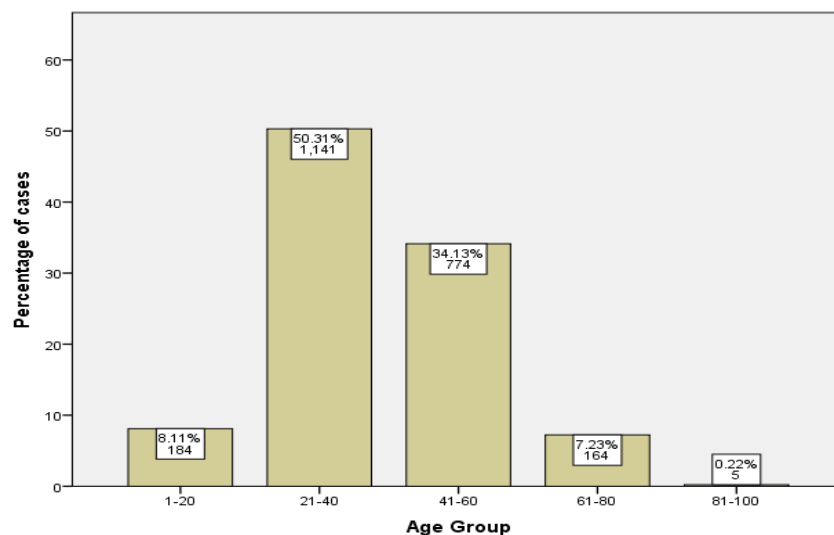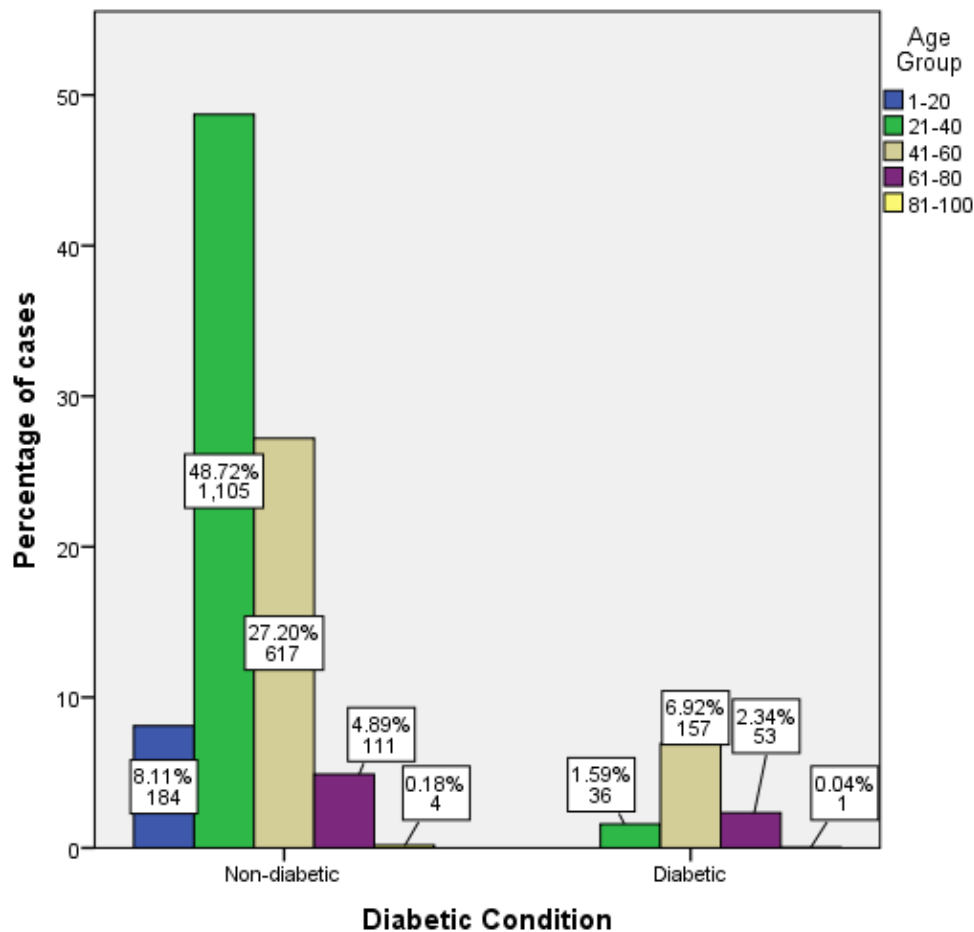

Fig.1: The bar graph depicts the age group distribution of the pulpitis patients. X-axis shows the age groups of the patients and Y-axis shows the Percentage. There are 1141 (50.31%) patients in the 21-40 age group followed by 774 (34.13%) patients in 41-60 age group, 184 (8.11%) patients in the 1-20 age group, 164 (7.23%) patients in the 61-80 age group and 5 (0.22%) patients in the 81-100 age group
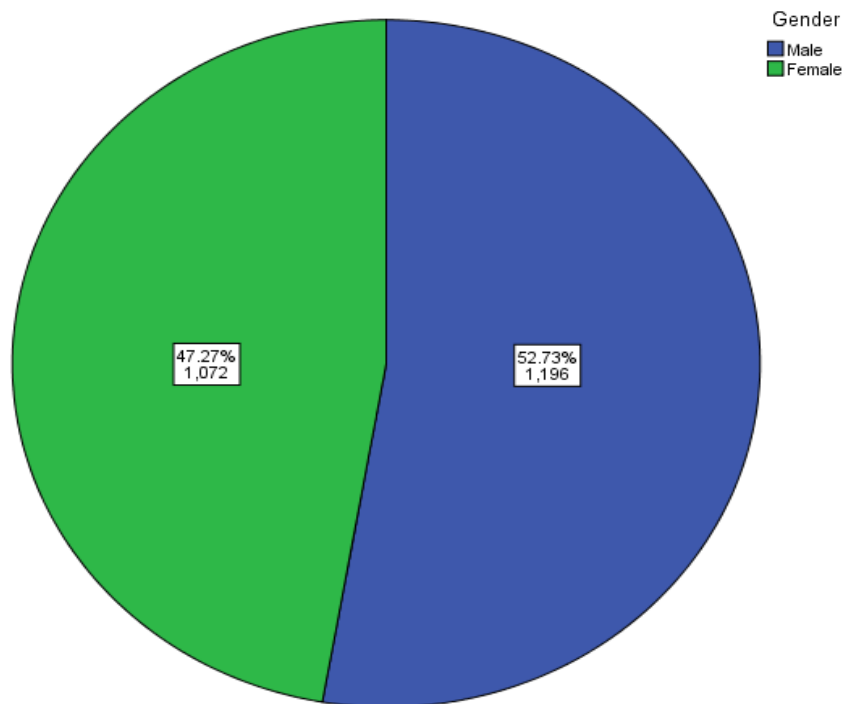
Fig.2: The pie chart shows the gender distribution of patients with pulpitis.Blue shows the male patients; Green shows the female patients. This chart shows males 1196(52.73%) and females 1072(47.27%) Males have a slightly higher prevalence of pulpitis in diabetics compared to females.
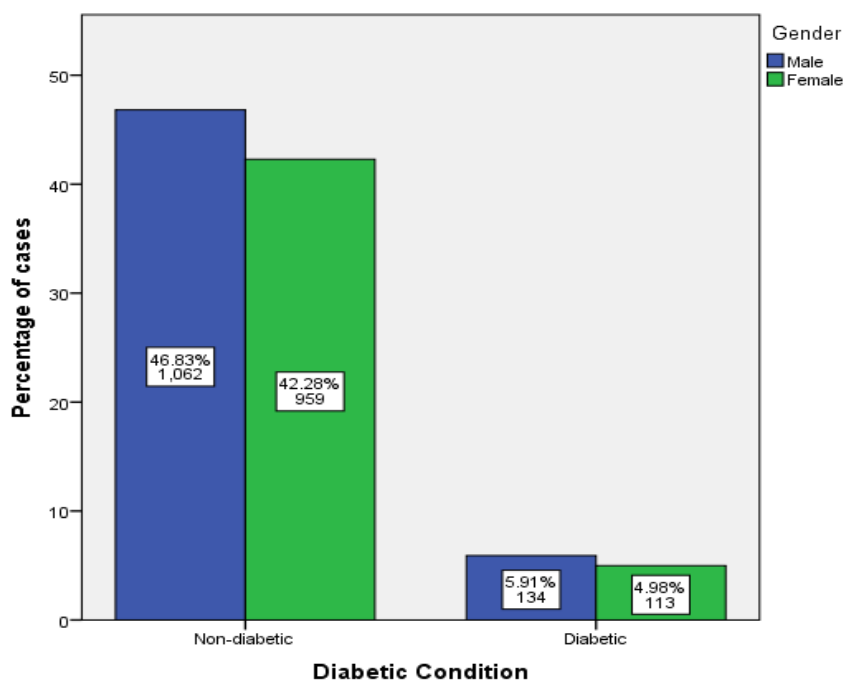
Fig.3: This is a clustered bar graph showing the relationship between the prevalence of diabetes with the gender in pulpitis patients. X axis gives the category and Y axis gives the percentage of patients. On a chi square analysis between the presence of diabetes and gender (chi-square-0.256;df-1;p-0.032) we found the results were statistically significant(P<0.05) which implies gender and self reported diabetics had an association.

Fig.4: This is a clustered bar graph showing the relationships between diabetic conditions and age group of the patients with pulpitis. X axis gives the category and Y axis gives the percentage of cases; On a chi-square analysis between the presence of diabetic conditions and age groups (chi square - 31.888,df - 4,p-0.02) we found the results were statistically significant (P<0.05) which implies that majority of pulpitis patients were seen in the age groups of 41-60 in diabetics and 21-40 in non-diabetics.

Legends
For figures
Figure 1: The histogram depicts the age distribution of the pulpitis patients. X-axis shows the age of the patients and Y-axis shows the Frequency. The mean age was 38.66 years.

Figure 2: The graph bar shows the gender distribution of patients with pulpitis.X-axis shows the Gender; Y-axis shows the percentage of patients with pulpitis based on gender. This graph shows males 1196(52.73%) and females 1072(47.27%) Males have a slightly higher prevalence of pulpitis in diabetics compared to females.

Figure 3: This is a clustered bar graph showing the relationship between the prevalence of diabetes with the gender in pulpitis patients. X axis gives the category and Y axis gives the percentage of patients. The blue colour represents the males and green colour represents the females. On a chi square analysis between the presence of diabetes and gender (chi-square-0.256;df-1;p-0.032) we found the results were statistically significant(P<0.05) which implies gender and self reported diabetics had an association.

Figure 4: This is a clustered bar graph showing the relationships between diabetic conditions and age group of the patients. X axis gives the category and Y axis gives the percentage of cases; Blue gives patients in the 0-20 age group; green shows patients in the 21-40 age group;brown gives patients in the 41-60 age group; purple gives patients in the 61-80 age group and yellow gives patients in the 81-100 age group.On a chi-square analysis between the presence of diabetic conditions and age groups (chi square - 31.888,df - 4,p-0.02) we found the results were statistically significant (P<0.05) which implies that there is an association between diabetes and age. In diabetics, the highest prevalence was seen in the 41-60 age group whereas the highest prevalence of dental caries in pulpitis in non diabetics are in the 21-40 age group.