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Diabetes Mellitus Related Knowledge and Awareness - A Survey Among Dental Students

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Abstract: Introduction: Diabetes mellitus is a metabolic disorder, which is a high risk factor for periodontal disease. Diabetes mellitus and periodontal disease shows bidirectional relationship. Oral health professionals to treat asymptomatic patients with undiagnosed diabetes mellitus. Diabetes mellitus is characterized by polyuria, polydipsia and weight loss. Diabetes will cause delayed wound healing. Management of diabetes mellitus is to delay microvascular and macrovascular complications.
Aim: To study the knowledge and awareness of diabetes mellitus among dental students.
Material and Method: A questionnaire-based study was conducted among 310 students of Saveetha Dental College, Chennai.
Results and Discussion: The obtained results showed that dental students are aware, but still have to gain some knowledge about diabetes mellitus. 89.4% say to check Blood Sugar level before any dental surgical procedure. Only 3.9% were aware of HbA1C blood investigation. 72.9% says that there is a bidirectional relationship between DM and periodontitis. 65.8% of dental students were aware of symptoms of diabetes mellitus.
Conclusion: Within the limitations of the study we can conclude that there is an adequate level of awareness about diabetes mellitus among dental students. The dental students lack knowledge about the risk factors associated with diabetes mellitus such as obesity and they are not aware of certain blood investigations for diabetes mellitus such as HbA1C.

Keywords: Diabetic mellitus, Periodontal disease, Knowledge, Awareness.

INTRODUCTION

Diabetes Mellitus is a metabolic disorder that causes high blood sugar. The hormone insulin moves sugar from the blood into the cell to be stored. Untreated high blood sugar can damage nerves, eyes, kidney and other organs(Coustan, 2012).

Diabetic Mellitus(DM) is a risk factor for periodontal disease, and periodontal diseases is one of the major causes of tooth loss among adults(Lamster *et al.,* 2008). Dental patients with poorly controlled diabetes can cause more periodontal problems due to poor treatment(Mealey and Rose, 2008). With the link between diabetes mellitus and periodontal disease, the dentist offers a screening of patients medical problems as Oral Health Professionals(OHP) are extremely to treat asymptomatic patients with undiagnosed Diabetes Mellitus and Pre Diabetes Mellitus(Lalla *et al.,* 2013). Diabetic mellitus is characterized by polyuria, polydipsia and weight loss(C *et al.,* 2017). Thyroid disorders can have a serious impact on glucose control, and untreated thyroid disorders affect the management of diabetes in patients(Fathima and Preetha, 2016)(Samuel and Devi, 2015).

Diabetes is the leading disease cause of deaths among both male and female of about 1.5 millions diabetes deaths(Bhansali, Chattopadhyay and Dash, 2003). Jaundice in newborns can also occur along with diabetes, that starts in childhood which is known as type 1 diabetes(Harsha *et al.,* 2015). Low blood sugar levels overnight can disrupt your sleep pattern and lead to difficulty waking in the morning and tiredness through the day(Rj and R, 2016). Diabetes can also affect the salivary glands which leads to xerostomia, sialosis, taste impairment and increases the risk for dental caries. Impaired leukocyte function and decreased cellular immunity in diabetes patients enhance susceptibility to periodontal disease. Inadequately controlled moderate to severe cause of periodontitis increases the gram-negative bacterial load which triggers insulin resistance through C- Reactive Proteins(CRP) and causes glycemic control (Fatema *et al.,* 2017). Therefore diabetes mellitus and periodontal disease shows bidirectional relationship.

The primary aim of management of diabetes mellitus is to delay the macrovascular and microvascular complications by optimal glycaemic control(Nathan *et al.*, 2009). Individuals with diabetes are at high risk of several pulmonary conditions (asthma, fibrosis, and pneumonia) but not lung cancer(Dave and Preetha, 2016). While muscular endurance training, persons with type 2 diabetes should undertake moderate to vigorous resistance training at least 2–3 days/week(Abigail *et al.*, 2019). This involves lifestyle modification, including regular exercise, healthy diet and weight loss and drug therapy(Saleh *et al.*, 2012). Good knowledge on diabetes and its complications seek proper treatment and care of the health(Islam *et al.*, 2014). Exercise improves blood glucose control in type 2 diabetes, reduces cardiovascular risk factors, contributes to weight loss, and improves well-being(David *et al.*, 2019). Diabetes mellitus are two types - DM1 and DM2. Diabetes raises risk of nonalcoholic fatty liver disease, a condition in which excess fat builds up in your liver even if you drink little or no alcohol. This condition occurs in at least half of those with type 2 diabetes (Choudhari and Jothipriya, 2016). An absolute reduction in insulin secretion due to Beta - cell destruction in DM1. In DM2, known as non – insulin dependent, the most common form that results in progressive defect in secretion and resistance of insulin(Courtney, 2015). People with diabetes who frequently take antibiotics to fight various infections are especially prone to developing a fungal infection of the mouth and tongue(Shruthi and Preetha, 2018). Diabetes will cause delayed wound healing, this is the main risk factor of periodontitis(Neidell, Lamster and Shearer, 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)
The aim of the study is to know about the knowledge and awareness of diabetes mellitus among dental students.

MATERIALS AND METHODS

A questionnaire based study was conducted among students of Saveetha Dental College, Chennai. A total 310 responses were collected. The first set of questionnaires were based on knowledge about Diabetic Mellitus and the second set of questionnaires were based on Awareness of Diabetes Mellitus in dentistry. A questionnaire containing 15 questions were circulated in google forms among dental students of Saveetha Dental College.
The obtained results are statistically analysed in SPSS. Using the SPSS method the graphs are plotted. Statistical tests used are descriptive statistics.

RESULTS AND DISCUSSION

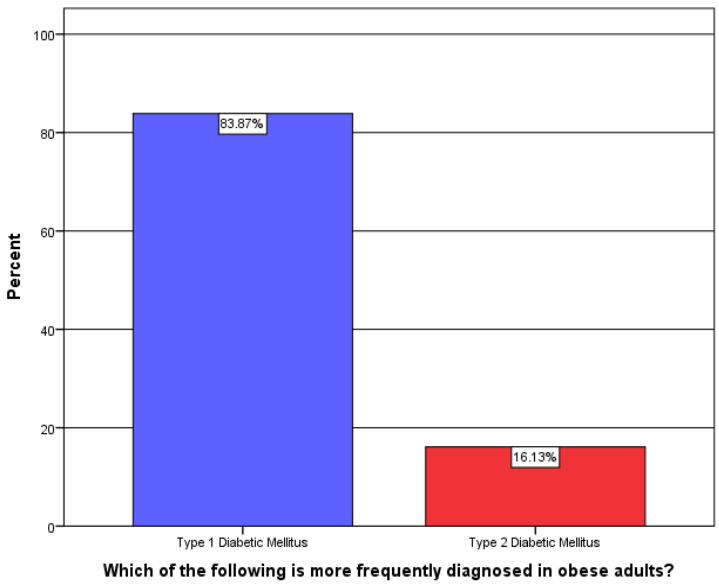

Fig.1 : Bar graph showing the reponses for the question on which type of diabetes diagnosed more frequently in obese adults, where the X axis represents type of diabetes and Y axis reprsents percentage of responses, for which 83.9% stated Type 1 Diabetes Mellitus(Blue) is frequently diagnosed in obese adults whereas, 16.1% stated Type 2 diabetic mellitus(Red).

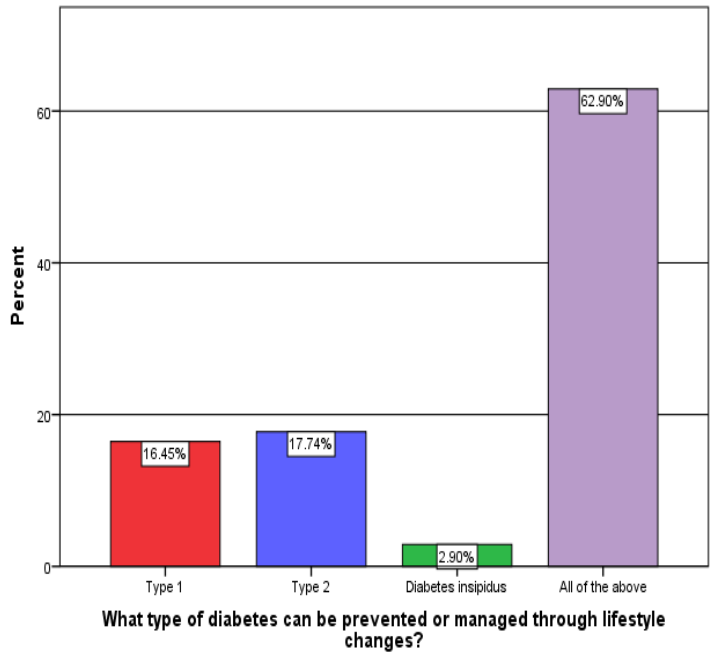

Fig.2: Bar graph showing the responses collected for question on what type of diabetes can be prevented or managed through lifestyle changes where X axis represents diabetes can be prevented through lifestyle changes and Y axis represents percentage of responses for which 16.5% of dental students responded to Type1 DM(Red), 17.7% responded to Type 2 DM(Blue), 2.9% to Diabetes insipidus(Green) and 63% dentist responded to all of these(Purple).

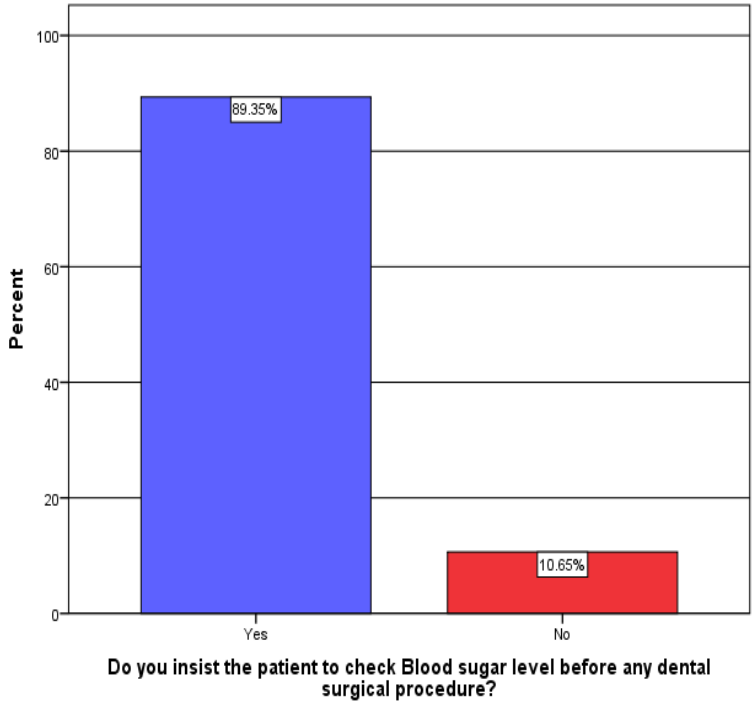

Fig.3: Bar graph depicting the responses for the question on whether the dental students check blood sugar before surgical procedures where X axis represents dentists insist the patient to check blood sugar level and Y axis represents percentage of responses for which 89.4% say yes(Blue) to check Blood Sugar level before any dental surgical procedure and 10.7% say no(Red).

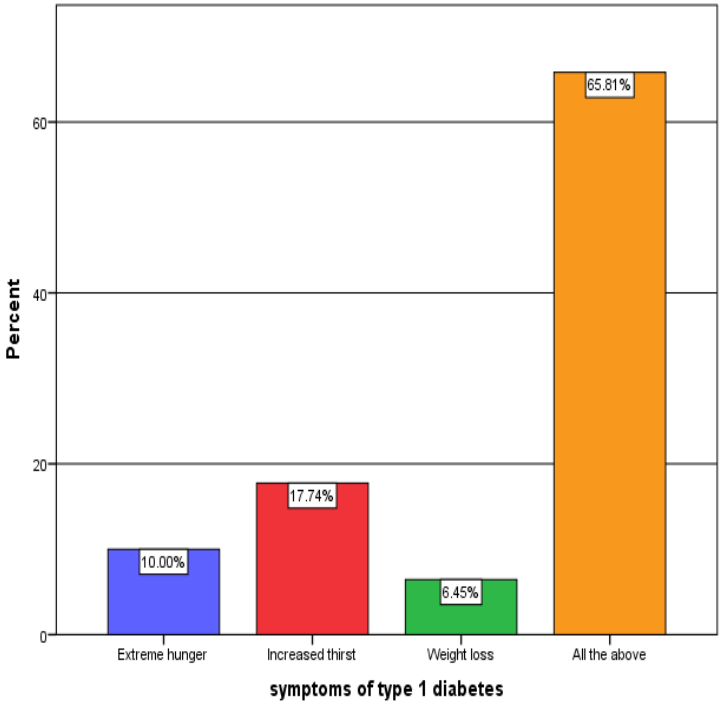

Fig.4: Bar graph showing the results for question on symptoms of type 1 DM are where X axis represents symptoms of type 1 diabetes and Y axis represents percentage of responses for which 10% of dental students responded to extreme hunger(Blue), 17.7% of dental students responded to increased thirst(Red), 6.5% of dental students responded to weight loss(Green) and 65.8% of dental students responded to all of these(Orange).

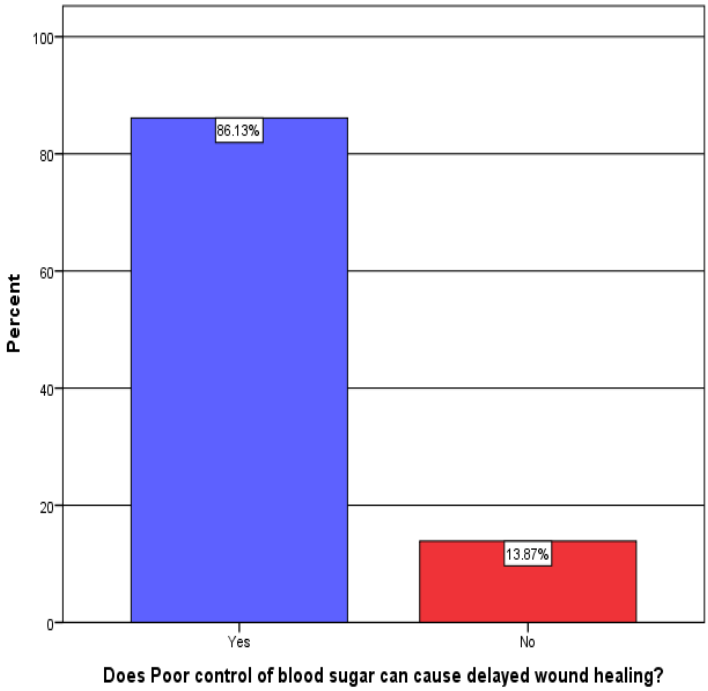

Fig.5 : Bar graph showing responses for question on does poor control of blood sugar can cause delayed wound healing where X axis represents symptoms of type 1 diabetes and Y axis represents percentage of responses for which 86.1% say yes(Blue) that poor control of blood sugar can cause delayed wound healing and 13.9% say no(Red) that poor control of blood sugar will not cause delayed wound healing.

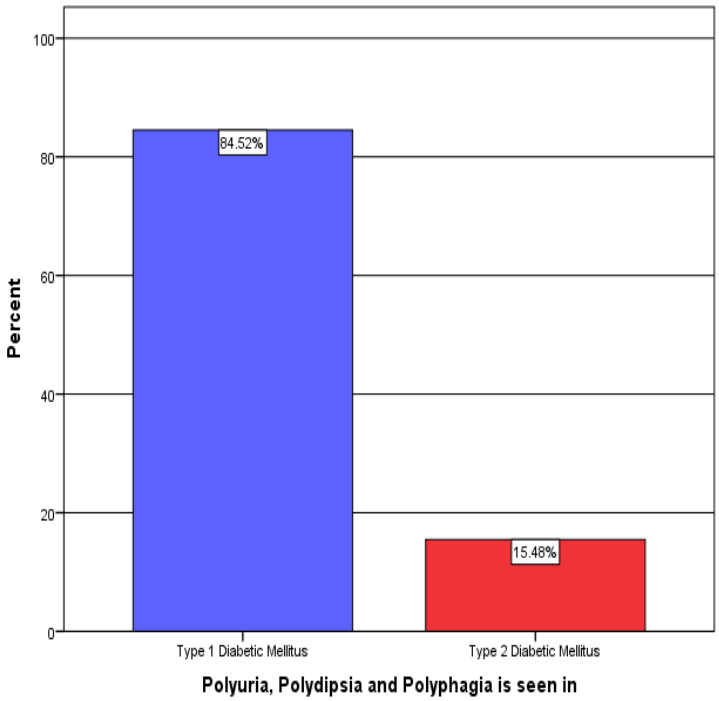

Fig.6: Bar graph showing the results collected for the question for symptoms such as Polyuria, Polydipsia and Polyphagia is seen in where X axis represents polyuria, polydipsia and polyphagia seen in and Y axis represents percentage of responses for which 84.5% say Type 1 Diabetes Mellitus(Blue) and 15.5% say Type 2 Diabetes Mellitus(Red).

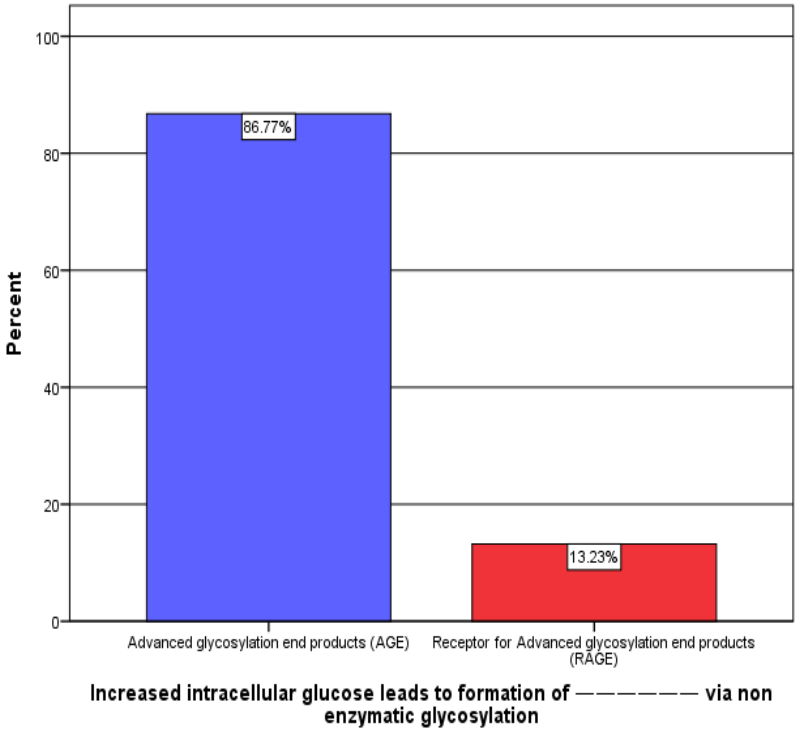

Fig.7: Bar graph showing the results collected for the question on increased intracellular glucose, where X axis represents increased intracellular glucose leads to formation of and Y axis represents percentage of responses for which 86.8% consider due to Advanced Glycosylation end products(AGE)(Blue) and 13.2% consider due to Receptor for Advanced Glycosylation end products (RAGE)(Red).

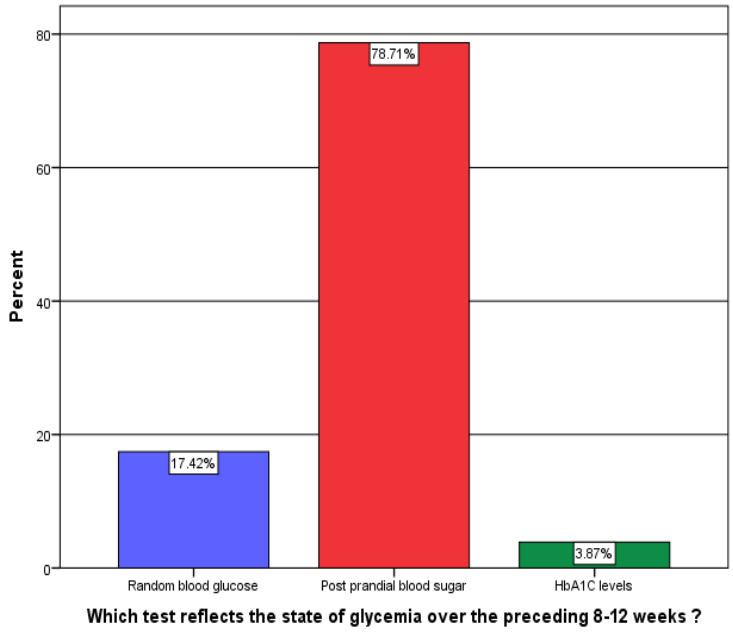

Fig.8 : Bar graph showing the results collected for the question on which test reflects the state of glycemia over the preceding 8-12weeks where X axis represents test reflects the state of glycemia and Y axis represents percentage of responses for which 78.7% of dental students responded to Post prandial blood sugar(Red) tests reflecting the state of glycemia over the preceding 8-12 weeks, 17.4 % say random blood glucose(Blue) and only 3.9% say HbA1C levels(Green) which is the correct answer.

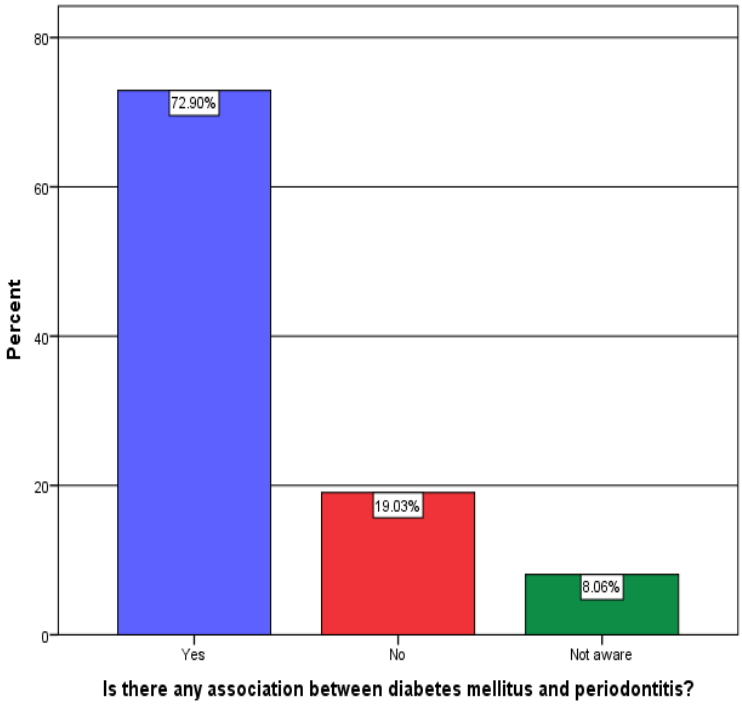

Fig.9: Bar graph showing the results collected for the question association between diabetes mellitus and periodontitis where the X axis represents association between diabetes mellitus and periodontitis and Y axis represents percentage of responses for which 72.9% say yes(Blue) that there is a bidirectional relationship between DM and periodontitis, 19% say no(Red) bidirectional relationship and 8.1% of dentists are not aware(Green).

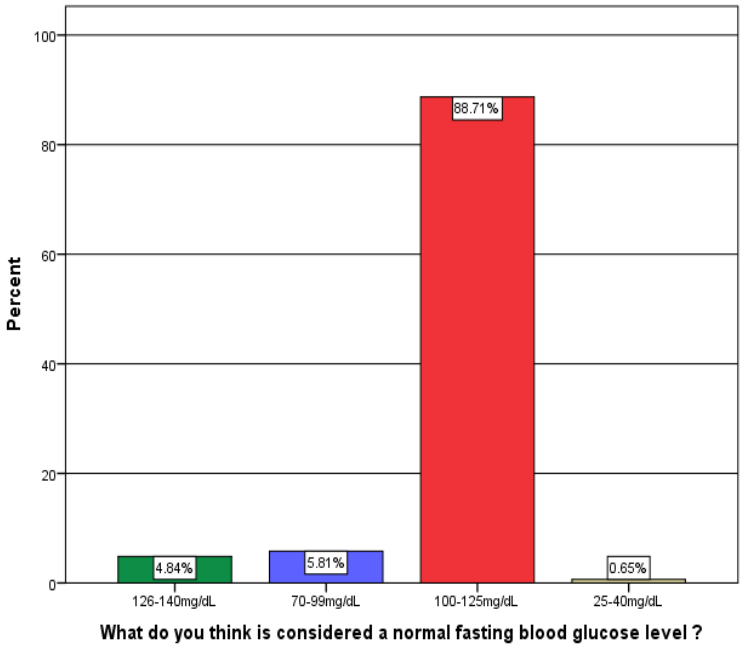

Fig.10: Bar graph showing the results collected for question whether do they think is considered the normal fasting blood glucose level where the X axis represents the options for normal fasting blood glucose level and Y axis represents the percentage of responses collected for which 88.7% consider 100-125mg/Dl(Red) a normal fasting blood glucose level, 4.8% consider 126-140mg/dL(Green), 5.8% consider 70-99mg/dL(Blue) and 0.6% consider 25-40mg/dL(Yellow).

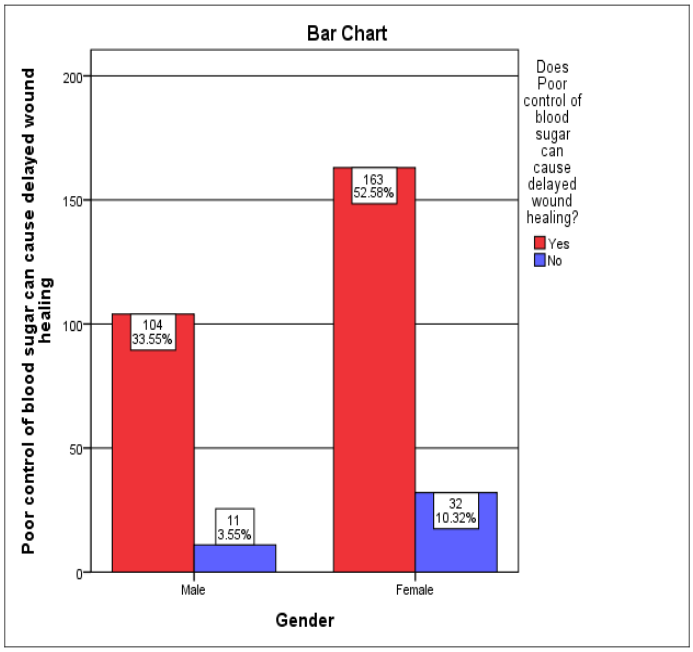

Fig.11: Bar chart representing association between gender and awareness on poor control of blood sugar can cause delayed wound healing. X axis represents gender and Y axis represents percentage of responses on poor control of blood sugar can cause delayed wound healing. Red colour denotes yes and blue denotes no. On comparing both males and females, females (52.58%) tend to have responded more to poor control of blood sugar causing delayed wound healing, but was statistically not significant. Chi square test (P value = 0.092) indicating statistically not significant.

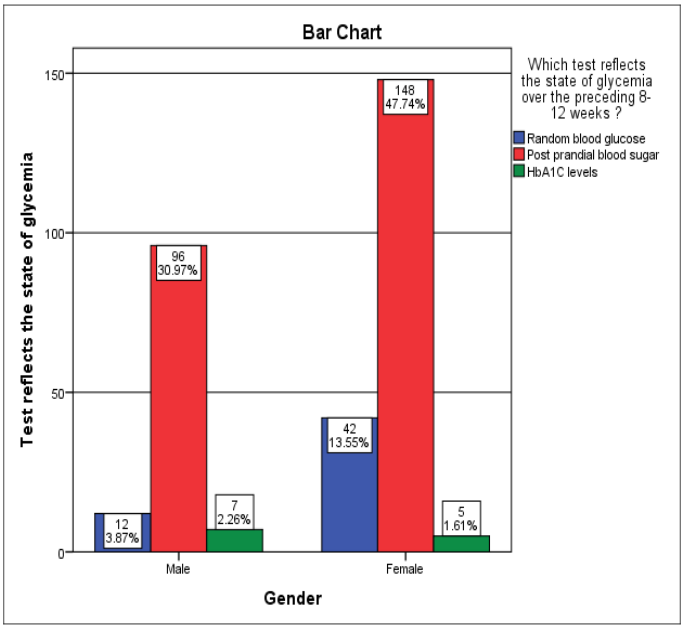

Fig.12: Bar chart representing association between gender and preference of test for reflecting the state of glycemia over the preceding 8-12weeks. X axis represents gender and Y axis represents percentages of responses on tests reflecting the state of glycemia. Blue colour denotes random blood glucose, red colour denotes post prandial blood sugar and green denotes HbA1C. Chi square test (P value = 0.019) was found to be statistically significant. On comparing both males and females, only 2.26% of males and 1.61% of females responded correctly that HbA1C levels reflect the state of glycemia over the preceding 8-12 weeks.

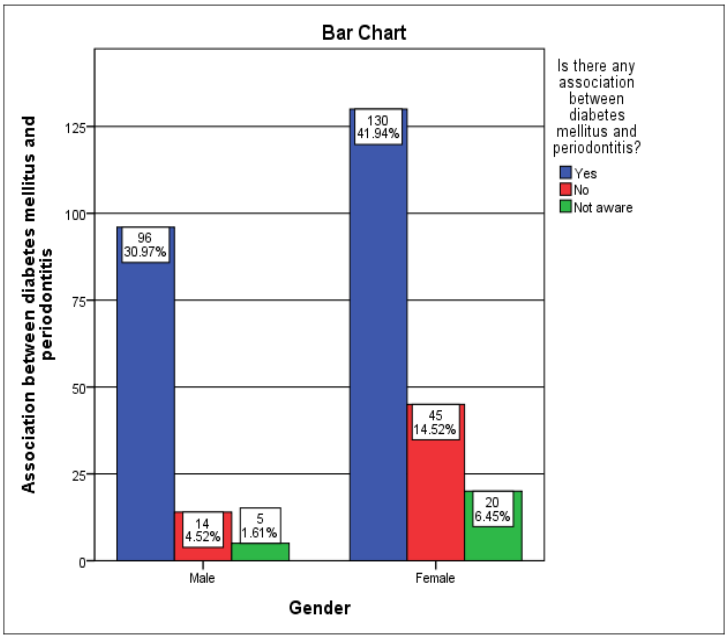

Fig.13: Bar chart representing association between gender and awareness on diabetes mellitus and periodontitis. X axis represents gender and Y axis represents percentage of responses on association between diabetes mellitus and periodontitis. Blue colour denotes yes, red denotes no and green colour denotes not aware. Chi square test (P value = 0.005) was found to be statistically significant. On comparing both males and females, the majority of the females(41.94%) stated that there is association between diabetes mellitus and periodontitis.

This study is the first study conducted among students of Saveetha Dental College to report on knowledge and awareness related to Diabetes Mellitus.

From this study, the majority had either moderate or good knowledge on Diabetes, there was no significant relationship between knowledge on Diabetes with gender or age. Level of Education was significantly

associated with knowledge on Diabetes. Diabetic patient population has an increased risk of developing nail abnormalities, including onychocryptosis, onychomycosis and other nail structure malformations and injuries(Iyer, Gayatri Devi and Jothi Priya, 2019). Even Though the knowledge was satisfactory in the majority of participants, their attitude towards diabetes mellitus was moderate.

84% of dental students tells Type 1 Diabetes Mellitus is frequently diagnosed in obese adults(Goh, Rusli and Khalid, 2015). The hormonal imbalance that comes with obesity often leads to insulin resistance. That is a serious risk factor on the road to diabetes, but it also affects fertility and may create abnormal menstrual cycles(Baheerati and Gayatri Devi, 2018). 66% had knowledge about the symptoms of Type1 Diabetes Mellitus. 89% knew about normal fasting blood glucose level. The low levels of participants might be a factor that contributed to the poor diabetes-related knowledge(Gul, 2010). Adenoids in childhood impact the function of the immune system, it is possible that these procedures could increase a child's risk of type 1 diabetes(R and Sethu, 2018). 63% of dentists think Type 1, Type 2 diabetes and Diabetes insipidus can be prevented or managed through lifestyle changes(Erasmus *et al.*, 2012). Factors unique to diabetes increase atherosclerotic plaque formation and thrombosis, thereby contributing to myocardial infarction(Renuka and Sethu, 2015). 89.4% insist the patient to check Blood Sugar level before any dental surgical procedure, because the dentist can decide what type of treatment can be given(Vijan *et al.*, 2005). 66% of dentists responded Symptoms of Type 1 Diabetes Mellitus are extreme hunger, Increased thirst, Weight loss(Peer *et al.*, 2014). Contributing factors include socio-economic development resulting in higher income and purchasing power and lower energy expenditure, also resulting in overweight and obesity(Pisa, Vorster and Nishida, 2017). Electroacupuncture is the most common type of acupuncture that practitioners used to treat diabetes(Swathy and Gowri Sethu, 2015).

86% of dentists consider that poor control of blood sugar can cause delayed wound healing(Islam *et al.*, 2014). Although behaviour changes and intensive lifestyle interventions are key components in the management of Diabetes Mellitus, the mean score obtained by the participants with regard to Diabetes Mellitus related practices was very low(Saaddine *et al.*, 2006). Peak expiratory flow rate is a significant predictor of survival over even a relatively short period of time (6 years) in patients with younger-onset diabetes(Timothy, Gayatri Devi and Jothi Priya, 2019). 84.5% of dentists think Polyuria, Polydipsia, and Polyphagia is seen in Type 1 Diabetes Mellitus (Fejfarová *et al.*, 2014). Increased intracellular glucose leads to formation, by non enzymatic glycosylation, 86.8% consider due to Advanced Glycosylation end products(AGE) and 13.2% consider due to Receptor for Advanced Glycosylation end products(RAGE) (Nazir *et al.*, 2016).Regular monitoring of blood glucose is an important aspect of self-management to reduce HbA1c levels and to delay the onset of complications(Nthangeni *et al.*, 2002).

89% of dentists consider 100-125mg/dL a normal fasting blood glucose level. 79% of dentists responded to Post prandial blood sugar tests reflecting the state of glycemia over the preceding 8-12 weeks (Memon *et al.*, 2014). Previous studies reported that DM management and care are strongly related to adequate knowledge, and there is a correlation between DM knowledge and hemoglobin A1c level (Akhter, no date). 73% of dentists think there is an association between diabetes mellitus and periodontitis(Tantipoj *et al.*, 2018). Patients generally have favourable dental visiting patterns, and dental practice visits offer a largely untapped opportunity for DM screening. Most patients visit their OHPs when they perceive themselves as not unhealthy, but visit the physician only when they are sick(Glick and Greenberg, 2005).

We acknowledge the following limitations are less sample size and unwillingness to answer. The fact that diabetes is strongly associated with a number of co-morbidities that could also have impacted on the knowledge and awareness of these patients may have impacted on the findings. Furthermore, not all factors that may have affected the knowledge and awareness of patients with Diabetes Mellitus were included in the questionnaire.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; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

CONCLUSION

Within the limitations of the study we can conclude that there is an adequate level of awareness about diabetes mellitus among dental students. The dental students lack knowledge about the risk factors associated with diabetes mellitus such as obesity and they are not aware of certain blood investigations for diabetes mellitus such as HbA1C. This study provides a snapshot of the current situation of knowledge, attitude and practice of diabetic mellitus among dental students. Proper patient health education about diabetes and self-care practices will help patients to optimize their lifestyle and reduce the chances of diabetes-associated complications.

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