

**ORAL SELF CARE PRACTICES, ORAL HEALTH  
STATUS AND TREATMENT NEEDS OF DIABETIC  
AND NON DIABETIC PATIENTS  
- A COMPARATIVE STUDY**

*Dissertation Submitted to*

**THE TAMILNADU Dr. M.G.R. MEDICAL UNIVERSITY**

*In Partial Fulfillment for the Degree of*

**MASTER OF DENTAL SURGERY**



**BRANCH VII**

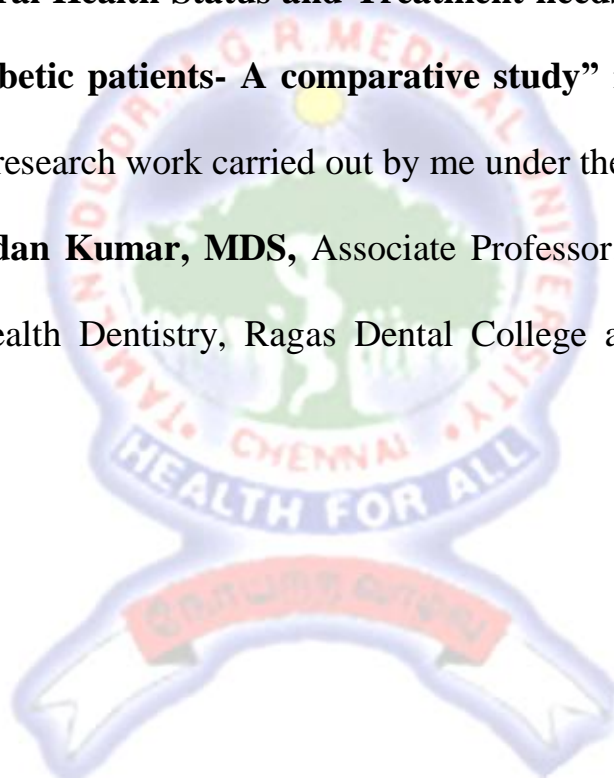
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I hereby declare that this dissertation titled “**Oral Self Care Practices, Oral Health Status and Treatment needs of Diabetic and non diabetic patients- A comparative study**” is a bonafide and genuine research work carried out by me under the guidance of **Dr.P.D. Madan Kumar, MDS**, Associate Professor, Department of Public Health Dentistry, Ragas Dental College and Hospital, Chennai.



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## **ABSTRACT**

### **Background:**

Diabetes mellitus is a chronic metabolic disease characterized by hyperglycemia resulting either from defects in insulin secretion, insulin action, or both. It affects almost all tissues in the body, including those in the oral cavity and hence the aim of this study is to assess the oral self care practices, oral health status and treatment needs of diabetic and non diabetic patients.

### **Methodology:**

A cross sectional descriptive study was conducted among 350 diabetic patients and a similar number of non diabetic ranging from 18-78 years. Data was collected using a pre tested questionnaire for oral self care practices and WHO proforma (1997) was used for assessing oral health status and treatment needs. Data was analyzed using SPSS version 17.

### **Results:**

The present study revealed that there was not much difference in the oral hygiene practices among diabetic and non diabetic. Percentage of oral mucosal lesions was high among diabetic group (11.8%) when compared to non diabetics (7.4%).The pocket formation of 4-6 mm was seen in 124 (35.4%) diabetics and 100 (28.6%) non diabetics.Loss of attachment of 4-5 mm was found among 116(33.1%) and 6-8 mm 40 (11.4%)of diabetic when compared to non diabetics loss of attachment of 4-5 mm was 84 (24.0%)and 6-8 mm was 35 (10.0%). Excluded sextants were found to be high in diabetics



(19.5%) when compared to non diabetic group (14.7%).The mean DMFT was high among diabetic (4.014) than non diabetic (3.020).

**Conclusion:**

Since the prevalence of periodontitis is more among diabetic the oral hygiene practices has to be improved. The oral complications of diabetes can be prevented by combined effect of dentist and the Physician by emphasizing the patients for periodic review to dentist for improving the oral health.

**Key Words:**

Oral Self Care Practices, Diabetes Mellitus, WHO Oral Health Assessment Proforma, Periodontal status.

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## **INTRODUCTION**

Health is an invaluable asset. An understanding of health is the basis of all health care.<sup>1</sup> From the time immemorial man has been actively striving to maintain health, free of disease and sickness. At the beginning of the twentieth century, infectious diseases were the leading cause of death worldwide. With the advances in preventive medicine and practice of public health, the pattern of disease began to change. By the end of the twentieth century, in most of the developed world, mortality from infectious diseases had been replaced by mortality from chronic illnesses such as heart disease, cancer and stroke.

Presently chronic diseases are the largest cause of death in the world. In 2002, the leading chronic diseases cardiovascular disease, cancer, chronic respiratory disease, and diabetes caused 29 million deaths worldwide. Worldwide annual mortality due to chronic disease is expected to increase in real numbers as well as relative to deaths from injuries and diseases traditionally understood to be infectious such as polio, rubella, tuberculosis, etc.<sup>2</sup>

Diabetes mellitus is one such chronic metabolic disease characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Several pathogenic processes are involved in the development of diabetes. These range from autoimmune destruction of the beta-cells of the pancreas with consequent insulin deficiency to abnormalities that result in

resistance to insulin action.<sup>3</sup> The basis of the abnormalities in carbohydrate, fat, and protein metabolism in diabetes is lack of insulin or deficient action of insulin on target tissues.

There are broadly three general categories of diabetes:

Type 1, which results from an absolute insulin deficiency

Type 2, which is the result of insulin resistance and an insulin secretory defect.

Gestational, a condition of abnormal glucose tolerance during pregnancy.<sup>4,5</sup>

Increases in both type 1 and type 2 diabetes have been observed in all societies studied in the last 30 years. However type 2 diabetes, which accounts for more than 95% of all diabetes, is showing a greater rate of increase than type 1 diabetes. Although type 2 diabetes is evident in all societies, the prevalence is generally higher in developed countries. The global distribution of type 2 diabetes is generally deemed to reflect environmental differences of lifestyle accorded by economic wealth, including improved diet and less physical exercise as well as better general standards of health and medicine. However the importance of genetic susceptibility must not be underrated since there are many examples of considerable variations in the prevalence of type 2 diabetes among different racial groups living in similar socio-economic conditions in the same country. The prevalence of diabetes was estimated to be 285 million people worldwide (6.6%) in the 20–79 year age group in 2010 and by 2030, 438 million people (7.8%) of the adult population, is expected to

have diabetes. By 2030, it was estimated that the number of people with diabetes above 64 years of age will be more than 82 million in developing countries and above 48 million in developed countries. There will be a 42% increase in the developed countries and a 170% increase in the developing countries. In the future, diabetes will be increasingly concentrated in urban areas.<sup>6,7</sup>

India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the “diabetes capital of the world”. The International Diabetes Federation (IDF) estimates the total number of people in India with diabetes to be around 50.8 million in 2010, rising to 87.0 million by 2030.<sup>36</sup> The so called “Asian Indian Phenotype” refers to certain unique clinical and biochemical abnormalities in Indians which include increased insulin resistance, greater abdominal adiposity *i.e.*, higher waist circumference despite lower body mass index, lower adiponectin and higher high sensitive C-reactive protein levels. This phenotype makes Asian Indians more prone to diabetes and premature coronary artery disease.<sup>8,9</sup>

Symptoms of marked hyperglycemia include polyuria, polydipsia, weight loss, sometimes with polyphagia, and blurred vision. Impairment of growth and susceptibility to certain infections may also accompany chronic hyperglycemia. Acute, life-threatening consequences of diabetes are hyperglycemia with ketoacidosis or the nonketotic hyper osmolar syndrome. The chronic hyperglycemia of diabetes is associated with long-term damage,

dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels. Long-term complications of diabetes include retinopathy with potential loss of vision; nephropathy leading to renal failure; peripheral neuropathy with risk of foot ulcers, amputation, and Charcot joints; and autonomic neuropathy causing gastrointestinal, genitourinary, and cardiovascular symptoms and sexual dysfunction.<sup>3</sup>

Diabetes affects almost all tissues in the body, including those in the oral cavity.<sup>10</sup> Periodontal disease is considered as the sixth common complication of diabetes. Other oral complications of diabetes include xerostomia, opportunistic infections, greater accumulation of plaque, delayed wound healing, oral paresthesia, and altered taste.<sup>11</sup> Studies suggest a bidirectional adverse relationship between diabetes and periodontal disease; diabetes can aggravate periodontitis, and periodontitis can negatively affect control of diabetes.<sup>12,13</sup>

Diabetics are said to exhibit poorer oral health than non-diabetics. Oral self-care is a part of general health and health care comprises wide spectrum of activities ranging from self-treatment, prevention and diagnosis to seeking lay or professional care. The concept of oral self-care includes prevention of common oral diseases, caries and periodontal diseases.

Although a number of oral findings have been associated with diabetes mellitus, there are not many studies conducted to assess the oral self care practices, oral health status and treatment needs of the diabetic patients. So the present study was aimed at evaluating the Oral Self Care Practices, Oral Health Status and Treatment Needs among the Diabetic and compare the same with a non Diabetic population.

## **AIM AND OBJECTIVES**

### **AIM**

To assess and compare the oral self care practices and Oral Health Status and Treatment needs of Diabetic and non diabetic patient.

### **OBJECTIVES**

1. To gather baseline information on oral self care practices of diabetic and non diabetic patient and compare with them.
2. To assess the oral health status and treatment needs of diabetic and non diabetic patient using WHO Basic Oral Health Proforma 1997.
3. To compare the Oral Health Status and Treatment needs of Diabetic and non diabetic patient.
4. To recommended appropriate preventive measures to improve oral health status among patients with Diabetes Mellitus and non diabetic.

## **REVIEW OF LITERATURE**

**Bacic M , Plancak D and Granic M (1988)<sup>15</sup>** done a comparison between 222 diabetic patient and 189 control subjects on their periodontal treatment need in diabetic patients using CPITN and to shed additional light on the possible effect of the duration and control of diabetic on the periodontal status in these patients. The mean number of extracted teeth per person was significantly higher in the diabetic (12.3) than in the control group of subject (9.7). The percentage of subjects with atleast one missing sextant was significantly higher in diabetic (54%) than in the control group (35.9%). The pathological pocket of 6mm or more were found in 1.3 and 0.3 sextants in the diabetic and control group respectively. All patients in both study group required oral hygiene instruction (TN 1), scaling and/ or removing overhangs or fillings (TN 2) was needed by almost 100% of the subjects. Complex treatment was needed by 50.9% of the diabetics in a mean of 1.3 sextants and by 17.9% of the control subject with a mean of 0.3 sextants.

**Emrich LJ, Shlossman M, and Genco RJ (1991)<sup>16</sup>** studied the relationship between diabetic mellitus and oral health status among 1342 Pima Indians. The probing attachment level, alveolar bone loss, age, sex, Calculus Index, Plaque Index, Gingival Index, fluorosis, and DMFT were assessed. The Subjects with type 2 diabetes have an increased risk of destructive periodontitis with an odds ratio of 2.81 when attachment loss was used to measure the disease. The odds ratio for diabetic subjects was 3.43 where bone

loss was used to measure periodontal destruction. These findings demonstrate that diabetes increases the risk of developing destructive periodontal disease about threefold.

**Firatli E (1997)**<sup>17</sup> studied the Relationship between Clinical Periodontal Status and Insulin-Dependent Diabetes Mellitus for 5 years .The plaque index, gingival index, bleeding on probing, probing depths and clinical attachment loss values were recorded for all participants in both groups. The only statistically significant difference observed in the diabetic group was clinical attachment loss. The correlations between the clinical attachment loss and duration of diabetes were 0.81 ( $P < 0.05$ ) and 0.80 ( $P < 0.05$ ) at baseline and 5 year examination. It has been concluded that diabetes modifies the clinical status of the periodontal tissues and increases clinical attachment loss.

**Collin HL, Uusitupa M, Niskanen L, Narhi VK, Koivisto HMA, and Meurman JH (1998)**<sup>18</sup> conducted a study to assess the periodontal findings in elderly patients with Non-Insulin Dependent Diabetes Mellitus. A total of 25 patients with NIDDM and 40 non-diabetic control subjects were participated in the study. Five out of 25 diabetic patients and 3 out of 40 control subjects had pockets with visible pus after probing. The mean alveolar bone loss was 26% in both the NIDDM patients and controls. The mean clinical attachment loss; i.e., the sum of probing depths and recessions was 3.8 mm in NIDDM patients and 3.6 mm in control subjects. Regular dental check-ups were reported by 28% of NIDDM patients and 43% of control subjects;

the rest of the subjects visited a dentist only occasionally. Eighty percent (80%) of diabetic patients and 90% of control subjects brushed their teeth daily. Advanced periodontitis seems to be associated with the impairment of the metabolic control in patients with NIDDM, and a regular periodontal surveillance is therefore necessary.

**Moore PA, Weyant RJ, Mongelluzzo MB et al (1999)**<sup>19</sup> did a study to describe the periodontal status of type I diabetic adult patients and to evaluate the multiple demographic, behavioral and medical factors that may be associated with extensive periodontal disease. Measures of loss of attachment generally increases with age (0.95±0.9 of above 25 years of age to 1.39±1.2 among 40-44 years of age). The results of the current study confirm the important role of cigarette smoking in the prevalence and severity of periodontal disease. (The odds ratio of 9.73 for the association with smoking was found). Management and prevention of extensive periodontal disease for type I diabetic patients should include strong recommendations to discontinue cigarette smoking.

**Guggenheimer J, Moore PA, Rossie K et al (2000)**<sup>20</sup> conducted a cross sectional study to determine the prevalence and characteristics of oral soft tissue diseases among 405 adult subjects with diabetes and 268 control subjects without diabetes. Twenty specific soft tissue lesions were identified. The results revealed that subjects with insulin dependant diabetes had one or more soft lesions (44.7% in diabetic patients and 25% in controls). Fissured



tongue, irritation fibromas and traumatic ulcers were the most prevalent non candidal lesion among diabetic patients. Irritation fibromas and traumatic ulcers were associated with older age and with longer duration and complications of insulin dependent diabetes.

**Tsai C, Hayes C and Taylor GW (2002)**<sup>21</sup> investigated the association between glycemic control of type II diabetes mellitus and severe periodontal disease. Subjects included in the study were adults who are at least 45 years old and who completed each portion of dental examination in Third National Health and Nutrition Examination Survey in US. Result revealed that persons with poorly controlled diabetes were 2.90 (1.40, 6.03) times as likely to have severe periodontitis as those without diabetes, controlling for age, education, smoking status and extent of sub gingival calculus. For the subjects with better controlled diabetes, there was a tendency for a higher prevalence of severe periodontitis (odds ratio=1.56; CI= 0.90, 2.68), though it was not statistically significant. Taken together, these findings suggest that poorly controlled type II diabetes mellitus was associated with greater prevalence of severe periodontitis.

**Karikoski A, Ilanne PP, Murtomaa H (2002)**<sup>22</sup> conducted a questionnaire study among 420 registered members of the Finnish Diabetic Federation to assess the oral self care among adults with diabetes in Finland. Out of 420; 336 participants responded for the first questionnaire in which 23% were edentulous and 77% dentate subjects. Among 258 dentate subjects

38% reported brushing their teeth more than once a day, 44% once a day and 17% less than once a day. 8% reported having a current perception of bleeding gums and 44% a past experience. During the previous year, 63% of the subjects had attended a dental appointment. The most frequent reason for a dental visit was a normal checkup (47%); pain or some other reason requiring urgent treatment was reported by 19%. Almost 16% had received physician referral for dental care. Over one third of the participants (35%) agreed that they have not received sufficient information about prevention and treatment of periodontal diseases from dental professionals. In conclusion oral self care among adults with diabetes does not seem to be consistent with the increased risk of periodontal disease. Furthermore, because some individuals with diabetes are not regular dental visitors, all health care professionals should be encouraged to support efforts for more comprehensive oral health, an integral part of general health.

**Blanco JJA, Villar BB, Martínez PS, Blanco FJA (2003)<sup>23</sup>** did a study to assess the status of oral hygiene and prevalence of dental caries in a diabetic population in compared to a control population. Plaque index showed statistically significant differences in the age group 56-70 (Mean= 60.0 in diabetics and  $47.1 \pm 10.7$  in controls) and those over 70 years which was (54.5 and 4.75 among diabetic and non diabetic respectively). No significant differences were found in the mean caries in both study groups ( $2.1 \pm 1.7$  and  $2.1 \pm 2.0$ ), mean number of absence of teeth due to caries is significantly greater

(10.5) in the diabetic patients compared to the control group (7.3). Type I patients had a higher number of carious lesions (2.74) and endodontically treated teeth (3.70) than the type II ones (1.65 and 1.58 respectively) ( $p < 0.05$ ). On the other hand, type II diabetics presented a statistically greater number of absences than the type I patients (13.95/5.11). It was observed that no differences in the number of caries, absences and endodontically treated teeth based on metabolic control, evolution time and existence of late complications of diabetes.

**Lalla E, Park DB, Papapanou PN and Lamster IB (2004)<sup>24</sup>** did a study using dental records of 150 adults with diabetes and 150 nondiabetic controls from the dental clinic at Columbia University in Northern Manhattan to find the oral disease burden among them. The radiographic findings showed that alveolar bone loss was significantly greater in the diabetic group than in the control group (mean alveolar bone level =  $4.0 \pm 1.9$  mm and  $3.1 \pm 1.4$  mm, respectively;  $P = .0001$ ). Proportional bone loss was 50% higher in the diabetic group ( $0.09 \pm 0.07$ ) than in the control group ( $0.06 \pm 0.05$ ;  $P = .0001$ ). Although the mean number of teeth with carious lesions was similar in controls and cases ( $2.2 \pm 2.2$  and  $2.4 \pm 2.4$ , respectively;  $P = .4$ ), the control group had significantly more teeth with restorations and fixed prostheses than the diabetic group ( $8.5 \pm 5.4$  and  $6.7 \pm 5.4$ , respectively). The findings corroborate the importance of including oral health information in educational

materials and promoting oral prevention/treatment programs for patients with diabetes.

**Siudikiene J, Maciulskiene V, Dobrovolskiene R, Nedzelskiene I (2005)<sup>25</sup>** evaluated the oral hygiene status in children with type I diabetes mellitus and in the non diabetic controls and they correlate the gingival condition among both. A total of 140 children were included in the study. The result revealed that 61% of diabetic and 43% of non diabetic controls had good oral hygiene and demonstrated using oral hygiene index simplified. Healthy gingival was recorded in 87% of non diabetic and 73 % of diabetic children using gingival index by Loe and Silness (1963). It was concluded that despite lower dental plaque level in the diabetic than in the non diabetic children the diabetes were more prone to the development of gingival inflammation. The presence of dental calculus as a local risk factor associated with gingivitis becomes more severe problem in the individuals with type I diabetes mellitus.

**Campus G, Salem A, Uzzau S, Baldoni E, and Tonolo G (2005)<sup>26</sup>** conducted a case- control study to assess the association between diabetic and periodontal disease. The total sample consisted of 212 individual. A total of 71 diabetics aged  $61.1 \pm 11.0$  years and 141 subjects in good general health aged  $59.1 \pm 9.2$  year included as control in the study, Type II diabetes patients clearly showed a significantly lower number of teeth present ( $P = 0.002$ ), and significantly increased number of probing depths  $>4$  mm ( $P= 0.04$ ), No

significant difference between type II diabetics and controls was shown regarding the presence of periodontal disease ( $\chi^2 = 1.53$ ,  $P > 0.05$ ) and presence of calculus ( $\chi^2 = 1.76$ ,  $P > 0.05$ ), while a significant association was detected regarding plaque presence ( $\chi^2 = 4.46$ ,  $P < 0.05$ ) and bleeding on probing ( $\chi^2 = 3.60$ ,  $P < 0.05$ ). Patients with diabetes undoubtedly have more plaque and thus may have more periodontitis. Poorly controlled diabetic patients have a worse periodontal status than control subjects, but well-controlled diabetic patients have a periodontal status similar to control subjects.

**Garcia ER, Padilla AM, Romo SA, Ramirez MAB (2006)<sup>27</sup>** conducted a study among end stage renal disease (Group A) and non end stage renal disease diabetic patients (Group B) to find out oral mucosa symptoms, signs and oral lesions. The results revealed that Group A had a 77.8% and group B 57.6% prevalence for at least one symptom or sign ( $P < 0.001$ ). Oral Lesions were also more prevalent in group A (65.6%) than group B (36.9%) ( $P < 0.001$ ). The most frequent oral lesions were dry, fissured lips (28.3%), saburral tongue (18.2%) and candidiasis (17.2%). No difference was found in candidiasis prevalence between groups. The high prevalence of uremic fetor, xerostomia, saburral tongue and candidiasis in end stage renal disease diabetic patients could be viewed as warning signs on the possibility of non diagnosed advanced renal disease in diabetic patients.

**Puranik MP, Hiremath SS (2006)<sup>1</sup>** studied the oral health status and treatment needs among adult diabetic and non diabetic patients in Bangalore City. The study was conducted among 250 dentate diabetic patients and 250 dentate control group attending the Bangalore hospital. Mean number of decayed, missing and filled teeth (DMFT) was similar in diabetics (3.71) and in control groups (4.06). The mean number of decayed teeth was significantly lower in diabetics (0.22) than in control group (0.87). The mean number of missing teeth was significantly higher in diabetics (3.23) than in control group (2.09). The mean number of filled teeth was significantly lower in diabetics (0.26) than in control group (1.1). According to the dentition status, 30.8% of diabetics and 28.8% of control group required no treatment. Extraction of the teeth was the predominant treatment need in diabetics (14.4%) where as it was 10.4% in controls. For CPITN code 4 diabetes had higher score (2.46) than control. Similarly diabetics had a higher mean number of excluded sextants (0.24) than the control group (0.07). Treatment need 3 (complex treatment) was needed in 60% of diabetics and 41.2% in the control group. It was concluded that both diabetic and control subjects had similar caries experience, periodontal diseases were more frequent and severe in diabetics than in controls, hence preventive measures were needed for both diabetic and control group.

**Hintao J, Teanpai R, Chongsuvivotwong V, Dahlen G and Rattarasan C (2007)**<sup>28</sup> studied the root surface and coronal caries in adults with type II diabetes mellitus. 105 type II diabetic patients compared with 103 non diabetic subjects. Subjects had a higher prevalence of root surface caries (40.0% and 18.5% respectively), a higher number of decayed/ filled root surfaces ( $1.2 \pm 0.2$  versus  $0.5 \pm 0.1$ ;  $p < 0.01$ ) and a higher percentage of generalized periodontitis (98.1% and 87.4% respectively); but the prevalence of decayed/ filled surface of coronal caries was not significantly different (83.8% versus 72.8% and  $8.0 \pm 9.4$  versus  $6.3 \pm 7.5$  respectively). In conclusion type II diabetes mellitus was a significant risk factor for root surface, but not for coronal caries. Periodontal disease should be treated as early in type II diabetic subjects to reduce the risk of subsequent root surface caries.

**Chandu GN, Prashant GM, Shivakumar KM et al (2007)**<sup>29</sup> did a study among diabetic patients of Davangere city, Karnataka, India to assess prevalence of dental caries and periodontal status. A total of 150 diabetic patients were reported during the study period and they were examined. The results showed that DMFT score was greater in patients over 40 years (4.14) than in the age group below 40 years (3.69). According to CPI scores only 3.3% of the patients had healthy gingiva. 33.3% had periodontal pocket of 4-5 mm, 12.7% had periodontal pocket more than 6mm. 46.7% of them scored 1 (loss of attachment of 4-5 mm) 16.0% scored 2 (loss of attachment of 6-8 mm), 12.0% showed loss of attachment of 9-12 mm. It was concluded that

there was a significant association between diabetes mellitus and oral health. There was higher prevalence of dental caries among over 40 years age group and also there was aggressive periodontal destruction among less than 40 year age group diabetic patients. Hence more emphasis should be given for health education about diabetes mellitus and its medical and dental complications.

**Reddy CVK and Maurya M (2008)**<sup>30</sup> have done a comparative study to assess the oral health status and treatment needs of diabetics and non diabetic population attending nine hospitals in Mysore City. Among the total of 1038 subjects, 519 diabetics and 519 non diabetics were examined. The results revealed that the mean number of DMFT scores were higher among diabetics ( $3.89 \pm 2.62$ ) as compared to non diabetics ( $3.06 \pm 1.98$ ) and this finding was statistically significant. Diabetics had more number of shallow pockets (34.1%) and deep periodontal pockets (23.7%) when compared to non diabetics the shallow pockets were 24.5% and deep periodontal pockets was 15.4%. Diabetics had more number of loss of attachment of 4-5 mm (15.8%) and 6-8 mm (4.6%) when compared to non diabetics loss of attachment of 4-5 mm was 8.9% and 6-8 mm was 1.2%. Excluded sextants were found to be higher in diabetics (3.3%) when compared to non diabetic group (0.4%) and was concluded that diabetes can have an adverse effect on oral health and oral health care.

**Alvis C, Brandao M, Andion J, Menezes R (2009)**<sup>31</sup> conducted a descriptive cross sectional study to evaluate the oral health knowledge and



habits in Brazilian children with type I diabetes mellitus (T1DM). In this study 85% of diabetics and 70.9% of non diabetics visited the dentist at least once. More diabetics had been visited the dentist within 12 months (63.8%) than non diabetics (48.7). The main reason for the visit was cleaning of teeth (34.0% of diabetics vs 46.2% of non diabetics) and caries treatment (31.9% of diabetics vs 23.1% of nondiabetics). The most common reason for not visiting a dentist is difficulty in scheduling an appointment (36.1% of diabetics vs 38.9% of non diabetics) and a high treatment cost (27.8% of diabetics and 13.9% of non diabetics). Tooth brushing at least three times a day was performed by 49.1% of subjects in both groups, while more diabetics used dental floss at least once a day (30.9% vs 18.3%). In conclusion although the diabetic children seemed to have better oral health habits than the control children, there is a need for more information regarding oral hygiene and healthy habits.

**Orlando VA, Johnson LR, Wilson AR, Maahs DM, Wadwa RP, Bishop FK, Morrato EH (2010)**<sup>32</sup> did a survey to assess the oral health knowledge, attitudes and behaviors among adolescents aging 12-19 years with type I diabetes. The mean tooth brushing frequency was once per day 42% did not floss. 93.2% reported having had a preventive dental visit within the past 6 months; and nearly all had seen a dentist within the last year. 77% of those participating indicated that doctors or health care providers had advised them about having regular dental check ups. 92% reported receiving instructions about tooth brushing technique and 94.3% reported having been

instructed about the use of dental floss. Messages about the hazards of tobacco use and its effects on the oral cavity reached 69.8% of this group. Despite having received regular professional dental care and instructions, the adolescents with type I diabetes in the study reported suboptimal oral hygiene behavior.

**Shenoy N, Sholapurkar AA, Pai KM, Adhikari P (2010)**<sup>33</sup> assessed the oral health status of 100 metabolically controlled geriatric diabetic patients and 50 non-diabetic controls in their study. The results showed degree of hyposalivation between the two groups was statistically significant ( $p < 0.05$ ) and no significant difference was observed in the taste, burning mouth sensation, angular cheilitis, glossitis, and stomatitis status of the two groups and no pathognomonic lesions or alterations could be observed in relation to the disease. The findings of the present study revealed that diabetics, if controlled, can maintain healthy oral conditions. Since the disease is bi-directional, dentists should help patients reduce oral bacteria through in-office care, diet counseling, and home care instructions.

**Reddy VC, Kesavan R, Ingle N (2011)**<sup>4</sup> did a study to assess the dentition status and treatment needs among 500 type II Diabetic and 500 Non-Diabetic individuals in Chennai city. WHO Oral Health Assessment Form (1997) was used to assess the dentition status and treatment needs. The result revealed not much difference in oral hygiene practices among diabetic and non-diabetics. The mean DMFT was  $2.63 \pm 2.48$  among diabetics and

2.84± 2.49 among non diabetics. The mean number of teeth missing due to other reasons was 1.40±2.80 among diabetics and 0.65±1.70 among non-diabetics. The mean number of teeth which require one surface filling was 0.58±0.97 among diabetics and 0.76±1.18 among non diabetics, teeth which require extraction was 0.34±0.86 among diabetics and 0.23±0.70 among non-diabetics. The mean number of teeth which require removable partial denture was 2.03±2.62 among diabetics and 1.57±2.13 among non diabetics. It was concluded that mean decayed, missing, filled and DMFT scores were similar among diabetics and non-diabetics. The mean number of teeth missing due to other reasons was significantly higher among diabetics. Mean number of teeth requiring extraction and removable partial denture was significantly more among diabetics.

**Das M, Upadhyaya V, Ramachandran SS, Jithendra KD (2011)<sup>34</sup>** conducted a study to assess the periodontal treatment needs among diabetic and non diabetic individuals. The vast majority of diabetic cases (ie) about 70% need TN 3 (complex treatment), followed by TN 2 (20.9%; Scaling and plaque retentive factors), but in non diabetic cases 45.3% needs TN 3, followed by TN2 (28.3%). To conclude more diabetic subjects were affected by severe degree of periodontal disease manifested as deep periodontal pockets while in non diabetics more number of subjects were affected by relatively lower degree of disease manifested as bleeding and calculus.

**Mittal M, Teeluckdharry H (2011)**<sup>35</sup> did a study to determine the prevalence of periodontal disease in patients with type II Diabetes mellitus out of 2000 patients, 980 diabetic and 1020 non diabetic patients as controls were included in the study. The results showed that all the patients who were diabetics were suffering from periodontal diseases. But while taking into account both diabetics and non diabetics, the prevalence of periodontal disease in both of them was 49.9%. This study showed that periodontitis prevalence was significantly higher in a group of Mauritian patients with Diabetes mellitus type II compared to a group of healthy Mauritian.

## **MATERIALS AND METHOD**

### **I. BACKGROUND OF STUDY**

The present study was contemplated to assess the Oral Self Care Practices, Oral Health Status and Treatment needs of Diabetes Mellitus patients attending various diabetic centers in Chennai and Puducherry and to compare their findings with that of a similar age and sex matched control population.

### **II. OBTAINING ETHICAL CLEARANCE:**

Ethical clearance to conduct the study was obtained from the Institution Review Board of Ragas Dental College and Hospital (**Annexure I**). Further, permission to conduct the study was also obtained from concerned authorities of the diabetic centers (**Annexure II**). Individual patient consent was obtained from the cases and control who participated in this study (**Annexure III**).

### **III. BACKGROUND OF THE STUDY AREA**

A list of hospitals and diabetic centers which specialized in treating only diabetic patients were obtained from the Department of Health Corporation of Chennai and from Department of Health Services, Puducherry. There were around thirty hospitals/ clinic in Chennai and three in Puducherry registered to treat Diabetes Mellitus. All the registered diabetes treating

centers were approached for obtaining permission to conduct the study among them two centers in Chennai city and one center situated at Puducherry consented to participate in the study.

The selected centers which consented to participate in this study were as follows: Voluntary Health Service hospital, Tharamani, Chennai, Chennai (Koyambedu) diabetes centre, Chennai and Pondicherry Diabetes Speciality Centre, Puducherry. This study was conducted between August 2011 to March 2012.

#### **IV. PILOT STUDY**

A pilot study was undertaken during August 2011 at Voluntary health Service Hospital, Chennai to determine the feasibility for conducting the study and also to determine the sample size. The study population included were 30 Diabetic and 30 non diabetic patients. Questionnaire was used to assess the demographic status, status and condition of diabetes, tobacco usage and alcohol consumption, oral hygiene practices, utilization of dental services and knowledge about oral health related problems due to Diabetes Mellitus. WHO oral health assessment proforma 1997 was used to assess the oral health status and treatment needs. It took an average of 15-20 minutes to complete the proforma and questionnaire. Necessary modifications were done in the questionnaire, which was used for conducting the survey. Subjects included in the pilot were not included in the actual study.

**V. SAMPLE SIZE DERIVATION:**

As per the pilot study, the prevalence of CPI code 3 among diabetic patients was higher than the prevalence of other oral conditions. A prevalence of 55% was obtained among Diabetes Mellitus patients which was taken for sample size calculation.

Sample size calculation was done using the formula given below.

$$n = \frac{z^2pq}{d^2} = \frac{2^2 \times 55 \times 45}{5.5 \times 5.5} = \frac{9900}{30.25} = 327$$

$$Z \text{ (Confidence Interval 95\%)} = 2$$

$$p \text{ (Prevalence in pilot study)} = 55\%$$

$$q \text{ (100 – Prevalence)} = 45\%$$

$$d \text{ (allowable error 10 \% of p)} = 5.5\%$$

The sample size for the cases was rounded off to 350. Similarly for controls 350 non diabetic were included.

**VI. SELECTION OF DIABETIC CASES:**

For the present study based on the pilot study findings the study population was derived as 350 diabetic patients and a similar number of non diabetic population. All patients who attended the diabetic treatment centers were selected as the cases based on the following inclusion and exclusion criteria.

**INCLUSION CRITERIA FOR DIABETIC CASES**

1. Patients who were diagnosed as Diabetes Mellitus positive and were undergoing treatment at the respective diabetic centers for more than one year duration.
2. The cases should be above 18 years of age.
3. The cases should have a minimum of 16 functional teeth in the oral cavity.
4. Those patients who gave a positive informed consent were included in the study.

**EXCLUSION CRITERIA FOR DIABETIC CASES:**

1. Patients with history of systemic illness other than Diabetic Mellitus.
2. History of systemic antibiotic administration within the last three months.
3. Patients having physical disability to perform the oral hygiene practices.

**VII. SELECTION OF NON DIABETIC CONTROLS:**

Control population similar in number to the cases who were age and sex matched were assessed for the present study. The control population was derived from the accompanying person for the cases and who were free from



any systemic illness. The following inclusion and exclusion criteria were followed for controls:

**INCLUSION CRITERIA FOR NON DIABETIC CONTROLS:**

1. Healthy subjects with no history of diabetes and any other systemic problem.
2. Not taking any medications other than vitamins and occasional analgesics.
3. The controls should be above 18 years of age.
4. Should have a minimum of 16 functional teeth in the oral cavity.
5. Those controls who gave a positive informed consent were included in the study.

**EXCLUSION CRITERIA FOR NON DIABETIC CONTROLS**

1. Persons with history of systemic antibiotic administration within the last three months.
2. People having physical disability to perform the oral hygiene practices.

**VIII. IMPLEMENTING THE STUDY:**

**a. PROFORMA AND DATA COLLECTION**

Data was collected from a cross-sectional survey, using a Survey Proforma which comprised of a Questionnaire, and Clinical examination.

**(i) QUESTIONNAIRE AND DEMOGRAPHIC DATA**

A total of 21 closed ended questionnaire was used to assess the demographic data, status and condition of diabetes, tobacco usage and alcohol consumption, oral hygiene practices, utilization of dental services and knowledge about oral health related problems due to Diabetes Mellitus. The questionnaire was pretested among the pilot study participants and the necessary modifications were done (**Annexure V**).

**(ii) CLINICAL EXAMINATION**

An intra-oral examination was carried out by a single examiner to assess the Oral Health Status and treatment needs using WHO Oral Health Surveys – Basic Methods Proforma (1997) (**Annexure VI**). The boxes 166 to 176 of the assessment form dealing with dentofacial anomalies were also excluded as the study subjects were above 20 years as these finding were not important for this population.

**b. EXAMINATION AREA**

According to ADA specification, Type III Examination were conducted under bright natural light, by positioning the subject as to receive sufficient daylight. All examination were conducted in the diabetic centers where an exclusive area was assigned for examination.

**c. EXAMINATION POSITION**

The subjects were made to sit on a chair with comfortable arm rest facing the light in an upright position with sufficient head rest. The examiner examined by standing to the right of the subject. The trained data recorder was seated on the left side of the patient, so that data recorder was able to hear the examiner's instructions and codes and also the examiner was able to see the data being entered. (**Annexure IV - A**)

**d. INSTRUMENTS AND MATERIALS USED**

Examination was carried out with the help of the following:

- ◆ Mouth mirrors
- ◆ CPI probe
- ◆ Cotton rolls
- ◆ Kidney trays
- ◆ Sterilizing solution
- ◆ Cotton holder
- ◆ Disposable gloves and masks

During data collection, chemical method of disinfection and sterilization using Korsolex (Glutaraldehyde- 7gms; Polymethyl urea derivatives- 11.6 gms; 1,6 dihydroxy 2,5 droxyhexane - 8.2gm) diluted by adding water was used. Used instruments were washed and placed in the disinfectant solution (for 30 minutes), then re-washed and drained well. After

each day of examination, the entire set of instruments was autoclaved (Annexure IV- B).

**IX. EXAMINATION, ORAL HEALTH EDUCATION AND TREATMENT REFERRAL:**

The questionnaire were filled by the study participants and clinical examination were done for 15 minutes by the examiner. Around 25 study participants were examined per day. After the oral examination, a brief oral health education about how to maintain their oral health was conducted for the study participants in local language (Tamil). Those participants requiring treatment were referred to respective dental centers for dental treatment.

**X. STATISTICAL ANALYSIS:**

The data recorded were transferred and tabulated to the computer - Windows Microsoft Excel (2007) - for the purpose of the data analysis. SPSS 15 was used for statistical analysis. The alpha error (Type I error) was assumed to be 0.05. 95% confidence limit was set for the above analysis. Chi-square test was used for comparison between diabetic and non diabetic patients.

## RESULTS

The present study was done to assess the Oral Self Care Practices, Oral Health Status and Treatment needs of Diabetes Mellitus patients attending various diabetic centers in Chennai and Puducherry and to compare their findings with that of a similar age and sex matched control population.

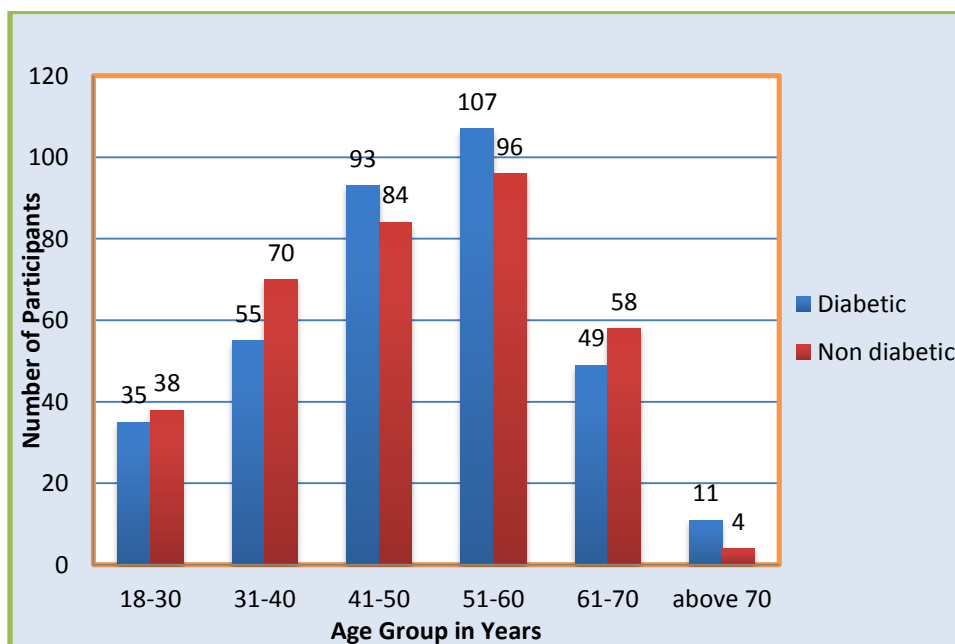
**Table 1 and Graph 1** describe the distribution of study population according to age groups. Among diabetics majority (30.6%) of them were in the age group of 51-60, 10.0% were in the age group of 18-30, 15.7% were in the age group of 31-40, 26.6% were in the age group of 41-50, 14.0% were in the age group of 61-70, and 3.1% were in the age group of above 70. Among non diabetic 10.9% were in the age group of 18-30, 20.0% were in the age group of 31-40, 24.0% were in the age group of 41-50, 27.4% were in the age group of 51-60, 16.6% were in the age group of 61-70 and 4% were above 70 years. There was no statistically significant difference between the two groups based upon age group. [ $\chi^2= 7.001$ ;  $P = 0. 0.221$  (Non Significant)]

**Table 1: Distribution of study population based on Age group in years**

Age group in years	Diabetic	Non Diabetic	Total
18-30	35 (10.0%)	38 (10.9%)	73(10.4%)
31-40	55 (15.7%)	70 (20.0%)	125(17.9%)
41-50	93 (26.6%)	84 (24.0%)	177(25.3%)
51-60	107 (30.6%)	96 (27.4%)	203(29.0%)
61-70	49 (14.0%)	58 (16.6%)	107(15.3%)
Above 70	11 (3.1%)	4 (1.1%)	15(2.1%)
<b>Total</b>	<b>350 (100%)</b>	<b>350 (100%)</b>	<b>700 (100%)</b>

**Chi Square Value= 7.001; P = 0. 0.221 (Non Significant)**

**Graph 1: Distribution of study population based on Age group in years**



**Chi Square Value= 7.001; P = 0. 0.221 (Non Significant)**

**Table 2 and Graph 2** shows that the diabetic group comprised of 350 subjects, of whom, 182 (51.0%) were males and 168 (49.0%) were females.

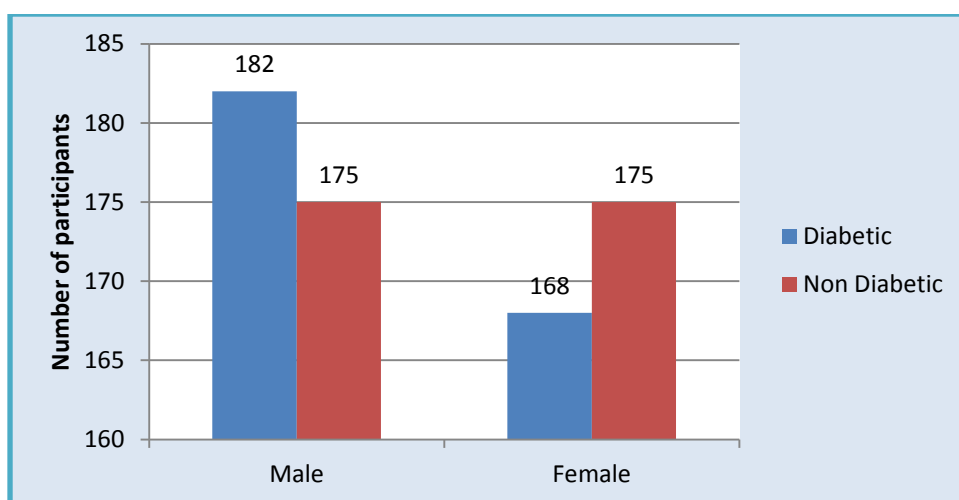
In non diabetic group out of 350, 175 (50.0%) were males and 175 (50.0%) were females. There was no statistically significant difference exist among the study participants based on sex. [ $\chi^2 = 0.280$ ;  $P = 0.221$  (Non Significant)]

**Table 2: Distribution of study population based on Sex**

Sex	Diabetic	Non Diabetic	Total
Male	182 (51.0%)	175 (50.0%)	357 (51.1%)
Female	168 (49.0%)	175 (50.0%)	343 (49.0%)
<b>Total</b>	<b>350 (100%)</b>	<b>350 (100%)</b>	<b>700 (100%)</b>

**Chi Square Value= 0.280; P = 0.221 (Non Significant)**

**Graph 2: Distribution of study population based on Sex**



**Chi Square Value= 0.280; P = 0.221 (Non Significant)**

**Table 3, Graph 3** shows that the majority of diabetics i.e., 110 (31.4%) had primary education, 80 (22.9%) had secondary education, 66 (18.9%) had PUC/Diploma, 35 (10.0%) UG, 11 (3.3%) had PG/ Professional degree and 48 (13.7%) had no formal education. Majority of the non diabetic i.e., 96 (27.4%) had primary education, 69 (19.7%) had secondary education, 59 (16.9%) had PUC/Diploma, 62 (17.7%) had UG, 12 (3.1%) had PG/ Professional degree and 52 (14.9%) had no formal education.

Statistical test showed no significant difference between diabetic and non diabetic groups based on education. ( $\chi^2 = 9.874$ ;  $P = 0.079$ , non significant).

**Table 4, Graph 4** shows that in diabetic group, about 173 (49.4%) of patients gave a history of diabetes less than five years, 85 (24.3%) from five to ten years and remaining 92 (26.3%) gave a history of more than ten years

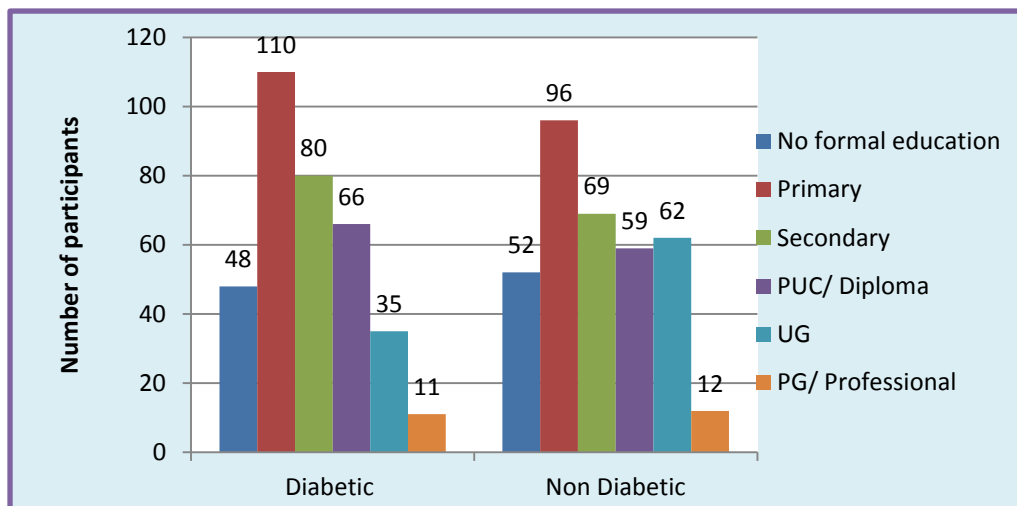


**Table 3: Distribution of study population based on education**

Education	Diabetic	Non Diabetic	Total
No formal education	48 (13.7%)	52(14.9%)	100(14.3%)
Primary	110 (31.4%)	96 (27.4%)	206 (29.4%)
Secondary	80 (22.9%)	69 (19.7%)	149 (21.3%)
HSC/ Diploma	66 (18.9%)	59(16.9%)	125 (17.9%)
UG	35(10.0%)	62(17.7%)	97(13.9%)
PG/ Professional	11(3.3%)	12 (3.1%)	23 (3.3%)
<b>Total</b>	<b>350(100%)</b>	<b>350(100%)</b>	<b>700(100%)</b>

Chi Square Value = 9.874; P = 0.079 (Non significant)

**Graph 3: Distribution of study population based on education**

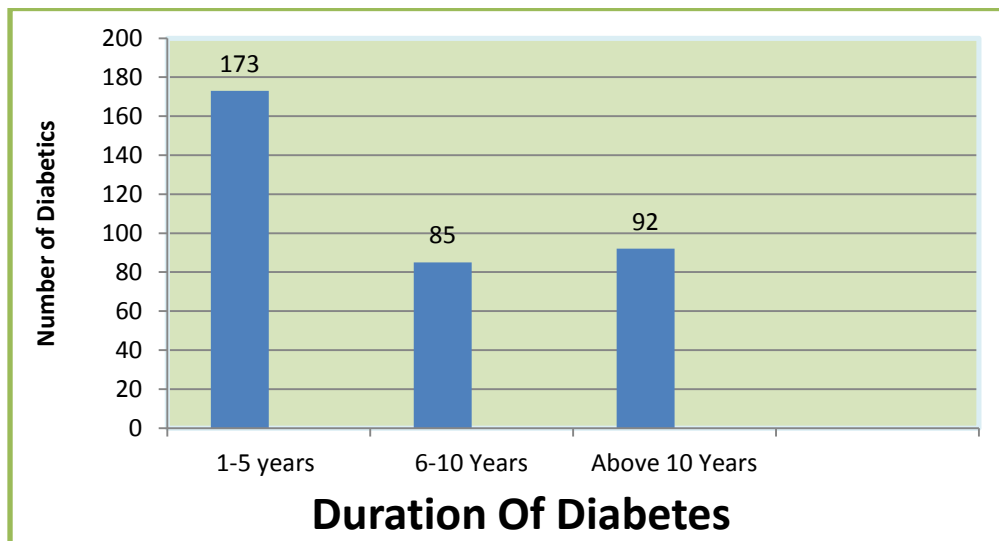


Chi Square Value = 9.874; P = 0.079 (Non significant)

**Table 4: Distribution of diabetics based upon duration of Diabetes Mellitus**

<b>Duration of diabetes mellitus (in years)</b>	<b>Diabetic</b>
<b>1-5</b>	173(49.4%)
<b>6-10</b>	85 (24.3%)
<b>Above 10</b>	92 (26.3%)
<b>Total</b>	350(100%)

**Graph 4: Distribution of diabetics based upon duration of Diabetes Mellitus**



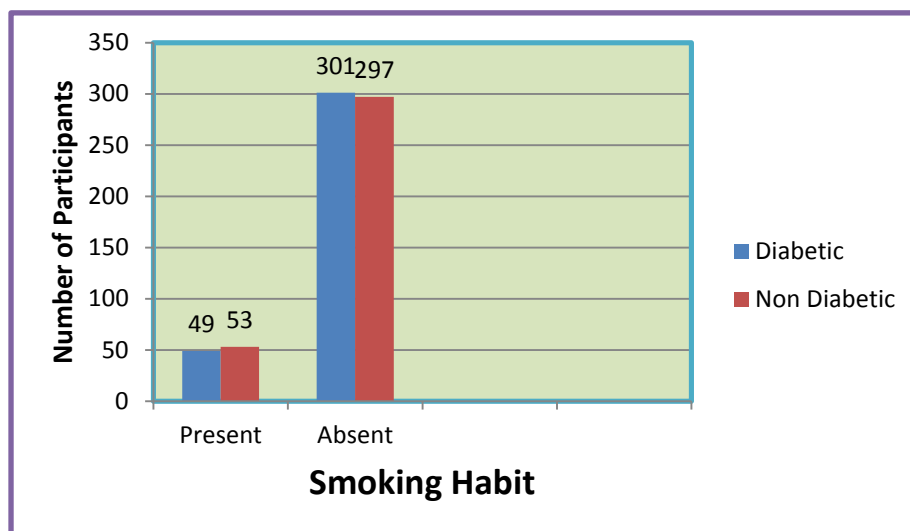
**Table 5, Graph 5** shows the distribution of study population based on smoking habit. 49 (14.0%) of diabetic and 53 (15.1%) of non diabetic had the habit of smoking.

**Table 5: Distribution of study population based on Smoking habit**

Smoking habit	Diabetic	Non Diabetic	Total
Yes	49 (14.0%)	53 (15.1%)	102 (14.6%)
No	301 (86.0%)	297 (84.9%)	598 (85.4%)
Total	350 (100%)	350 (100%)	700 (100%)

Chi Square Value = 0.184; P = 0.668 (Non significant)

**Graph 5: Distribution of study population based on Smoking habit**



Chi Square Value = 0.184; P = 0.668 (Non significant)

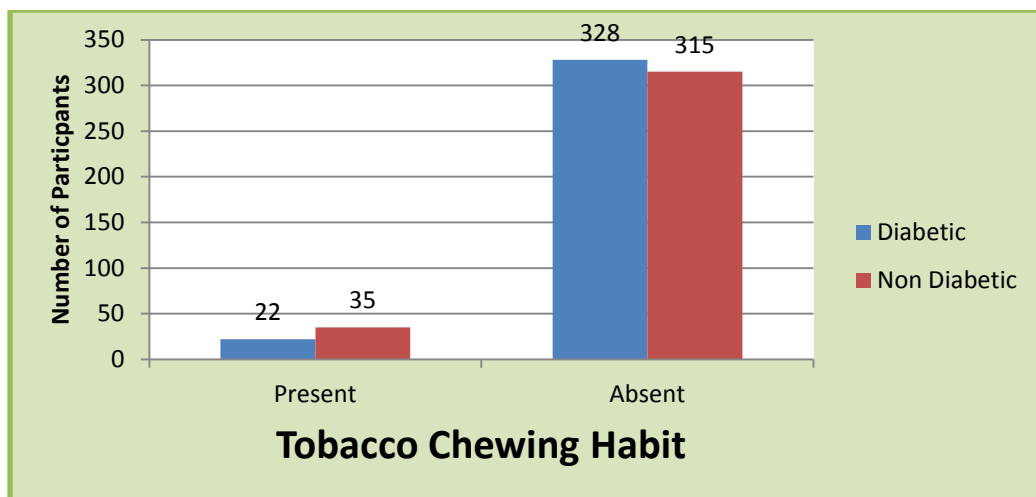
**Table 6, Graph 6** shows the distribution of study population based on tobacco chewing habit of which 22 (6.3%) of diabetic and 35 (10.0%) of non diabetic had the habit of tobacco chewing.

**Table 6: Distribution of study population based on Tobacco Chewing**

Tobacco Chewing Habit	Diabetic	Non Diabetic	Total
Yes	22(6.3%)	35 (10.0%)	57 (8.1%)
No	328(93.7%)	315 (90.0%)	643 (91.9%)
Total	350(100%)	350 (100%)	700 (100%)

Chi Square Value = 3.228; P = 0.072 (Non significant)

**Graph 6: Distribution of study population based on Tobacco Chewing**



Chi Square Value = 3.228; P = 0.072 (Non significant)

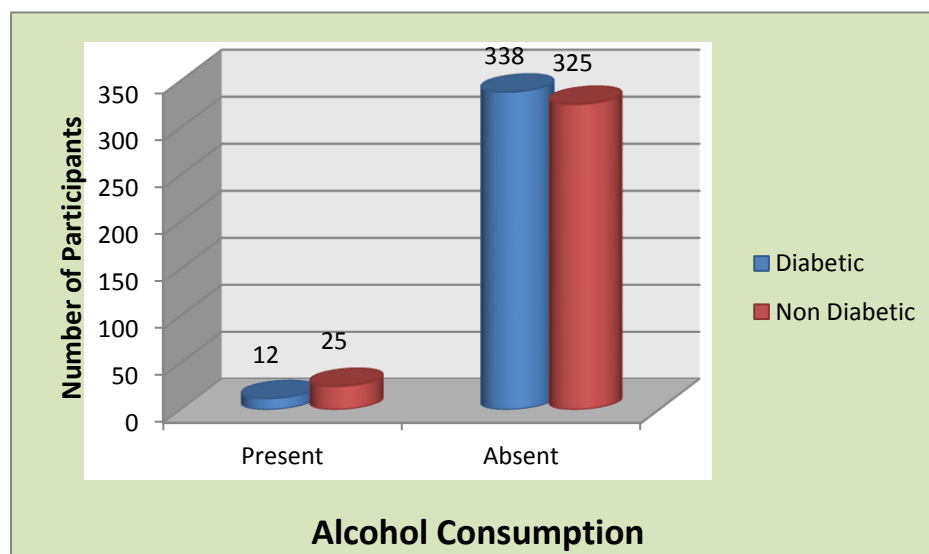
Table 7, Graph 7 shows the distribution of study population based on alcohol consumption of which 12 (3.4%) diabetic and 25 (7.1%) of non diabetic had the habit of alcohol consumption.

**Table7: Distribution of study population based on alcohol consumption**

Alcohol consumption	Diabetic	Non Diabetic	Total
Yes	12(3.4%)	25 (7.1%)	37 (5.3%)
No	338(96.6%)	325 (92.9%)	663 (94.7%)
Total	350(100%)	350 (100%)	700 (100%)

Chi Square Value = 4.822; P = 0.028 (significant)

**Graph 7: Distribution of study population based on alcohol consumption**



Chi Square Value = 4.822; P = 0.028 (significant)

**Distribution of study population based on Oral Hygiene Practices:**

**Table 8 (A) and graph 8 (A)** shows the distribution of study participants based on material used for cleaning the teeth. In diabetics group, 326 (93.1%) patients claimed that they used toothbrush and tooth paste to clean their teeth, 10 (2.9%) used tooth brush and tooth powder, 11 (3.1%) used finger and tooth paste, 3 (1.7%) used finger and tooth powder for cleaning the teeth.

Among non diabetic group 337 (96.3%) subjects used toothbrush and tooth paste to clean their teeth, 5 (1.4%) used tooth brush and tooth powder, 2 (0.6%) used finger and tooth paste, 6 (0.9%) used finger and tooth powder for cleaning the teeth.

A statistically significant association was observed between diabetic and non diabetic group based on material used for brushing. [ $\chi^2= 9.080$ ; **P = 0.028 (significant)**]

**Table 8 (B), Graph 8 (B)** shows the distribution of study population based on the number of times they brushed their teeth per day. In diabetic group, 300 (85.7%) patients cleaned their teeth once in a day, 44 (12.6%) cleaned their teeth twice daily and 6 (1.7%) of them cleaned thrice or more times in a day.

In non diabetic group, 321 (91.7%) subjects cleaned their teeth once in a day, 26 (7.4%) twice in a day and 3 (0.9%) cleaned thrice in a day.

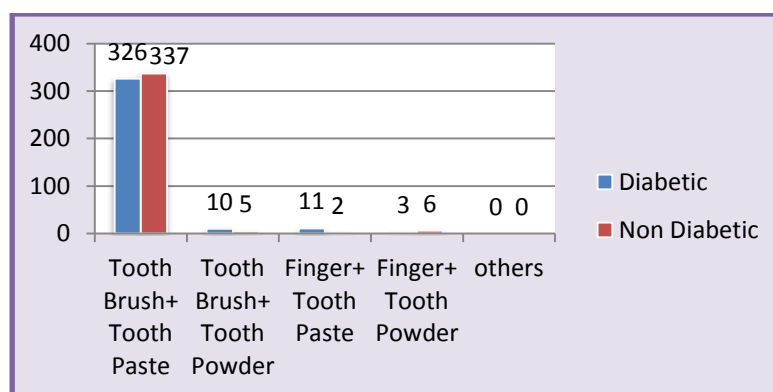
Statistical analysis showed significant association between diabetic and non diabetic group based upon the frequency of brushing in a day [ $\chi^2 = 6.339$ ;  $P = 0.042$ ].

**Table 8 (A): Material used for tooth cleaning**

Material used tooth for cleaning	Diabetic	Non Diabetic	Total
Tooth brush + Tooth paste	326 (93.1%)	337 (96.3%)	663 (94.7%)
Tooth brush + Tooth powder	10(2.9%)	5 (1.4%)	15(2.1%)
Finger + Tooth paste	11(3.1%)	2 (0.6%)	13 (1.9%)
Finger + Tooth powder	3 (1.7%)	6 (0.9%)	9(1.3%)
Others	0 (0%)	0 (0%)	0 (0%)
<b>Total</b>	<b>350 (100%)</b>	<b>350 (100%)</b>	<b>700 (100%)</b>

**Chi Square Value = 9.080; P = 0.028 (significant)**

**Graph 8 (A): Material used for tooth cleaning**



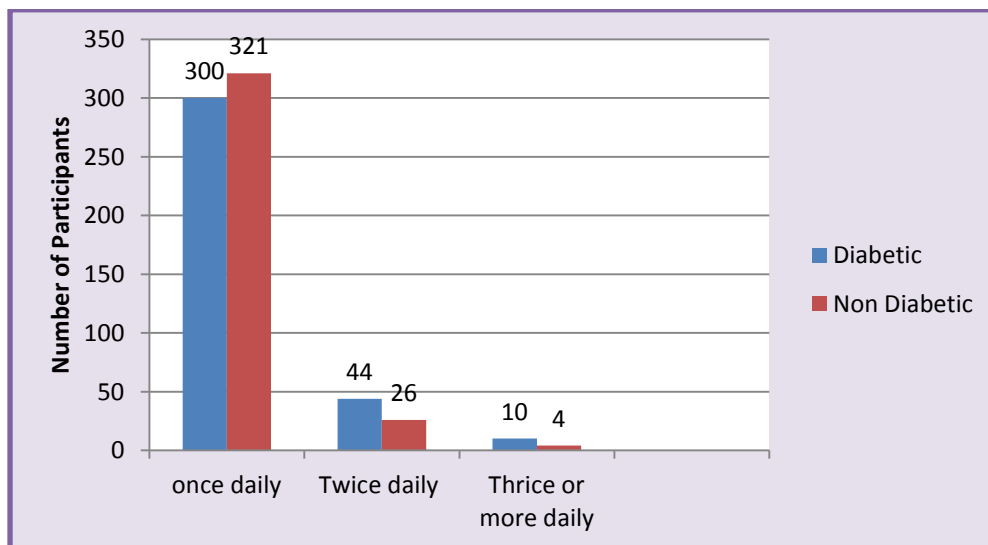
**Chi Square Value = 9.080; P = 0.028 (significant)**

**Table 8 (B): Distribution of the study population based on frequency of Tooth Cleaning**

Frequency of tooth brushing	Diabetic	Non Diabetic	Total
Once daily	300 (85.7%)	321 (91.7%)	621 (88.7%)
Twice daily	44 (12.6%)	26 (7.4%)	70 (10.0%)
Thrice or more daily	6(1.7%)	3 (0.9%)	9 (1.3%)
<b>Total</b>	<b>350 (100%)</b>	<b>350 (100%)</b>	<b>700 (100%)</b>

**Chi Square Value =6.339; P = 0.042 (significant)**

**Graph 8 (B): Distribution of the study population based on frequency of Tooth Cleaning**



**Chi Square Value =6.339; P = 0.042 (significant)**



**Table 8 (C), Graph 8 (C)** shows distribution of study population based on the method of tooth brushing. Among the total study population i.e., 260 (37.1%) used horizontal strokes to clean their teeth of which 143 (40.9%) were diabetic and 117 (33.4%) were non diabetic. 168 (24.0%) participants used vertical strokes of which 70 (20.0%) were diabetes patients and 98 (28.0%) were non diabetic . 224 (32.0%) of them used both horizontal and vertical strokes to clean their teeth of which 115 (32.9%) were diabetics and 109 (31.1%) were non diabetics. 48 (6.9%) used circular strokes of which 22 (6.3%) and 26 (7.4%) were diabetics and non diabetic respectively

Statistical analysis showed a statistically non significant association for method of brushing between the diabetic and non diabetic group ( $\chi^2$  7.761; P = 0.051 (significant).

**Table 8 (D), Graph 8 (D)** shows distribution of study population based on type of toothbrush used by the study participants

In diabetic group, out of 336 patients who were using toothbrush, 168 (48.0%) of patients claimed that they were using medium bristle toothbrush, 100 (28.6%) were using soft bristle brush, 35 (10.0%) were using hard bristles and 33 (9.4%) of the participants did not know the type of tooth brush they were using.

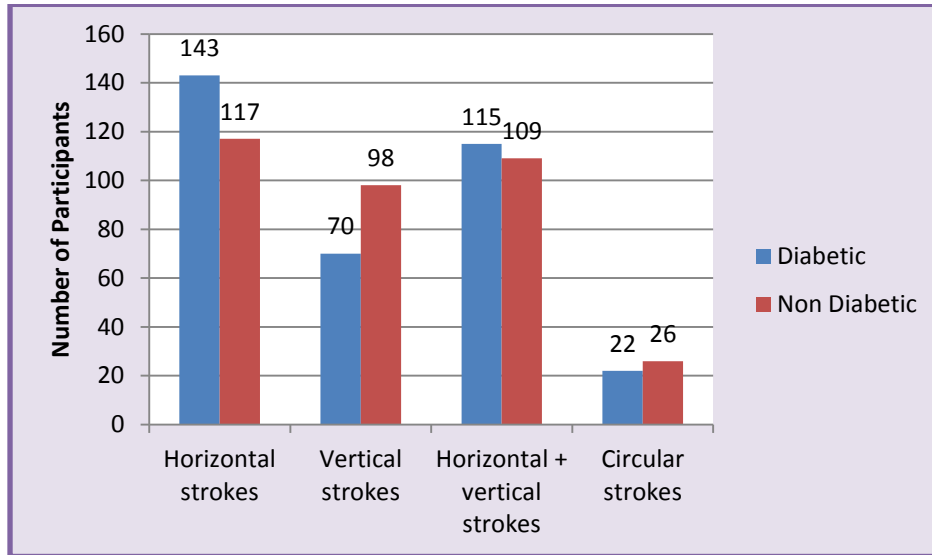
In non diabetic group, out of 342 subjects who used toothbrush, 186 (53.1%) of patients claimed that they were using medium bristle toothbrush, 63 (18.0%) were using soft bristle brush, 68 (19.4%) were using hard bristles and 25 (7.1%) of the participants did not know the type of tooth brush they were using.

**Table 8 (C): Distribution of study population based on Method of Tooth Brushing**

<b>Method of tooth brushing</b>	<b>Diabetic</b>	<b>Non Diabetic</b>	<b>Total</b>
<b>Horizontal strokes</b>	143 (40.9%)	117 (33.4%)	260 (37.1%)
<b>Vertical strokes</b>	70 (20.0%)	98 (28.0%)	168 (24.0%)
<b>Horizontal + vertical strokes</b>	115 (32.9%)	109 (31.1%)	224 (32.0%)
<b>Circular strokes</b>	22 (6.3%)	26(7.4%)	48 (6.9%)
<b>Total</b>	350 (100%)	350 (100%)	700 (100%)

**Chi Square Value = 7.761; P = 0.051 (Non significant)**

**Graph 8 (C): Distribution of study population based on Method of Tooth Brushing**



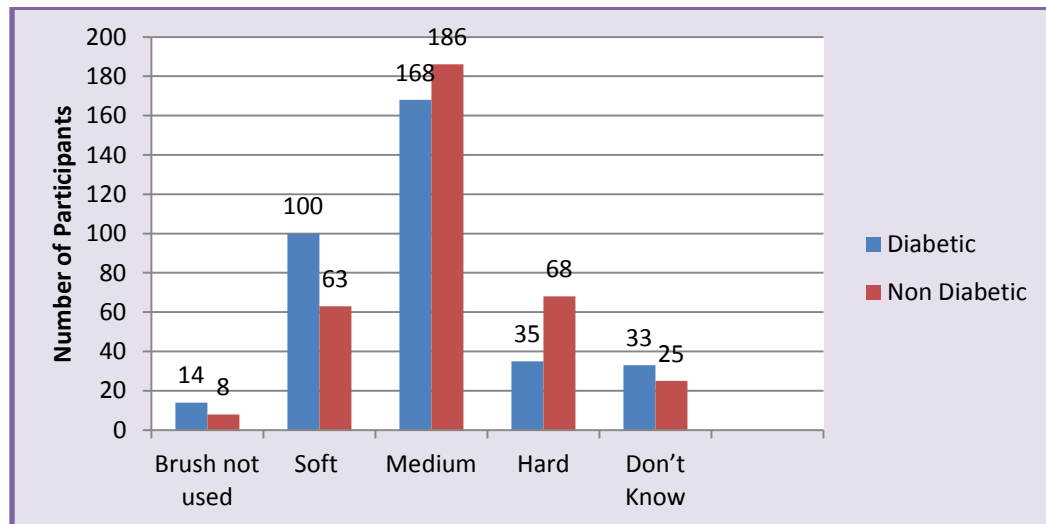
Chi Square Value = 7.761; P = 0.051 (Non significant)

**Table 8 (D): Distribution of the study population based on type of Tooth Brush**

Type of tooth brush	Diabetic	Non Diabetic	Total
Brush not used	14(4.0%)	8 (2.3%)	22 (3.1%)
Soft	100 (28.6%)	63 (18.0%)	163 (23.3%)
Medium	168(48.0%)	186(53.1%)	354 (50.6%)
Hard	35 (10.0%)	68 (19.4%)	103 (14.7%)
Don't know	33(9.4%)	25(7.1%)	58(8.3%)
<b>Total</b>	<b>350(100%)</b>	<b>350(100%)</b>	<b>700(100%)</b>

Chi Square Value = 22.627; P = 0.000 (significant)

**Graph 8 (D): Distribution of the study population based on type of Tooth Brush**



**Chi Square Value = 22.627; P = 0.000 (significant)**

**Table 8 (E), Graph 8 (E)** shows the distribution of study population based on the duration of brushing by study participants. Majority of the study population i.e., 323 (46.1%) brushed their teeth for 3 – 5 minutes of which 162 (46.3%) were Diabetic and 161 (46.0%) were non diabetic. 229 (32.7%) study participants brushed their teeth for more than 5 minutes of which 111 (31.7%) were diabetics and 118 (33.7%) were non diabetic. 105 (15.0%) of study participants brushed their teeth for 1 – 2 minutes of which 58 (16.6%) were diabetics and 47 (13.4%) were non diabetics. 43 (6.1%) participants had not noticed their duration of tooth brushing.

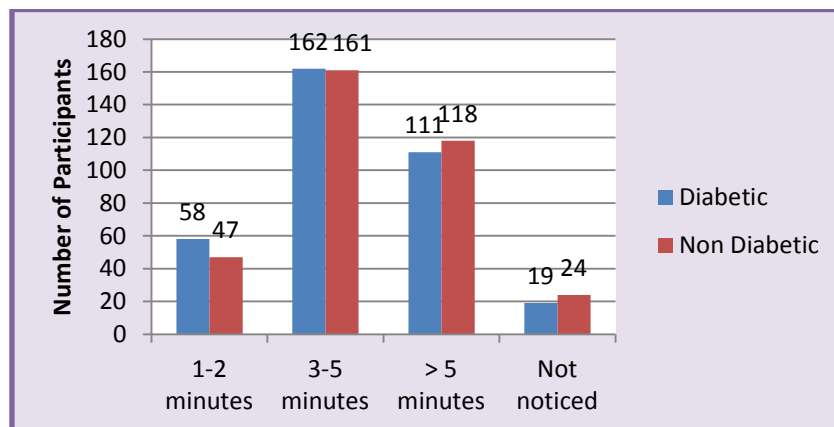
Statistical analysis showed a non significant association between diabetic and non diabetic groups based on duration of tooth brushing. ( $\chi^2= 1.951$ ;  $P = 0.583$ ).

**Table 8 (E): Distribution of the study population based on duration of Tooth Brushing**

Duration of tooth brushing	Diabetic	Non Diabetic	Total
1-2 minutes	58 (16.6%)	47(13.4%)	105 (15.0%)
3-5 minutes	162 (46.3%)	161 (46.0%)	323(46.1%)
> 5 minutes	111(31.7%)	118(33.7%)	229(32.7%)
Not noticed	19 (5.4%)	24(6.9%)	43(6.1%)
<b>Total</b>	<b>350(100%)</b>	<b>350(100%)</b>	<b>700(100%)</b>

**Chi Square Value = 1.951; P = 0.583 (Non significant)**

**Table 8 (E): Distribution of the study population based on duration of Tooth Brushing**



**Chi Square Value = 1.951; P = 0.583 (Non significant)**

**Table 8 (F), Graph 8 (F)** shows the distribution of study population based on the frequency of tooth brushing by the study participants. Majority of the study population i.e., 241 (34.4%) changed their tooth brush between 4 – 6 months of which 117 (33.4%) were diabetics and 124 (35.4%) were non diabetic. 192 (27.4%) participants changed their tooth brush once in 3 months of which 86 (24.6%) were diabetics and 106 (30.3%) were non diabetics. 89 (12.7%) participants changed their tooth brush between 7 – 12 months of which 49 (14.0%) were diabetics and 40 (11.4%) were non diabetic. 65 (9.3%) study participants changed their tooth brush between 1 – 2 months of which 40 (11.4%) were diabetic and 25 (7.1%) were non diabetic. 58 (8.3%) of study participants changed their tooth brush once flared of which 27 (7.7%) were diabetic and 31 (8.9%) were non diabetic. 13 (1.9%) study participants changed their tooth brush irregularly of which 4 (1.1%) were diabetic and 9 (2.6%) were non diabetic. 20 (2.9%) study participants had not noticed their frequency of change of their tooth brush of which 13 (3.7%) were diabetic and 7 (2.0%) were non diabetic.

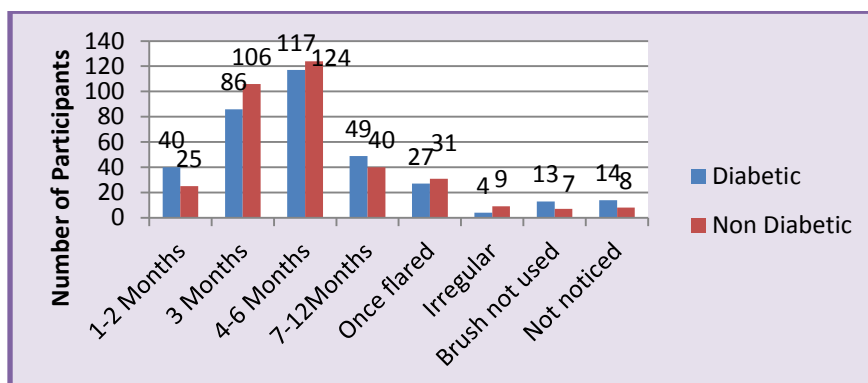
A statistically non significant difference was observed between diabetic and non diabetic for frequency of tooth brushing change. ( $\chi^2 = 12.294$  ;  $P = 0.091$ ).

**Table 8 (F): Distribution of study population based on frequency of changing Tooth Brush**

Frequency of changing tooth brush	Diabetic	Non Diabetic	Total
1 – 2 months	40 (11.4%)	25 (7.1%)	65 (9.3%)
3 months	86 (24.6%)	106 (30.3%)	192(27.4%)
4 – 6 months	117 (33.4%)	124(35.4%)	241 (34.4%)
7 – 12 months	49 (14.0%)	40 (11.4%)	89 (12.7%)
Once flared	27 (7.7%)	31 (8.9%)	58 (8.3%)
Irregular	4(1.1%)	9(2.6%)	13(1.9%)
Not noticed	13 (3.7%)	7 (2.0%)	20(2.9%)
Brush not used	14(4.0%)	8(2.3%)	22(3.1%)
<b>Total</b>	<b>350 (100%)</b>	<b>350 (100%)</b>	<b>700 (100%)</b>

Chi Square Value = 12.294; P = 0.091 (Non significant)

**Graph 8 (F): Distribution of study population based on frequency of changing Tooth Brush**



Chi Square Value = 12.294; P = 0.091 ( Non significant)

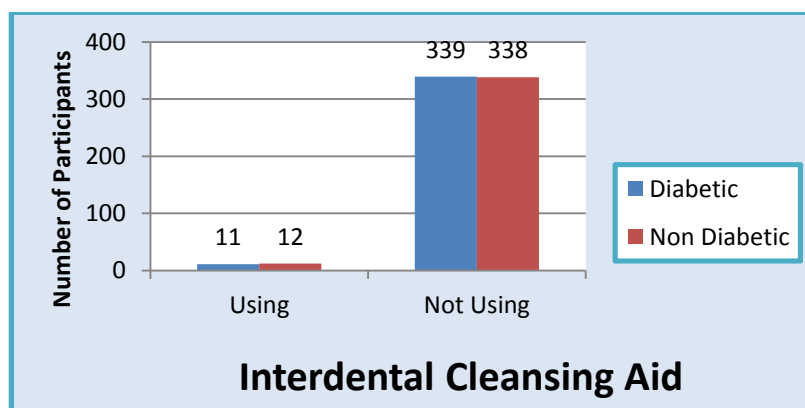
**Table 8 (G) and Graph 8 (G)** shows the distribution of study population based on interdental cleansing aid. 23(3.3%) study participants used interdental cleansing aids. In that 11 (3.1%) diabetic patients claimed that they used interdental cleansing aids and 12 (3.4%) control group subjects claimed that they are used interdental cleansing aid. 339 (96.9%) diabetic and 338 (96.6%) non diabetic did not use any interdental cleansing aid.

**Table 8 (G): Distribution of the study population based on usage of Interdental Cleaning aid**

Interdental Cleaning aid	Diabetic	Non Diabetic	Total
Yes	11 (3.1%)	12 (3.4%)	23(3.3%)
No	339 (96.9%)	338 (96.6%)	677(96.7%)
<b>Total</b>	<b>350 (100%)</b>	<b>350 (100%)</b>	<b>700(100%)</b>

Chi Square Value = 0.45; P = 0.832 (Non significant)

**Graph 8 (G): Distribution of the study population based on usage of Interdental Cleaning aid**



Chi Square Value = 0.45; P = 0.832 (Non significant)



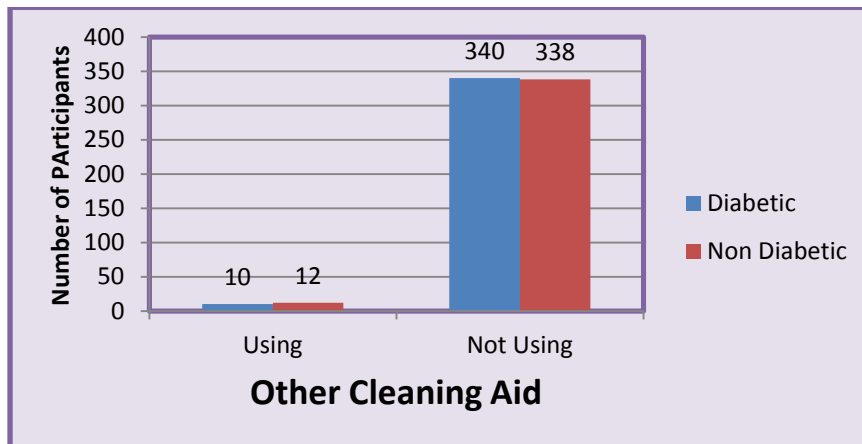
**Table 8 (H) and graph 8 (H)** shows the distribution of study population based on other cleansing aid used like mouthwash (chemical), tongue cleaner. 22 (3.1%) study participants used other cleansing aids. In diabetic group 10 (2.9%) patients claimed that they used other cleansing aids and 340 (97.1%) did not use any other oral hygiene aids. In control group 12 (3.4%) subjects claimed that they are use other cleansing aid and 338 (96.6%) did not use any other oral hygiene aid.

**Table 8 (H): Distribution of the study population based on usage of other Cleaning aid**

<b>Other Cleaning aid</b>	<b>Diabetic</b>	<b>Non Diabetic</b>	<b>Total</b>
<b>Yes</b>	10 (2.9%)	12 (3.4%)	22 (3.1%)
<b>No</b>	340 (97.1%)	338 (96.6%)	678 (96.9%)
<b>Total</b>	350 (100%)	350 (100%)	700 (100%)

**Chi Square Value = 0.188    P = 0.665 (Non significant)**

**Graph 8 (H): Distribution of the study population based on usage of other Cleaning aid**



**Chi Square Value = 0.188; P = 0.665 (Non significant)**

**Table 9 (A) and Graph 9 (A)** shows population based on past dental visit. Among 700 study subjects 525 (75.0%) had visited a dentist earlier of which 274 (78.3%) were diabetic patients and 251 (71.7%) were non diabetic control subjects. 175 (25.0%) had no previous dental visits of which 76 (21.7%) were diabetic patients and 99 (28.3%) were non diabetic control subjects.

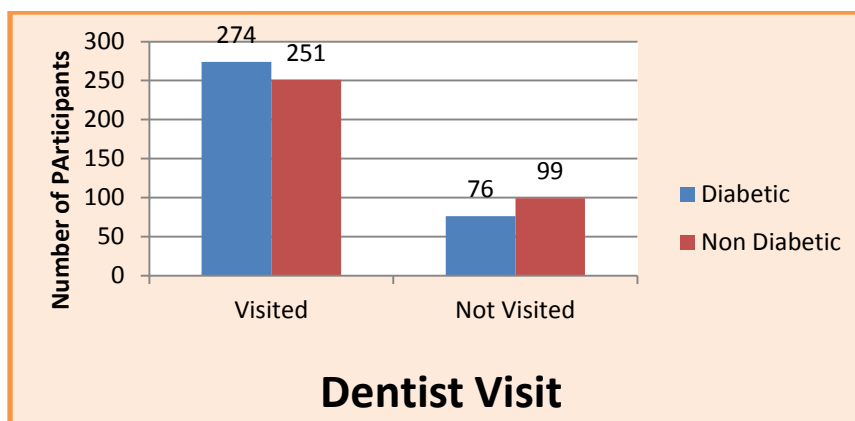
Statistical test showed a significant association between past dental visits and the two groups (diabetic and non diabetic groups) [ $\chi^2 = 4.030$ ; P = 0.045 (Significant)].

**Table 9 (A): Distribution of study population based on past dental visit:**

Past dental visit	Diabetic	Non Diabetic	Total
Yes	274(78.3%)	251 (71.7%)	525 (75.0%)
No	76 (21.7%)	99(28.3%)	175 (25.0%)
<b>Total</b>	<b>350 (100%)</b>	<b>350 (100%)</b>	<b>700(100%)</b>

**Chi Square Value = 4.030; P = 0.045 (Significant)**

**Graph 9 (A): Distribution of study population based on past dental visit:**



**Chi Square Value = 4.030; P = 0.045 (Significant)**

**Table 9 (B) and Graph 9 (B)** shows the distribution of study population based on time of past dental visits. Among 274 diabetics, 72 (26.3%) patients visited the dentist within 6 months, 81 (29.6%) visited the dentist in between 6- 12 months and 121 (44.2%) patients visited dentist over 12 months. Among 251 non diabetic, 60 (23.9%) subjects visited the

dentist within 6 months, 113 (28.3%) subjects visited the dentist in between 6- 12 months and 78 (31.1%) patients visited dentist over 12 months.

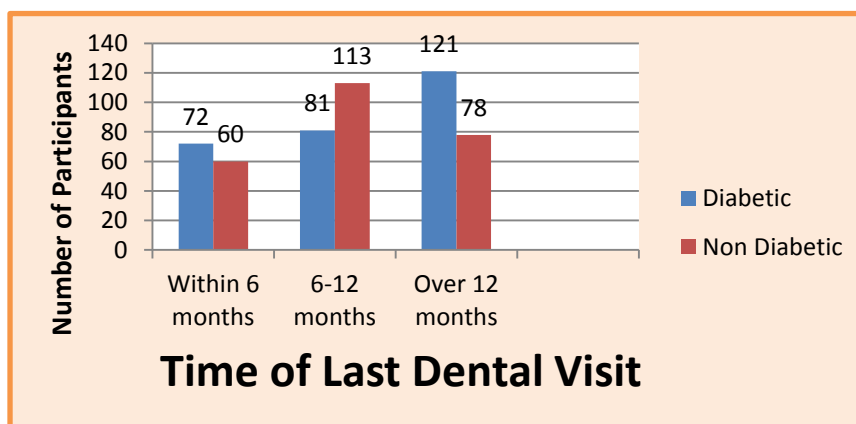
Statistical test showed a significant difference between time of past dental visits and the two groups (diabetic and non diabetic groups) [ $\chi^2 = 14.681$ ;  $P = 0.001$  (significant)]

**Table 9 (B): Distribution of study population based on time of past dental visit**

Time of Past dental visit	Diabetic	Non Diabetic	Total
Below 6 months	72 (26.3%)	60 (23.9%)	132 (25.1%)
6-12 months	81 (29.6%)	113(28.3%)	194 (37.0%)
Above 12 months	121(44.2%)	78(31.1%)	199(37.9%)
<b>Total</b>	<b>274(100%)</b>	<b>251 (100%)</b>	<b>525(100%)</b>

**Chi Square Value = 14.681; P = 0.001 (significant)**

**Graph 9 (B): Distribution of study population based on time of past dental visit**



**Chi Square Value = 14.681; P = 0.001 (significant)**

**Table 9 (C) and Graph 9 (C)** shows the distribution of study participants based on their reason for last dental visit. Majority of study population i.e., 167(31.8%) visited the dentist for extraction of which 97 (35.4%) were diabetic and 70 (27.9%) were non diabetic. 133 (25.3%) participants had visited a dentist due to tooth ache of which 56 (20.4%) were diabetic and 77 (30.7%) were non diabetic. 76 (14.4%) had visited a dentist for filling of which 42 (15.3%) were diabetic and 34 (13.5%) were non diabetic. 64(12.2%) participants had visited a dentist for cleaning their teeth of which 37 (13.5%) were diabetic and 27 (10.8 %) were non diabetic. 46 (8.8%) participants had visited a dentist for replacement of their teeth of which 18 (6.6%) were diabetic and 28 (11.2%) were non diabetic. 39 (5.1%) participants had visited a dentist for loose teeth of which 24 (8.7%) were diabetic and 15 (6.0%) were non diabetic.

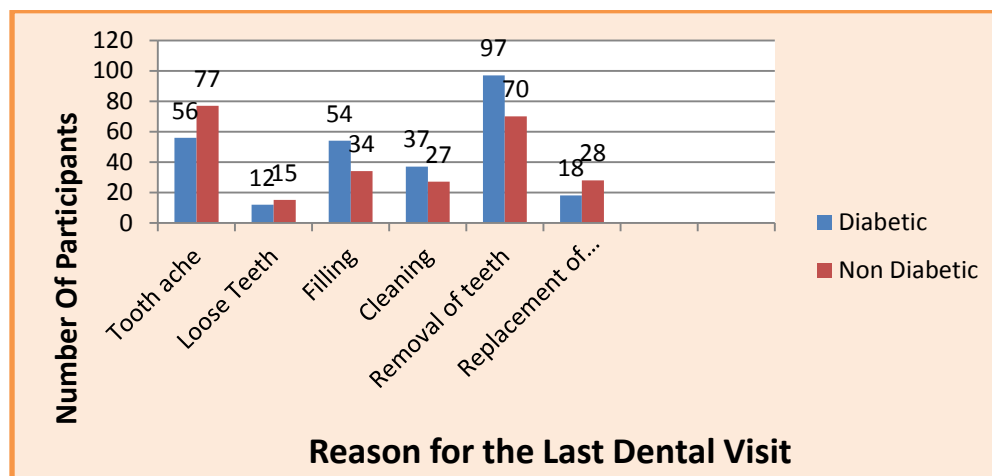
Statistical analysis showed a significant association between reason for last dental visits and two groups [Diabetic and non diabetic] [ $\chi^2 = 15.318$ ;  $P = 0.009$  (significant)].

**Table 9 (C): Distribution of study population based on reason for last dental visit**

Reason for last dental visit	Diabetic	Non Diabetic	Total
Tooth ache	56(20.4%)	77 (30.7%)	133(25.3%)
Loose teeth	12 (4.4%)	15 (6.0%)	27 (5.1%)
Filling	54 (19.7%)	34 (13.5%)	88 (16.8%)
Cleaning	37 (13.5%)	27 (10.8 %)	64(12.2%)
Removal of teeth	97 (35.4%)	70 (27.9%)	167(31.8%)
Replacement of teeth	18 (6.6%)	28 (11.2%)	46(8.8%)
<b>Total</b>	<b>274 (100%)</b>	<b>251 (100%)</b>	<b>525 (100%)</b>

**Chi Square Value = 15.318 P = 0.009 (significant)**

**Graph 9 (C): Distribution of study population based on reason for last dental visit**



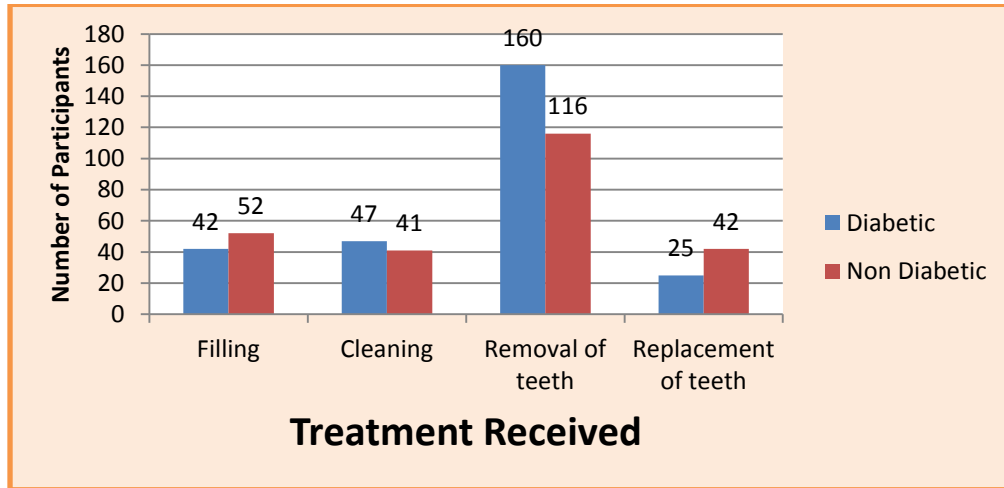
**Table 9 (D) and Graph 9 (D)** shows the distribution of study participants based on the treatment received in last dental visit. Majority of study population i.e., 276 (52.6%) underwent extraction of which 160 (58.4%) were diabetic and 116 (46.2%) were non diabetic. 94 (17.9%) subjects had received filling of which 42 (15.3%) were diabetic and 52 (20.7%) were non diabetic. 88 (16.8%) participants had received cleaning of their teeth of which 47 (17.2%) were diabetic and 41 (16.3%) were non diabetic. 67 (12.8%) participants had received replacement of teeth of which 25 (9.1%) were diabetic and 42 (16.7%) were non diabetic. Statistical analysis showed a significant association between treatment received in last dental visit and two groups [Diabetic and non diabetic] [ $\chi^2 = 11.816$ ;  $P = 0.008$  (significant)].

**Table 9 (D): Distribution of study population based on treatment received in last dental visit**

Treatment received in last dental visits	Diabetic	Non Diabetic	Total
Filling	42(15.3%)	52 (20.7%)	94(17.9%)
Cleaning	47 (17.2%)	41 (16.3%)	88 (16.8%)
Removal of teeth	160 (58.4%)	116 (46.2%)	276 (52.6%)
Replacement of teeth	25 (9.1%)	42 (16.7 %)	67(12.8%)
<b>Total</b>	274 (100%)	251 (100%)	525 (100%)

**Chi Square Value = 11.816 P = 0.008 (significant)**

**Graph 9 (D): Distribution of study population based on treatment received in last dental visits**



**Chi Square Value = 11.816; P = 0.008 (significant)**

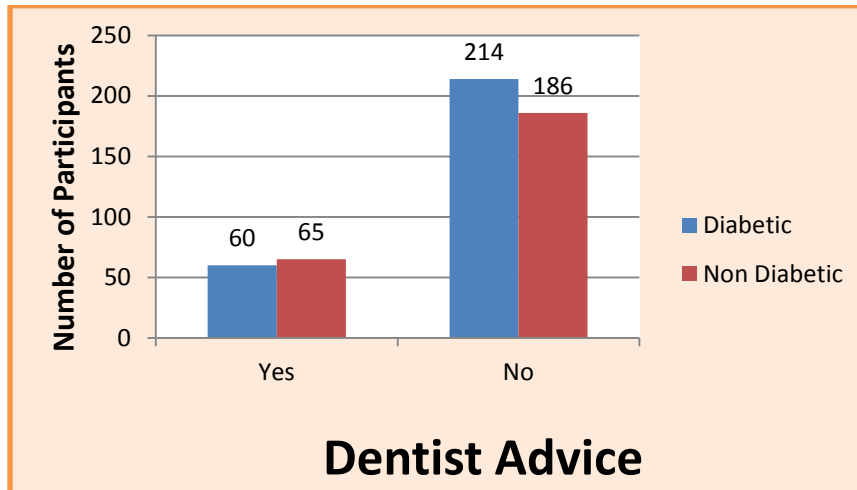
**Table 9 (E) and Graph 9 (E)** shows the distribution of diabetic study participants based on dentist advice for maintaining oral health. Total of 125 (23.8%) participants had received advice from the dentist of which 60 (21.9%) were diabetic and 65 (25.9%) were non diabetic.

**Table 9 (E): Distribution of study population based on Dentist advice**

Dentist Advice	Diabetic	Non Diabetic	Total
Yes	60 (21.9%)	65 (25.9%)	125 (23.8%)
No	214 (78.1%)	186 (74.1%)	400 (76.2%)
<b>Total</b>	<b>274 (100%)</b>	<b>251 (100%)</b>	<b>525 (100%)</b>

**Chi Square Value = 1.155; P = 0.283 (Non significant)**



**Graph 9 (E): Distribution of study population based on Dentist advice**

**Chi Square Value = 1.155; P = 0.283 (Non significant)**

**Table 10 and Graph 10** shows the distribution of diabetic study participants based on Knowledge about effect of Diabetic mellitus on oral health. 420 (60.0%) participants had a knowledge that Diabetic mellitus affects oral health of which 238 (68.0%) were diabetic and 182 (52.0%) were non diabetic. Statistical analysis showed a significant association between the diabetic and non diabetic group. (Chi Square Value = 18.66; P = 0.000 )

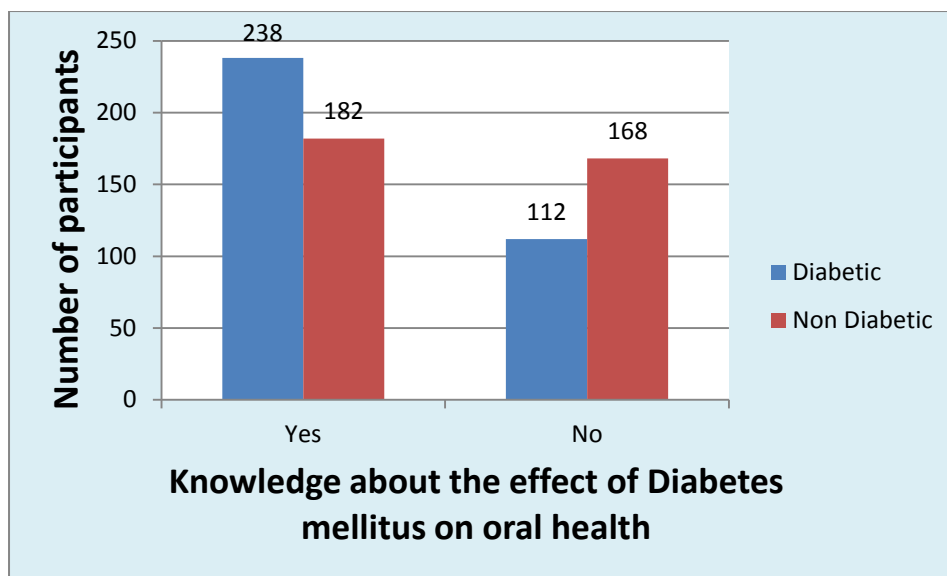
**Table 11 and Graph 11** shows the distribution of diabetic study participants based on physician referral to dental check up for oral health complications due to diabetes. Only 25 (7.1%) participants had been referred by physicians and the remaining 325 (92.9%) was not referred to dentist.

**Table 10: Distribution of study population based on Knowledge about effect of Diabetic mellitus on oral health**

Diabetes affects oral health	Diabetic	Non Diabetic	Total
Yes	238 (68.0%)	182 (52.0%)	420 (60.0%)
No	112 (32.0%)	168(48.0%)	280 (40.0%)
<b>Total</b>	350 (100%)	350 (100%)	700(100%)

**Chi Square Value = 18.66; P < 0.001 (significant)**

**Graph 10: Distribution of study population based on Knowledge about effect of Diabetic mellitus on oral health**

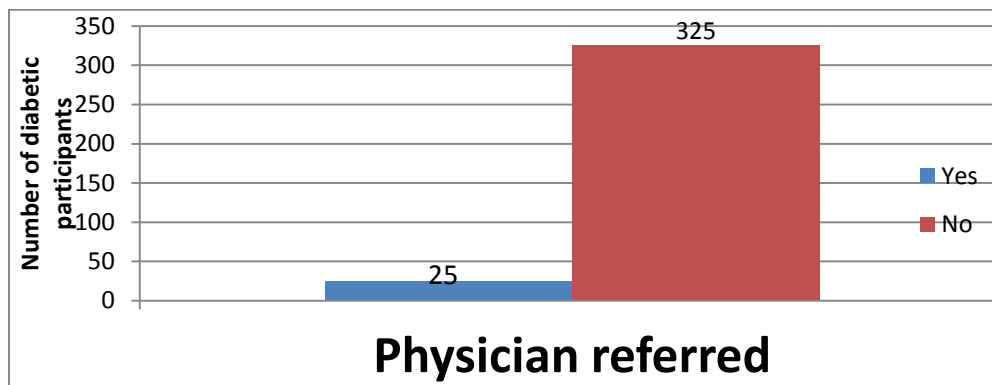


**Chi Square Value = 18.66; P < 0.001 (significant)**

**Table 11: Distribution of study population based on Physician Referral to visit dentist**

Physician Referred	Diabetic
Yes	25 (7.1%)
No	325 (92.9%)
Total	350 (100%)

**Graph 11: Distribution of study population based on Physician Referral to visit dentist**



**Table 12** and **Graph 12** shows the distribution of study population based on TMJ symptoms, clicking, tenderness, and reduced jaw mobility. Among the total study population 19 (5.4%) diabetic and 12 (3.4%) non diabetic subjects reported of TMJ symptoms, 22 (6.3%) diabetic and 16 (4.6%) non diabetic had clicking, 9 (2.6%) diabetic had tenderness on palpation, 7 (2.0%) diabetic had reduced jaw mobility. Statistical test showed no significant difference between TMJ symptoms and two groups

(diabetic and non diabetic group) [ $\chi^2 = 1.654$ ;  $P = 0.198$  (non significant)], clicking and two groups [ $\chi^2 = 1.002$ ;  $P = 0.317$  (non significant)]. Statistical test showed significant difference between tenderness and two groups ( $\chi^2 = 9.117$ ;  $P = 0.03$  (significant), reduced jaw mobility and two groups ( $\chi^2 = 7.071$ ;  $P = 0.008$  (significant)).

**Table 12: Distribution of study population based on TMJ symptoms, clicking, tenderness, and reduced jaw mobility**

TMJ symptoms	Diabetic	Non Diabetic	Total
<b>Yes</b>	19 (5.4%)	12 (3.4%)	31 (4.4%)
<b>No</b>	331 (94.6%)	331 (96.6%)	669 (95.6%)
<b>Total</b>	350 (100%)	350 (100%)	700 (100%)
<b>Clicking</b>			
<b>Yes</b>	22 (6.3%)	16 (4.6%)	38 (5.4%)
<b>No</b>	328 (93.7%)	334(95.4%)	662(94.6%)
<b>Total</b>	350(100%)	350 (100%)	700 (100%)
<b>Tenderness</b>			
<b>Yes</b>	9 (2.6%)	0 (0%)	9 (1.3%)
<b>No</b>	341 (97.4%)	350 (100%)	691 (98.7%)
<b>Total</b>	350 (100%)	350 (100%)	700 (100%)
<b>Reduced jaw mobility</b>			
<b>Yes</b>	7 (2.0%)	0 (0%)	7 (1.0%)
<b>No</b>	343 (98.0%)	350 (100%)	693 (99.0%)
<b>Total</b>	350 (100%)	350 (100%)	700(100%)

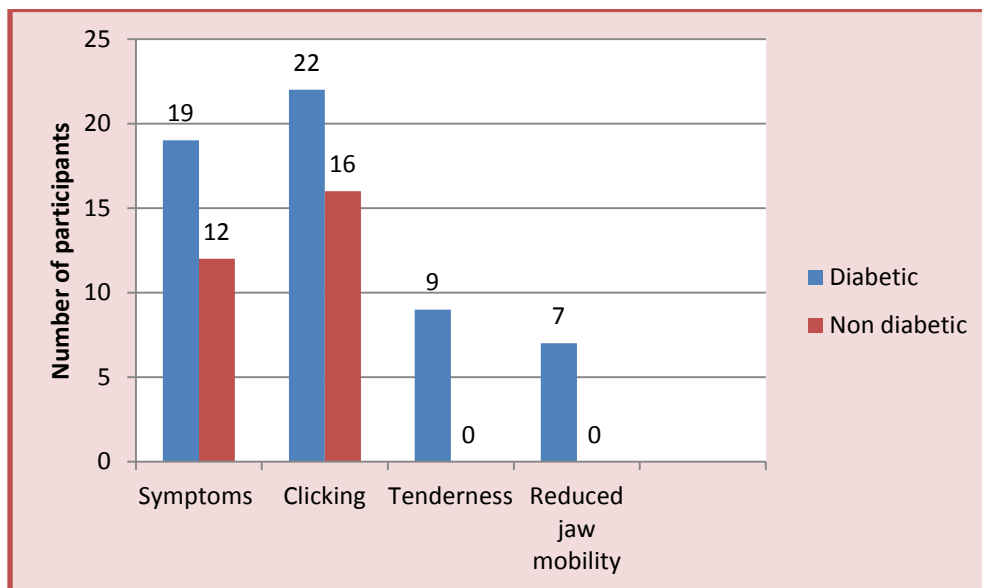
TMJ symptoms : Chi Square Value =1.654; P = 0.198 (non significant)

Clicking : Chi Square Value = 1.002; P = 0.317 (non significant)

Tenderness : Chi Square Value =9.117; P = 0.03 (significant)

Reduced Jaw Mobility: Chi Square Value = 7.071; P = 0.008 (significant)

**Graph 12: Distribution of study population based on Presence of TMJ symptoms, Clicking, tenderness, and reduced jaw mobility**



TMJ symptoms : Chi Square Value = 1.654; P = 0.198 (non significant)

Clicking : Chi Square Value = 1.002; P = 0.317 (non significant)

Tenderness : Chi Square Value = 9.117; P = 0.03 (significant)

Reduced Jaw Mobility : Chi Square Value = 7.071; P = 0.008 (significant)

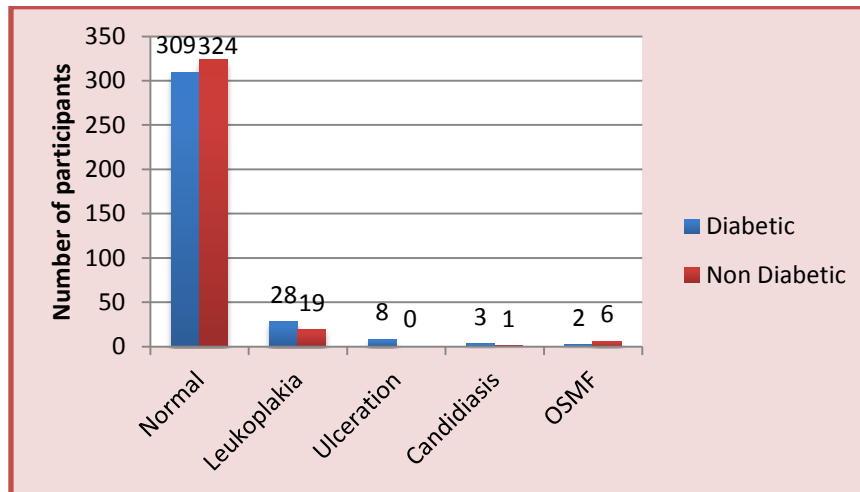
**Table 13** and **Graph 13** shows the distribution of study population based upon the oral mucosal condition. Majority of the population, 663 (90.4%) had no abnormal condition of oral mucosa, of which 309 (88.2%) were diabetic and 324 (92.5%) were non diabetic. There were cases of 47 (6.7%) leukoplakia, of which 28 (8%) were diabetic and 19 (5.4%) were non diabetic. 8 (1.1%) ulcers, 4 (0.5%) Candidiasis and 8 (1.1%) of study participants were affected by Oral submucous fibrosis. Statistically, there existed a significant association between oral mucosal condition and two groups (Diabetic and Non diabetic). (Chi square value = 15.738; p=0.008).

**Table13: Distribution of study population based upon the oral mucosal condition**

<b>Oral mucosal condition</b>	<b>Diabetic</b>	<b>Non Diabetic</b>	<b>Total</b>
<b>Normal</b>	309 (88.2%)	324 (92.5%)	663 (90.4%)
<b>Leukoplakia</b>	28 (8%)	19 (5.4%)	47 (6.7%)
<b>Ulceration</b>	8 (2.3%)	0 (0%)	8 (1.1%)
<b>Candidiasis</b>	3 (0.9%)	1 (0.3%)	4 (0.5%)
<b>Oral Sub mucous fibrosis (OSMF)</b>	2 (0.6%)	6 (1.7%)	8 (1.1%)
<b>Total</b>	350 (100%)	350 (100%)	700 (100%)

**Chi square value = 15.738; p=0.008(Significant)**

**Graph 13: Distribution of study population based upon the oral mucosal condition**



Chi square value = 15.738; p=0.008 (Significant)

**Table 14, Graph 14,** shows the distribution of study population based on Dental Fluorosis. Among the study population 9 (1.3%) subjects had questionable fluorosis, 5 (0.7%) had mild fluorosis and 11 (1.6%) subjects had severe fluorosis.

Statistical test shows significant association between Dental fluorosis and the two groups diabetic and non diabetic. ( $\chi^2 = 10.537$ ;  $p = .015$ ).

**Table 15 and Graph 15,** shows distribution of study population based on CPI index. Among the total study population majority of them i.e., 427 (61.0%) had calculus of which 188 (53.7%) were Diabetic and 239 (68.3%) were non diabetic. 224 (32.0%) study participants of which 124 (35.4%) diabetic and 100 (28.6%) non diabetic had pocket depth of 4-5mm, 37

(5.3%) participants had pocket depth of 6mm or more of which 31 (8.9%) were diabetic and 6 (1.7%) were non diabetic.

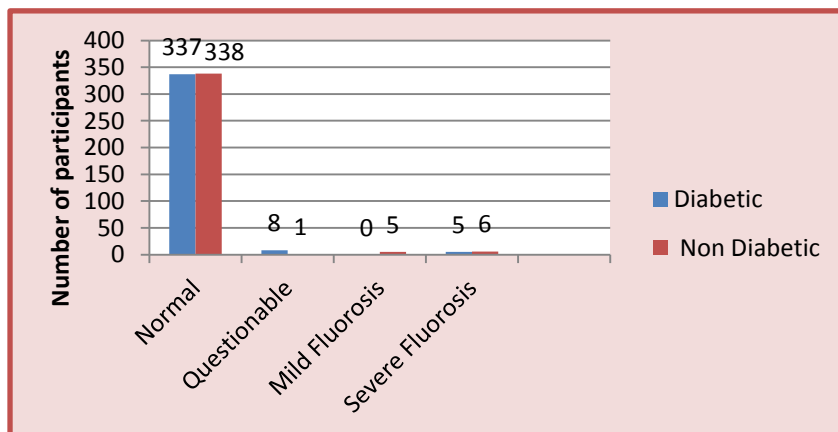
Statistical analysis showed a significant association between CPI index and two groups, diabetic and non diabetic group ( $\chi^2 = 25.888$ ;  $P = 0.000$ )

**Table 14: Distribution of study population based on Dental Fluorosis**

Dental Fluorosis	Diabetic	Non Diabetic	Total
Normal	337 (96.3%)	338 (96.6%)	675(96.4%)
Questionable Fluorosis	8 (2.3%)	1(0.3%)	9(1.3%)
Mild Fluorosis	0(0%)	5(1.4%)	5(0.7%)
Severe Fluorosis	5(1.4%)	6(1.7%)	11(1.6%)
Total	350(100%)	350(100%)	700(100%)

Chi Square Value = 10.537; P=.015 (significant)

**Graph 14: Distribution of study population based on Dental Fluorosis**



Chi Square Value = 10.537; P=.015 (significant)

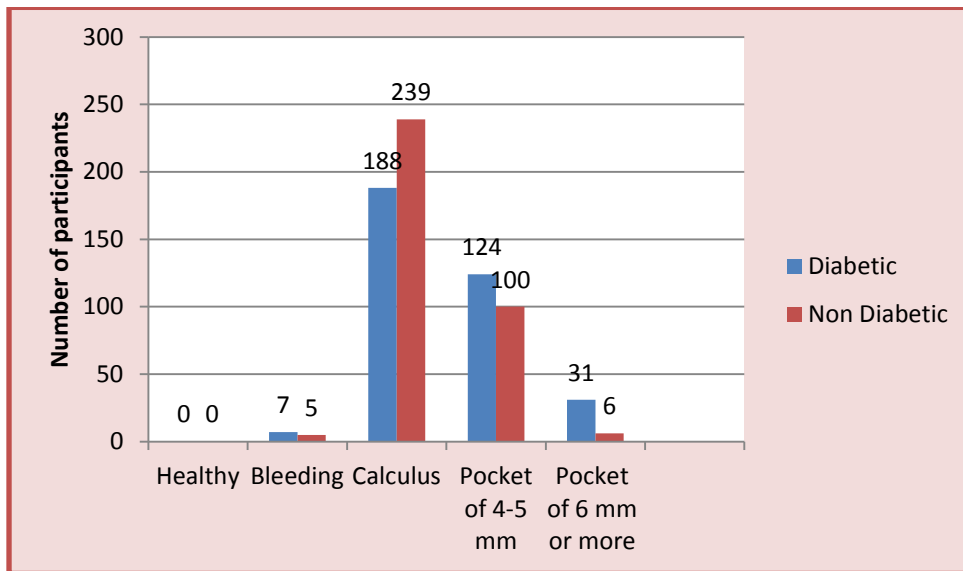


**Table 15: Distribution of study population based on Community Periodontal Index Code**

<b>Prevalence of person affected</b>							
<b>Group</b>	Number examined	Number of dentate persons	H	B	C	P <sub>1</sub>	P <sub>2</sub>
<b>Diabetic</b>	350(100%)	350 (100%)	0 (0%)	7 (2.0%)	188 (53.7%)	124 (35.4%)	31 (8.9%)
<b>Non Diabetic</b>	350(100%)	350 (100%)	0 (0%)	5 (1.4%)	239 (68.3%)	100 (28.6%)	6 (1.7%)
<b>Total</b>	700(100%)	700 (100%)	0 (0%)	12 (1.7%)	427 (61.0%)	224 (32.0%)	37 (5.3%)

**Chi Square Value =25.888; P = 0.000(significant)**

**Graph 15: Distribution of study population based on Community Periodontal Index Code**



**Chi Square Value =25.888; P = 0.000(significant)**

**Table 16** shows the frequency distribution of Community Periodontal Index among diabetic patients of which no one had all six sextants healthy, except 7 (2.0%) of the study population all of them had atleast calculus in any one of their sextant.

**Table 16: Frequency Distribution of Community Periodontal Index among diabetic**

Age	Number of Sextants	Sextant Score (No. Of Subjects)					
		H	B	C	P <sub>1</sub>	P <sub>2</sub>	M
18-78	0	315 (90%)	279 (79.7%)	7 (2.0%)	226 (64.6%)	319 91.1%	282 (80.5%)
	1	19 (5.4%)	20 (5.7%)	10 (2.8%)	48 (13.7%)	10 (2.9%)	44 (12.6%)
	2	8 (2.2%)	8 (2.3%)	12 (3.4%)	34 (9.7%)	3 (0.9%)	24 (6.9%)
	3	6 (1.7%)	14 (4.0%)	63 18.0%	14 (4.0%)	0 (0%)	0(0%)
	4	2 (0.5%)	15 (4.3%)	41 11.9%	8 (2.3%)	4 (1.1%)	0(0%)
	5	0 (0.0%)	8 (2.3%)	57 (16.2%)	11 (3.1%)	3 (0.9%)	0(0%)
	6	0 (0.0%)	6 (1.7%)	160 45.7%	9 (2.5%)	1 (0.2%)	0(0%)

**Table 17** and **Graph 16**, shows the distribution of study population based on number of sextants excluded. Among the study population 580 (82.9%) participants had no sextants excluded of which 282 (80.6%) were diabetic and 298 (85.1%) were non diabetic. 92 (13.1%) study participants had one sextant excluded of which 44 (12.6%) were diabetic and 48 (13.7%)

were non diabetic. 28 (4.0%) study participants had two sextants excluded of which 24 (6.9%) were diabetic and 4 (1.1%) were non diabetic.

Statistical tests showed no significant difference between number of sextants excluded and two groups diabetic and non diabetic. ( $\chi^2= 14.901$  P = 0.001).

**Table 18** and **Graph 17**, shows the distribution of study population based on highest Loss of attachment. Among the study population 416 (59.4%) subjects had 0 – 3mm attachment loss of which 188 (53.7%) were diabetic and 228 (65.1%) were non diabetic. 200 (28.6%) subjects had 4 – 5mm attachment loss, of which 116 (33.1%) were diabetic and 84 (24.0%) were non diabetic. 75 (10.7%) subjects had 6 – 8mm attachment loss of which 40 (11.4%) were diabetic and 35 (10.0%) were non diabetic, 9 (1.3%) subjects had 9 – 11mm attachment loss of which 6 (1.7%) were diabetic and 3 (0.9%) were non diabetic

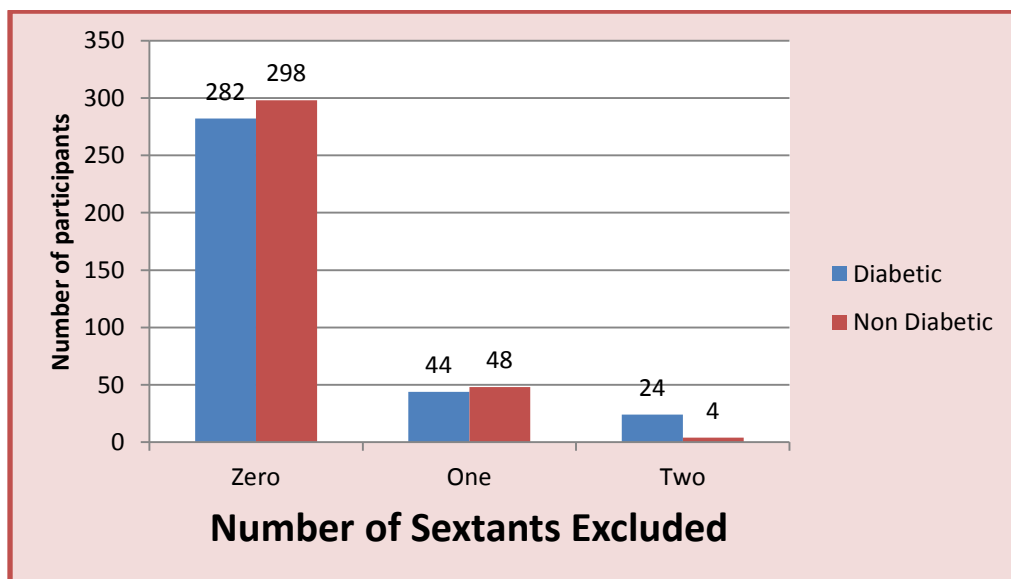
Statistical analysis showed a significant association between Loss of attachment and two groups, Diabetic and non diabetic ( $\chi^2 =10.299$ ; P = 0.016)

**Table 17: Distribution of study population based on Number of sextants excluded**

Number of sextants excluded	Diabetic	Non Diabetic	Total
0	282(80.6%)	298(85.1%)	580 (82.9%)
1	44(12.6%)	48 (13.7%)	92 (13.1%)
2	24 (6.9%)	4 (1.1%)	28 (4.0%)
<b>Total</b>	350 (100%)	350(100%)	700(100%)

**Chi Square Value = 14.901; P = 0.001(significant)**

**Graph 16: Distribution of study population based on Number of sextants excluded**



**Chi Square Value = 14.901; P = 0.001 (significant)**

**Table 18: Distribution of study population based on Loss of Attachment**

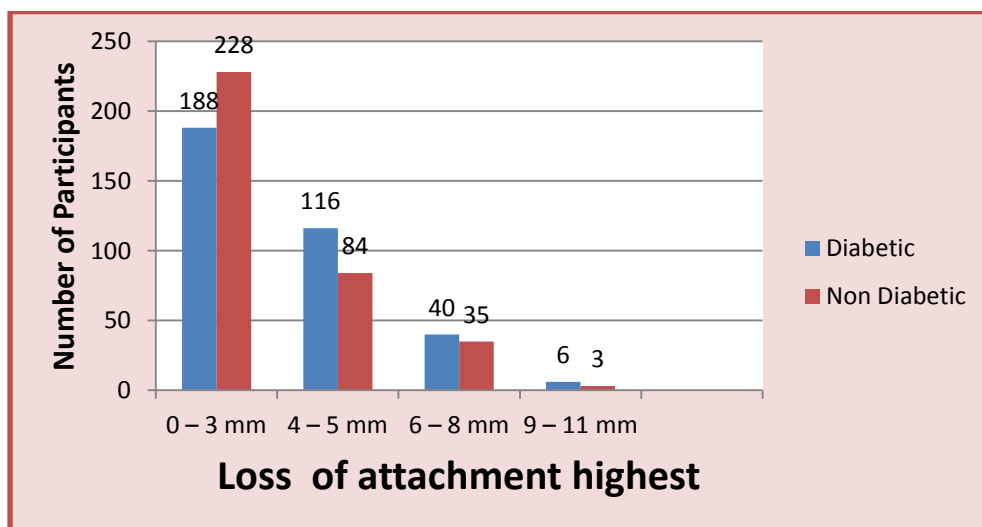
**Code**

Code	Diabetic	Non Diabetic	Total
<b>0 = 0 – 3 mm</b>	188 (53.7%)	228 (65.1%)	416 (59.4%)
<b>1 = 4 – 5 mm</b>	116(33.1%)	84 (24.0%)	200 (28.6%)
<b>2 = 6 – 8 mm</b>	40 (11.4%)	35 (10.0%)	75 (10.7%)
<b>3 = 9 – 11 mm</b>	6(1.7%)	3(0.9%)	9 (1.3%)
<b>Total</b>	350(100%)	350 (100%)	700 (100%)

**Chi Square Value = 10.299; P = 0.016 (significant)**

**Graph 17: Distribution of study population based on Highest Loss of**

**Attachment Code**



**Chi Square Value = 10.299; P = 0.016 (significant)**

**Table 19** shows the distribution of study population based on crown status. 620 (88.6%) study participants of which 323 (92.3%) diabetic and 297 (84.9%) had decayed teeth. 18 (5.1%) diabetic and 3 (0.9%) non diabetic had filled teeth with decay. 60 (17.1) diabetic and 10 (2.9%) non diabetic had filled teeth without decay.163 (46.6%).diabetic and 85 (24.3%) non diabetic had teeth missing due to caries.106 (30.3%) diabetic and 74 (21.1%) non diabetic had teeth missing due to reason other than dental caries. 5 (1.4%) diabetic and 2 (0.6%) non diabetic had Bridge, Abutment or Special Crown.7 (1.0%) study participants had fractured teeth.

**Table 19: Distribution of study population based on Crown Status**

	Diabetic	Non Diabetic	Total
<b>Decayed</b>			
Yes	323 (92.3%)	297 (84.9%)	620 (88.6%)
No	27 (7.7%)	53 (15.1%)	80 (11.4%)
<b>Filled with decay</b>			
Yes	18 (5.1%)	3(0.9%)	21 (3.0%)
No	332 (94.9%)	347 (99.1%)	679 (97.0%)

<b>Filled without decay</b>			
Yes	60 (17.1)	10 (2.9%)	70(10.0%)
No	290 (82.9%)	340 (97.1%)	630 (90.0%)
<b>Missing due to caries</b>			
Yes	163 (46.6%)	85 (24.3%)	248 (35.4%)
No	187 (53.4%)	265 (75.7%)	452 (64.6%)
<b>Missing other reason</b>			
Yes	106 (30.3%)	74 (21.1%)	80 (25.7%)
No	244(67.7%)	276 (78.9%)	520 (74.3%)
<b>Bridge, Abutment or Special Crown</b>			
Yes	5 (1.4%)	2 (0.6%)	7 (1.0%)
No	345 (98.6%)	348 (99.6%)	693(99.0%)
<b>Trauma</b>			
Yes	6(1.7%)	10 (2.9%)	16 (2.3%)
No	344 (98.3%)	340(97.1%)	684(97.7%)



**Table 20** shows the distribution of study population based on root status. 123 (17.6%) had decayed root of which 77 (22.0%) were diabetic and 46 (13.1%) were non diabetic. No participant had root bridge abutment. 349 (49.9%) study participants of which 210 (60.0%) were diabetic and 139 (39.7%) were non diabetic had unexposed root

**Table 20: Distribution of study population based on Root status**

	Diabetic	Non Diabetic	Total
<b>Root decayed</b>			
Yes	77 (22.0%)	46 (13.1%)	123 (17.6%)
No	273(78.0%)	304 (86.9%)	577 (82.4%)
<b>Root bridge abutment</b>			
Yes	0 (0%)	0 (0%)	0 (0%)
No	350 (100%)	350 (100%)	700 (100%)
<b>Root unexposed</b>			
Yes	210 (60.0%)	139 (39.7%)	349 (49.9%)
No	140 (40.0%)	211 (60.3%)	351 (50.1%)

**Table 21** shows the distribution of study participants based on their treatment needs. Majority of the study population i.e., 238 (34.0%) of which 95 (27.1%) diabetic and 143 (40.9%) non diabetic needed one surface restoration and two surface restoration was needed by 164 (23.4%) of which 94 (51.1%) were diabetic and 70 (42.9%) were non diabetic. Pulp care treatment was needed by 65 (18.6%) diabetic and 42 (12.0%) non diabetic. Extraction was needed by 104 (29.7%) diabetic and 74 (21.1%) non diabetic.

**Table 21: Distribution of study population based on Treatment needs**

	<b>Diabetic</b>	<b>Non Diabetic</b>	<b>Total</b>
<b>One surface restoration</b>			
<b>Yes</b>	95 (27.1%)	143 (40.9%)	238 (34.0%)
<b>No</b>	255 (72.9%)	207 (59.1%)	462(66.0%)
<b>Two surface restoration</b>			
<b>Yes</b>	94 (51.1%)	70 (42.9%)	164 (23.4%)
<b>No</b>	256 (48.9%)	280 (57.1%)	536 (76.6%)
<b>Pulp care</b>			
<b>Yes</b>	65 (18.6%)	42 (12.0%)	107 (15.3%)
<b>No</b>	285 (81.4%)	308(88.0%)	593 (84.7%)
<b>Extraction</b>			
<b>Yes</b>	104 (29.7%)	74 (21.1%)	178 (25.4%)
<b>No</b>	246 (70.3%)	276 (78.9%)	522 (74.6%)

**Table 22** shows the mean DMFT of the study population. Diabetic and non diabetic had a mean DMFT Value of 4.014 and 3.020 respectively.

Statistical analysis showed no significant association between Mean DMFT and two groups, Diabetic and non diabetic. (t test value =3.837; P = 0.000)

**Table 22: Distribution of study population based on Mean DMFT**

DMFT	Males	Females
<b>Mean</b>	<b>4.014</b>	<b>3.020</b>
<b>Standard Deviation</b>	<b>3.680</b>	<b>3.148</b>

**T test Value = 3.837; P = 0.000 (significant)**

**Table 23** and **Graph 18** shows the distribution of the workers based on their prosthetic status. Among the total study population 37 (5.3%) wore an upper partial denture of which 19 (5.4%) were diabetic and 18 (5.1%) were non diabetic. 2. 9 (1.3%) of them had bridge in upper arch of which 6 (1.7%) were diabetic and 3 (0.9%) were non diabetic. 18 (2.6%) wore a lower partial denture of which were 15 (4.3%) diabetic and 3 (0.9%) were non diabetic.

Statistical analysis showed a significant association between upper and lower prosthetic status and two groups (diabetic and non diabetic). (Upper  $\chi^2 = 12.078$ ;  $P = 0.001$ , Lower ( $\chi^2 = 8.211$ ;  $P = 0.004$ ).

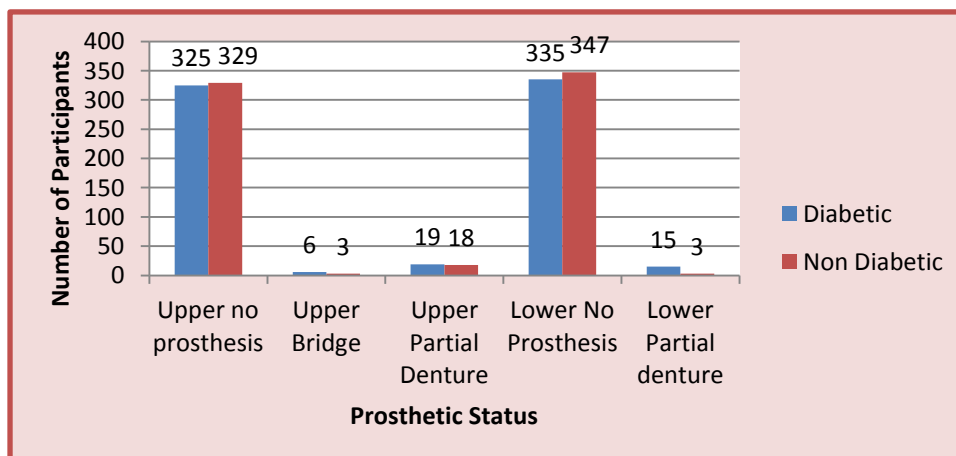
**Table 24** and **Graph 19** shows the distribution of study population based on their prosthetic needs. Among the study population 30 (8.6%) diabetic and 17 (4.9%) non diabetic needed upper one unit prosthesis. 78 (22.3%) diabetic and 22 (6.3%) non diabetic needed upper multiunit prosthesis. 14 (4.0%) diabetic and 13 (3.7%) non diabetic needed both upper one unit and multiunit prosthesis. 41 (11.7%) diabetic and 21 (6.0%) non diabetic needed lower one unit prosthesis. 89 (25.4%) and 63 (18.0%) non diabetic needed lower multiunit prosthesis. 24 (6.9%) diabetic and 7 (2.0%) non diabetic needed both lower one unit and multiunit prosthesis.

Statistical analysis showed a significant association between upper and lower prosthetic needs and two groups [Diabetic and non Diabetic]. (Upper- $\chi^2 = 49.358$ ;  $P = 0.000$ ); Lower- $\chi^2 = 28.945$ ;  $P = 0.000$ )

**Table 23: Distribution of study population based on prosthetic status**

Prosthetic status	Diabetic	Non Diabetic	Total
<b>Upper</b>			
No prosthesis	325 (92.9%)	329 (94.0%)	654 (93.4%)
Bridge	6 (1.7 %)	3 (0.9%)	9(1.3%)
Partial denture	19 (5.4%)	18 (5.1%)	37 (5.3%)
<b>Chi Square Value = 12.078 P = 0.001 (significant)</b>			
<b>Lower</b>			
No prosthesis	335 (95.7%)	347 (99.1%)	682 (97.4%)
Partial denture	15 (4.3%)	3 (0.9%)	18 (2.6%)
<b>Chi Square Value = 8.211 P = 0.004 (significant)</b>			

**Graph 18: Distribution of study population based on prosthetic status**

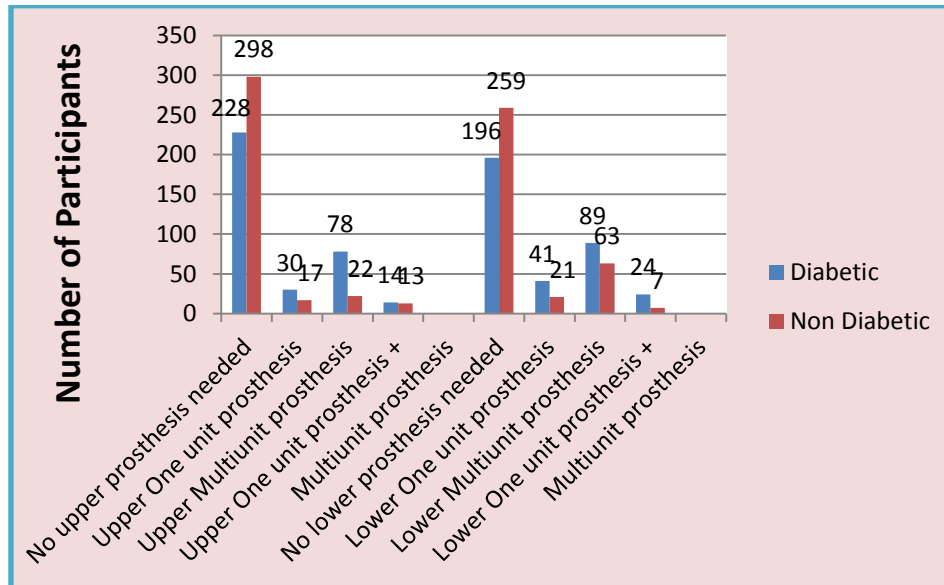


Upper Chi Square Value = 12.078; P = 0.001; Lower Chi Square Value = 8.211; P = 0.004.

Table 24: Distribution of study population based on prosthetic needs

Prosthetic needs	Diabetic	Non Diabetic	Total
<b>Upper</b>			
No prosthesis needed	228 (65.1%)	298 (85.1%)	526(75.1%)
One unit prosthesis	30 (8.6%)	17(4.9%)	47 (6.7%)
Multiunit prosthesis	78 (22.3%)	22(6.3%)	100 (14.3%)
One unit prosthesis + Multiunit prosthesis	14(4.0%)	13 (3.7%)	27 (3.9%)
<b>Total</b>	<b>350 (100%)</b>	<b>350 (100%)</b>	<b>700 (100%)</b>
<b>Chi Square Value = 49.358 P = 0.000 (significant)</b>			
<b>Lower</b>			
No prosthesis needed	196(56.0%)	259 (74.0%)	455 (65.0%)
One unit prosthesis	41 (11.7%)	21(6.0%)	62 (8.9%)
Multiunit prosthesis	89 (25.4%)	63 (18.0%)	152 (21.7%)
One unit prosthesis + Multiunit prosthesis	24 (6.9%)	7(2.0%)	31 (4.4%)
<b>Total</b>	<b>350 (100%)</b>	<b>350 (100%)</b>	<b>700 (100%)</b>
<b>Chi Square Value = 28.945 P = 0.000 (significant)</b>			

**Graph 19: Distribution of study population based on prosthetic needs**



**Table 25** and **Graph 20** shows the distribution of study population based on duration of diabetes and highest Community Periodontal Index score. Among the diabetic Population who are having diabetes between 1-5 years; 101 (28.9%) patients had calculus, 57 (16.3%) participants had 4 – 5 mm pocket depth, 15 (4.3%) had 6 mm or more pocket depth. Among the diabetic population who had diabetes in between 6-10 years; 1 (0.3%) were normal, 33 (9.4%) had calculus, 40 (11.4%) diabetic patients had 4 – 5 mm pocket depth and 11(3.1%) diabetic patients had 6 mm or more pocket depth. Among the diabetic population who had above 10 years of diabetics, 6 (1.7%) were normal, 54 (15.4) had calculus, 27 (7.7%) had 4 – 5 mm pocket and 5 (1.4%) diabetics had pocket depth of 6 mm or more.

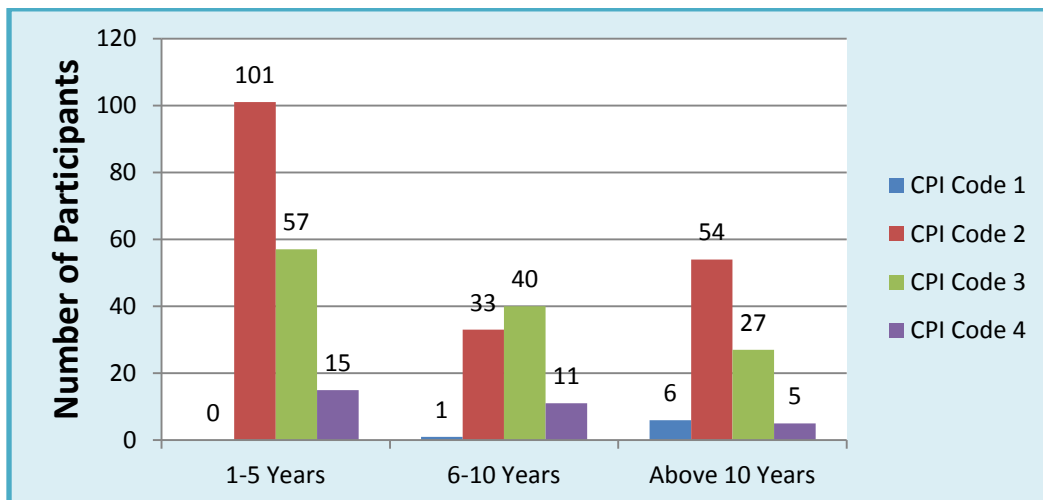
Statistical analysis showed a significant association between age andCommunity Periodontal Index. ( $\chi^2= 28.936; P=0.001$ )

**Table 25: Distribution of study population based on duration of diabetes and Community Periodontal Index**

Duration of Diabetes in years	CPI Code 1	CPI Code 2	CPI Code 3	CPI Code 4	Total
1-5	0 (0.0%)	101 (28.9%)	57 (16.3%)	15 (4.3%)	173(49.4%)
6-10	1(0.3%)	33 (9.4%)	40 (11.4%)	11 (3.1%)	85(24.3%)
Above 10	6 (1.7%)	54 (15.4%)	27 (7.7%)	5 (1.4%)	92(26.3%)
<b>Total</b>	7 (2.0%)	188 (53.7%)	124 (35.4%)	31 (8.8%)	350(100%)

Chi Square value= 28.936; P=0.001

**Graph 20: Distribution of study population based on duration of diabetes and Community Periodontal Index**



Chi Square value= 81.770; P=0.000



**Table 26** and **Graph 21** shows the distribution of study population based on duration of diabetes and highest Loss of attachment (LOA). Among the diabetic population who had diabetes in between 1-5 years, 99 (28.2%) subjects had 0 – 3 mm attachment loss, 48 (13.7%) diabetics had 4 – 5 mm attachment loss, 21 (6.0%) had 6 – 8 mm attachment loss and 5 (5.3%) had loss of attachment of 9-11 mm. Among the diabetic population who had diabetes in between 6-10 years, 36 (10.3%) subjects had 0 – 3 mm attachment loss, 39 (11.1%) diabetics had 4 – 5 mm attachment loss, 9 (2.6%) had 6 – 8 mm attachment loss and 1 (0.3%) had loss of attachment of 9-11 mm. Among the diabetic population who had diabetes above 10 years, 53 (15.1%) had 0 – 3 mm attachment loss, 29(8.3%) diabetics had 4 – 5 mm attachment loss, 10 (2.9%) had 6 – 8 mm attachment loss.

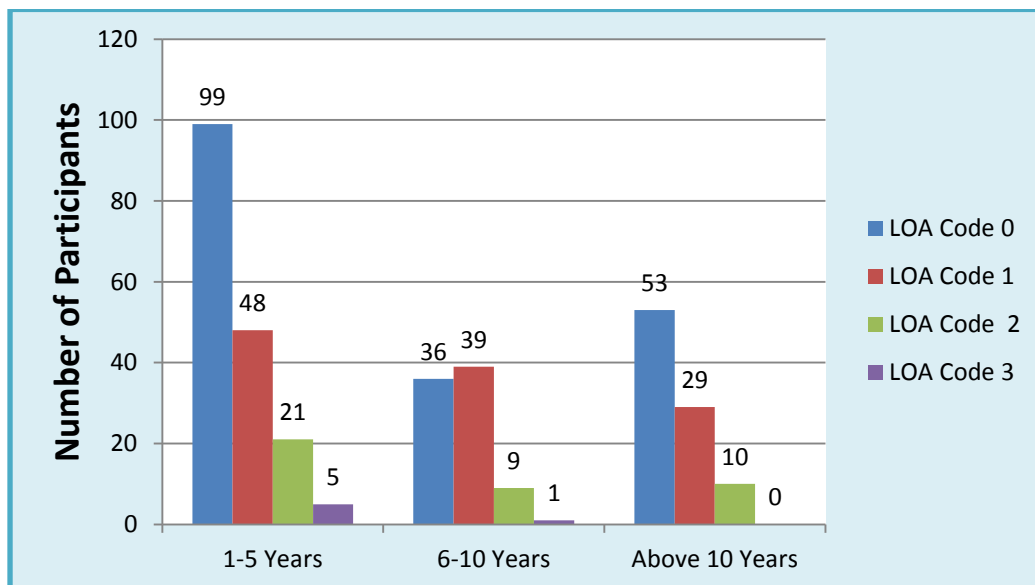
Statistical analysis showed a significant association between duration of diabetes and Loss of attachment ( $\chi^2= 18.055$ ;  $P=0.035$ )

**Table 26: Distribution of study population based on duration of diabetes and Loss of attachment (LOA) highest**

Duration of Diabetes mellitus in years	LOA Code 0	LOA Code 1	LOA Code 2	LOA Code 3	Total
1-5	99 (28.2%)	48 (13.7%)	21(6.0%)	5(5.3%)	173(49.4%)
6-10	36 (10.3%)	39 (11.1%)	9(2.6%)	1(0.3%)	85(24.3%)
Above 10	53 (15.1%)	29 (8.3%)	10(2.9%)	0(0.0%)	92(26.3%)
<b>Total</b>	188 (53.7%)	116 (33.2%)	40(11.4%)	6(1.7%)	350(100%)

Chi Square value= 18.055; P=0.035

**Graph 21: Distribution of study population based on duration of diabetes and Loss of attachment (LOA) highest**



(Chi Square value= 18.055; P=0.035)

**Table 27** and **Graph 22** shows the distribution of study population based on age group and Community Periodontal Index. Among the diabetic population who were 18 -30 years of age group 5 (1.4%) were normal, 19 (5.4%) had calculus, 10 (2.9%) participants had 4 – 5 mm pocket depth, 1 (0.3%) had 6 mm or more pocket depth. Among 31-40 years of age group 2 (0.6%) were normal, 41 (11.7%) had calculus, 11(3.1%) diabetic patients had 4 – 5 mm pocket depth, 1 (0.3%) had 6 mm or more pocket depth. Among 41-50 years of age group 65 (18.6%) diabetics had calculus, 26 (7.4%) had 4 – 5 mm pocket and 2 (0.6%) diabetics had pocket depth of 6 mm or more. Among the diabetics who were in age group of 51-60 years, 41 (11.7%) had calculus, 50 (14.3%) had 4 – 5 mm pocket depth and 16 (4.6%) participants had pocket depth of 6 mm or more. Among the diabetics who were in age group of 61-70 years, 18 (5.1%) had calculus, 21 (6.0%) had 4 – 5 mm pocket depth and 10(2.9%) participants had pocket depth of 6 mm or more. Among the diabetics who were in age group of above 70 years, 4 (1.1%) had calculus, 6 (1.7%) had 4 – 5 mm pocket depth and 1 (0.3%) participants had pocket depth of 6 mm or more.

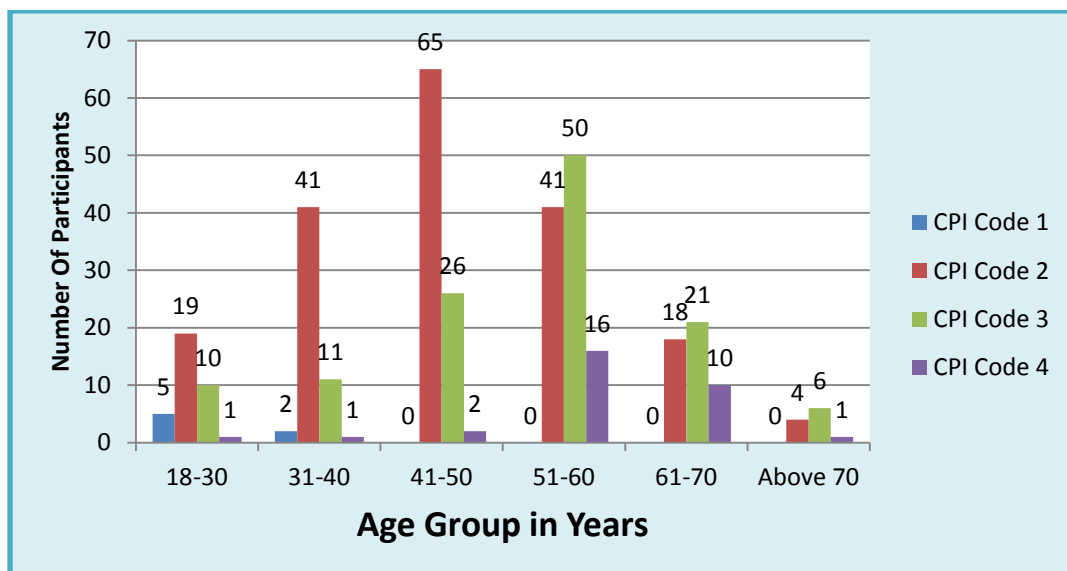
Statistical analysis showed a significant association between age and Community Periodontal Index. ( $\chi^2$ =Chi Square value= 81.770; P=0.000)

**Table 27: Distribution of study population based on age group and Community Periodontal Index**

Age group in years	CPI Code 1	CPI Code 2	CPI Code 3	CPI Code 4	Total
18-30	5(1.4%)	19 (5.4%)	10(2.9%)	1(0.3%)	35(10.0%)
31-40	2(0.6%)	41(11.7%)	11(3.1%)	1(0.3%)	55(15.7%)
41-50	0(0.0%)	65(18.6%)	26(7.4%)	2(0.6%)	93(26.6%)
51-60	0(0.0%)	41(11.7%)	50(14.3%)	16(4.6%)	107(30.6%)
61-70	0(0.0%)	18(5.1%)	21(6.0%)	10(2.9%)	49(14.0%)
Above 70	0(0.0%)	4(1.1%)	6(1.7%)	1(0.3%)	11(3.1%)
<b>Total</b>	<b>7(2.0%)</b>	<b>188(53.7%)</b>	<b>124(35.4%)</b>	<b>31(8.9%)</b>	<b>350(100%)</b>

Chi Square value= 81.770; P=0.000

**Graph 22: Distribution of study population based on age group and Community Periodontal Index**



Chi Square value= 81.770; P=0.000

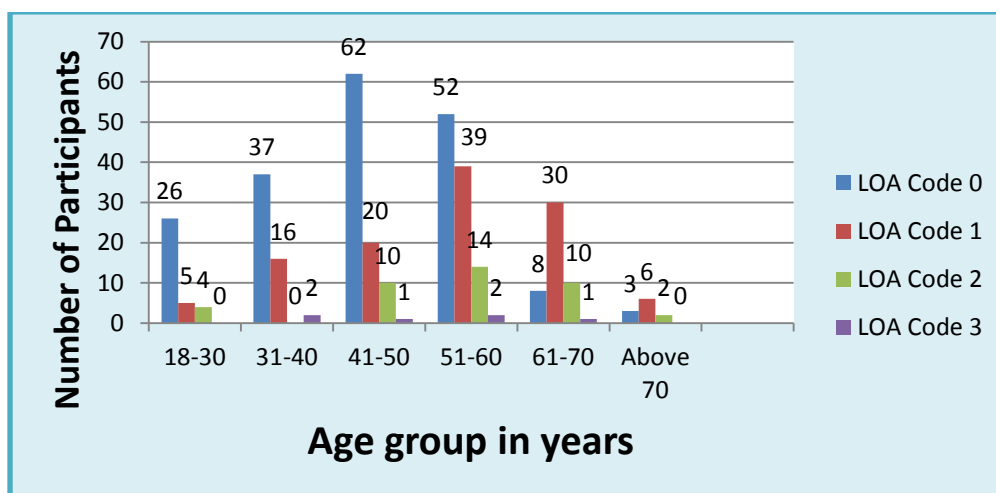
**Table 28** and **Graph 23** shows the distribution of study population based on age group and highest Loss of attachment (LOA). Among the diabetic population who were 18 -30 years of age group 26 (7.4%) participants had 0 – 3 mm attachment loss, 5 (1.4%) diabetics had 4 – 5 mm attachment loss, 4 (1.1%) 6 – 8 mm attachment loss and 0 (0.0%) had loss of attachment of 9-11 mm. Among 31-40 years of age group 37 (10.9%) participants had 0 – 3 mm attachment loss, 16 (4.6%) diabetics had 4 – 5 mm attachment loss, 0 (0.0%) had 6 – 8 mm attachment loss and 2 (0.6%) had loss of attachment of 9-11 mm. Among 41-50 years of age group. 62 (17.7%) participants had 0 – 3 mm attachment loss, 20 (5.7%) diabetics had 4 – 5 mm attachment loss, 10 (2.9%) had 6 – 8 mm attachment loss and 1 (0.3%) had loss of attachment of 9-11 mm. Among the diabetics who were in age group of 51-60 years, 52 (14.9%) participants had 0 – 3 mm attachment loss, 39 (11.1%) diabetics had 4 – 5 mm attachment loss, 14 (4.0%) had 6 – 8 mm attachment loss and 2 (0.6%) had loss of attachment of 9-11 mm. Among the diabetics who were in age group of 61-70 years 8 (2.3%) participants had 0 – 3 mm attachment loss, 30 (8.6%) diabetics had 4 – 5 mm attachment loss, 10 (2.9%) had 6 – 8 mm attachment loss and 1 (0.3%) had loss of attachment of 9-11 mm. Among the diabetics who were in age group of above 70 years, 3 (0.9%) participants had 0 – 3 mm attachment loss, 6 (1.7%) diabetics had 4 – 5 mm attachment loss, 2 (0.6%) had 6 – 8 mm attachment loss.

Statistical analysis showed a significant association between age and highest Loss of attachment (LOA) ( $\chi^2=56.325$ ;  $P=0.000$ )

**Table 28: Distribution of study population based on age group and Loss of attachment**

Age group in years	LOA Code 0	LOA Code 1	LOA Code 2	LOA Code 3	Total
18-30	2 (7.4%)	5 (1.4%)	4(1.1%)	0(0.0%)	35(10.0%)
31-40	37(10.9%)	16 (4.6%)	0(0.0%)	2(0.6%)	55(15.7%)
41-50	62 (17.7%)	20(5.7%)	10(2.9%)	1(0.3%)	93(26.6%)
51-60	52(14.9%)	39(11.1%)	14(4.0%)	2(0.6%)	107(30.6%)
61-70	8(2.3%)	30(8.6%)	10(2.9%)	1(0.3%)	49(14.0%)
Above 70	3(0.9%)	6(1.7%)	2(0.6%)	0(0.0%)	11(3.1%)
<b>Total</b>	<b>188(53.7%)</b>	<b>116(33.2%)</b>	<b>40(11.4%)</b>	<b>6(1.7%)</b>	<b>350(100%)</b>

**Graph 23: Distribution of study population based on age group and Loss of attachment**



Chi Square value= 56.325;  $P=0.000$

## **DISCUSSION**

Diabetes mellitus is one of the major chronic health problems facing the world today with prevalence of approximately 285 million people worldwide (6.6%) in the 20–79 year age group in 2010 and by 2030, 438 million people (7.8%) of the adult population, is expected to have diabetes.<sup>6</sup> The International Diabetes Federation (IDF) estimates the total number of people in India with diabetes to be around 50.8 million in 2010, rising to 87.0 million by 2030.<sup>36</sup>

Diabetes is a clinically and genetically heterogeneous group of metabolic disorders manifested by abnormally high levels of glucose in the blood. Implication of Diabetes mellitus on oral health is very well documented.<sup>4</sup> The association of diabetes mellitus and periodontal diseases has received the greatest attention. It is believed to promote periodontitis through an exaggerated inflammatory response to the periodontal microflora.<sup>37</sup>

Ship (2003) listed dental caries, salivary dysfunction, oral mucosal diseases, oral infections such as candidiasis, taste and other neurosensory disorders are also prevalent among diabetes. However, in the previous studies the choice of indices for measuring the oral health was diverse in character and only few studies provide the oral self care practices, oral health status and treatment needs in a comprehensive manner.

Hence the present study was undertaken to assess and compare the oral self care practices, oral health status and treatment needs of diabetic and non

diabetic population to provide additional information to the existing literature. While oral self care practices was assessed using a pretested close ended structured questionnaire, WHO Oral Health Assessment Proforma (Basic oral health survey 1997) was used for assessing oral health status and treatment needs.

Study samples were taken in Chennai and Puducherry. A total of 700 subjects - 350 diabetic and same number of age and sex matched non diabetics were examined.

**Oral hygiene practices:**

The present study revealed that there was not much difference in the oral hygiene practices among diabetic and non diabetic. 94.7% participants brushed their teeth using tooth brush and tooth paste.

This finding was similar with the study conducted by **CVK Reddy et al**<sup>30</sup> in Mysore where 97.1% of study participants used tooth brush and tooth paste to clean. But in the study conducted by **Safia A et al**<sup>38</sup> in Jeddah, Saudi Arabia only 80% used tooth brush and tooth paste. This may be due to the fact that the study was conducted in Urban cities where most of them use tooth brush and tooth paste as oral hygiene measures.

In our study 88.7% cleaned their teeth once in a day and 10.0% cleaned their teeth twice daily which was similar to the study conducted by



**Reddy VC et al<sup>4</sup>** in Chennai were most of them brushed once daily and 8.2% brushed their teeth twice daily.

But study done by **Karikoski et al<sup>22</sup>** in Finland reported that 38% brushed their teeth more than once a day and the study done by **Alvis C et al<sup>31</sup>** in Brazil, 49.1% of subjects brushed atleast three times a day. The difference in the results shows that the oral hygiene habit in the developed countries were better when compared to India where still the importance for oral hygiene has to be improved and awareness has to be created.

In our study only 23(3.3%) used interdental cleansing aids like flossing. It shows that participants were not giving importance to flossing.

But in a study conducted by **Orlando VA et al<sup>32</sup>** in Colorado, only 42% did not floss and another study done by **Alvis C et al<sup>31</sup>** (30.9%) diabetics used dental floss atleast once a day. The results emphasized that awareness about the importance of interdental cleaning should be created among adults in Chennai.

#### **Dentist visit and reason for dental visit:**

Our study results revealed that among 274 diabetics who visited dentist before, 121 (44.2%) patients visited dentist over 12 months. Regular home oral care and a yearly dental check-up are the best means for maintaining oral hygiene but in spite of this many people fail to take these precautions. Barriers

to seeking dental services as classified by the Federation Dentaire Internationale are related to the following:

- a. Individuals themselves (lack of perceived need and access, anxiety or fear and financial considerations),
- b. Dental profession (inappropriate manpower resources, uneven geographical distribution, training inappropriate to changing needs and demands and insufficient sensitivity to patient's attitudes and needs), and
- c. Society (insufficient public support of attitudes conducive to health, inadequate oral health care facilities, inadequate oral health manpower planning and insufficient support for research.<sup>39,40</sup>

The study finding was better than the study conducted by **Collin HL et al<sup>18</sup>** in Finland, where regular dental check-ups were reported by 28% of NIDDM patients and 43% of control subjects; the rest of the subjects visited a dentist only occasionally.

But in a study conducted by **Alvis C et al<sup>31</sup>** in Brazil 70.9% of non diabetics visited the dentist at least once. More diabetics had been visited the dentist within 12 months (63.8%) than non diabetics (48.7) which shows that in developed countries the habit of visiting dentist regularly for check up was existing.

In the present study majority of study population i.e., 167 (31.8%) visited the dentist for extraction of which 97 (35.4%) were diabetic and 70 (27.9%) were non diabetic. 133 (25.3%) participants had visited a dentist due to tooth ache of which 56 (20.4%) were diabetic and 77 (30.7%) were non diabetic.

But studies conducted in Brazil by **Alvis C et al**<sup>31</sup> the main reason for the visit was cleaning of teeth (34.0% of diabetes vs 46.2% of non diabetics).

Caries treatment was the reason for the visit in a study conducted by **Karikoski A et al**<sup>22</sup> in Finland. In a study done by **Orlando VA et al**<sup>32</sup> in Colorado majority of them visited the dentist for regular dental check up and preventive treatment. All this results clearly demonstrates that the study participants visit dentist in emergency or only when there is pain, preventive treatments were not given importance by them.

**Dentist advice:**

In the present study only 125 (23.8%) of study participants received advice from the dentist regarding their improvement in oral hygiene.

This study was similar to findings from the study done by **Karikoski A et al**<sup>22</sup> over one third of the participants (35%) agreed that they have not received sufficient information about prevention and treatment of periodontal diseases from dental professionals.

This result gives an impression that the oral health education was not given important by the professionals where a study conducted by **Baghianimoghadam MH et al**<sup>41</sup> demonstrated that health education have an impact on all of the quality of life measures.

A study conducted by **Koerber et al** also recommended the development of dental consultation protocols and education about basic oral health as strategies for improving the oral health of individuals with type I Diabetes Mellitus.

But in a study by **Orlando et al**<sup>32</sup> reported that 92% were receiving instructions about tooth brushing technique and messages about the hazards of tobacco use and its effects on the oral cavity reached 69.8% of this group.

**Physician referral:**

Only 25 (7.1%) participants had been referred by physicians for oral health check up for oral complications of diabetes and the remaining 325 (92.9%) were not referred to dentist which shows that all health care professionals should be educated about the oral complications of diabetes and the ways to prevent it.

But in a study conducted by **Karikoski A et al**<sup>22</sup> in Finland almost 16% had received physician referral for dental care because some individuals with diabetes were not regular dental visitors and in a study conducted by **Orlando VA et al**<sup>32</sup> in Colorado 77% were referred by health care providers

which shows that the complications of oral health were known by other health professionals also which should be improved in our country.

**Oral mucosal lesions:**

In the present study higher percentage of oral mucosal lesions was observed in the diabetic group (11.8%) when compared to non diabetics (7.4%).

The prevalence of mucosal lesions were as follows. 47 (6.7%) leukoplakia, of which 28 (8%) were diabetic and 19 (5.4%) were non diabetic. 8 (2.3%) and 3 (0.9%) patients were affected by ulcers and Candidiasis in diabetic group were no one had ulcer and 1 (0.3%) only had candidiasis in non diabetic group. Study finding shows that ulcers were more commonly present among diabetic than non diabetic.

This finding in our study was in agreement with a previous study conducted in Budapest Hungary, where the study reported that leukoplakia and lichen planus both showed the highest prevalence among diabetic.

A study conducted by **Guggenheimer Jet al**<sup>20</sup> suggests that subjects with insulin dependant diabetes had one or more soft lesions (44.7% in diabetic patients and 25% in controls). Fissured tongue, irritation fibromas and traumatic ulcers were the most prevalent non candidal lesion among diabetic patients. Irritation fibromas and traumatic ulcers were associated with older age and with longer duration and complications of insulin dependent diabetes.

**Periodontal Status:**

Type 2 diabetes mellitus (T2DM) patients had a higher prevalence of periodontal disease as determined by using either periodontal attachment loss or radiographic bone loss parameters, indicating that T2DM is a risk factor for periodontal disease. The present study showed that there was a significant association between diabetes and periodontal status. Severity of periodontal disease was high among Diabetics than non diabetics.

The participants with pocket formation of 4-6 mm was 124 (35.4%) diabetics and 100 (28.6%) non diabetics. Pocket formation of more than 6mm was also more prevalent among diabetics 31 (8.9%) than non diabetics 6 (1.7%).

This was similar to the study Conducted by **Reddy CVK et al**<sup>30</sup> were diabetics had more number of shallow pockets (34.1%) and deep periodontal pockets (23.7%) when compared to non diabetics the shallow pockets were 24.5% and deep periodontal pockets was 15.4%.

Study by **Mittal Met al**<sup>35</sup> showed that periodontitis prevalence was significantly higher in a group of Mauritian patients with Diabetes mellitus type II compared to a group of healthy Mauritian.

Study done by **Hintao Jet al**<sup>28</sup> and **Chandu GN et al**<sup>29</sup> also showed that CPI code 3 and 4 was high among diabetics than non diabetics.

Study conducted by **Das Met al**<sup>34</sup> more diabetic subjects were affected by severe degree of periodontal disease manifested as deep periodontal pockets while in non diabetics more number of subjects were affected by relatively lower degree of disease manifested as bleeding and calculus.

Mechanism by which diabetes may influence the periodontium:

Most culture studies show that the bacterial microflora at periodontally diseased sites in diabetic subjects is similar to the microflora at similarly diseased sites in non-diabetic subjects. However, the apparent lack of significant differences in potential pathogens suggests that alterations in the host immune inflammatory response may have a major influence on the increased prevalence and severity of periodontal destruction seen in diabetes.

Neutrophil adherence, chemotaxis, and phagocytosis are often impaired, which may inhibit bacterial killing in the periodontal pocket and significantly increase periodontal destruction. The increased levels of periodontal attachment and bone loss seen in diabetic patients may be associated with the alterations in connective tissue metabolism that uncouple the resorptive and formative responses. There is additional evidence emerging that decreases in matrix-producing cells critical to maintaining the periodontium, including fibroblasts and osteoblasts, occur due to an increased rate of apoptosis in a hyperglycemic state in response to *P. gingivalis* infection. Increased plasma glucose levels are also reflected in elevated

gingival crevicular fluid glucose levels in diabetic individuals. Because the periodontal pocket is a site of persistent bacterial wounding, an intact wound-healing response is critical to maintain tissue health.<sup>42-44</sup>

**Loss of attachment:**

Diabetics had more number of loss of attachment of 4-5 mm 116 (33.1%) and 6-8 mm 40 (11.4%) when compared to non diabetics loss of attachment of 4-5 mm was 84 (24.0%) and 6-8 mm was 35 (10.0%).

This results was similar to the study done by **Reddy CVK et al, Moore PA, Weyant RJ et al, Chandu GN et al, Lalla E et al, and Firatli E.**<sup>30,17,19, 24,29</sup> The diminished levels of proliferation and differentiation and increased levels of cell death provide a compelling argument for the greater propensity of diabetic patients to have more severe periodontal attachment loss due to inadequacies in the formative aspects of connective tissue metabolism relative to the degradation and remodeling of tissues of the attachment apparatus.<sup>42</sup>

**Excluded sextants:**

In the present study the percentage of patients with excluded sextants were found to be high in diabetics (19.5%) when compared to non diabetic group (14.7%) and the findings were similar to the study conducted by **Reddy CVK et al, Puranik MP et al and Bacic M et al.**<sup>1,30,15</sup> These findings



conclude that missing tooth were more common among diabetic than non diabetic.

**Dental caries experience:**

Clinical and epidemiological studies have been carried out in many parts of the world to investigate the association between diabetes and dental caries. Most studies showed higher, similar or lower caries experience among diabetics than non diabetics.

In the present study Diabetic and non diabetic had a mean DMFT Value of 4.014 and 3.020 respectively. The mean decayed teeth (DT) was low in diabetic group(1.89) and high among(2.04) non diabetic. The mean Missing teeth (MT) was 1.67 more among diabetic and less in non diabetic (0.91). The mean filled teeth (FT) was low (0.44) among diabetic and than non diabetic (0.54).

The study finding was favor to the study conducted by **Puranik MP et al**<sup>1</sup> the mean DMFT was similar in diabetics and non-diabetics but the mean number of decayed and filled teeth was significantly lower among diabetics were the mean number of teeth missing teeth was high among diabetics. Carious lesions was significantly high among diabetics in studies conducted by **Reddy CVK et al, Hintao J et al, Chandu GN et al and Bacic M et al**.<sup>30,17,15,29</sup> In spite of decreased intake of sugar consumption Xerostomia among diabetic patients can lead to markedly increased dental caries.

**Treatment Needs:**

In the present study, the number of teeth requiring one surface filling was more among non-diabetics than diabetics which was consistent with the study conducted by **Reddy CVK et al** and **Puranik MP et al.**<sup>1,30</sup>

Number of participants requiring two surface filling, pulp care and extraction was significantly more among diabetics which was also in agreement with the study conducted by **Reddy CVK et al** and **Puranik MP et al.**<sup>1,30</sup>

**Prosthodontic status:**

A higher percentage of diabetic group needed prosthesis in the upper jaw (34.9%) and in the lower jaw (44%).

The finding was in agreement with the study conducted by **Reddy VC et al**<sup>4</sup> in Chennai showed a mean number of teeth which require removable partial denture was 2.03+2.62 among diabetics and 1.57+2.13 among non diabetics.

The present study has few limitations of its own,

Comparison for dentition status and periodontal status depending upon the diabetic status of the patient had not been done in the present study as the evaluation of blood sugar level was not done. Age span of the study participants and the cross sectional study design does not allow us to draw the temporal association of Diabetes Mellitus on dental health.

Confounding factors like age distribution, diabetic control also would have influenced the study result.

## **SUMMARY**

The present descriptive cross-sectional study was conducted to assess the oral self care practices, oral health status and treatment needs of diabetic and non diabetic patients. Ethical clearance was obtained from the Institution Review Board of Ragas Dental College & Hospital and from concerned authorities in the respective diabetic centres to conduct the study and informed consent was obtained from the study participants.

Study was conducted among 350 diabetic patients and a similar number of non diabetic were examined, the age range of the study population was 18-78 years. Data was collected using a questionnaire for oral self care practices and WHO proforma (1997) was used for assessing oral health status and treatment needs. Data was analyzed using SPSS version17.

The findings of the current study were as follows:

- Among diabetics majority (30.6%) of them were in the age group of 51-60, 26.6% were in the age group of 41-50.
- 173 (49.4%) of patients gave a history of diabetes less than five years, 85 (24.3%) from five to ten years and remaining 92 (26.3%) gave a history of more than ten years
- There was not much difference in the oral hygiene practices among diabetic and non diabetic. 94.7% participants brushed their teeth using

tooth brush and tooth paste. 88.7% participants cleaned their teeth once in a day and 10.0% cleaned their teeth twice daily.

- Only 23(3.3%) of participants used interdental cleansing aids like flossing.
- 525 (75.0%) had visited a dentist earlier of which 274 (78.3%) were diabetic patients and 251 (71.7%) were non diabetic control subjects.
- Majority of study population i.e., 167 (31.8%) visited the dentist for extraction of which 97 (35.4%) were diabetic and 70 (27.9%) were non diabetic. 133 (25.3%) participants had visited a dentist due to tooth ache of which 56 (20.4%) were diabetic and 77 (30.7%) were non diabetic.
- Among 350 diabetic only 25 (7.1%) participants had been referred by physicians and the remaining 325(92.9%) was not referred to dentist.
- Among the total study population 19 (5.4%) diabetic and 12 (3.4%) non diabetic subjects reported of TMJ symptoms, 22 (6.3%) diabetic and 16 (4.6%) non diabetic had clicking, 9 (2.6%) diabetic had tenderness on palpation, 7 (2.0%) diabetic had reduced jaw mobility.
- There were cases of 47 (6.7%) leukoplakia, of which 28 (8%) were diabetic and 19 (5.4%) were non diabetic. 8 (1.1%) ulcers, 4 (0.5%) Candidiasis and 8 (1.1%) of study participants were affected by Oral submucous fibrosis.

- 224 (32.0%) study participants of which 124 (35.4%) diabetic and 100 (28.6%) non diabetic had pocket depth of 4-5mm.
- 37 (5.3%) participants had pocket depth of 6mm or more of which 31 (8.9%) were diabetic and 6 (1.7%) were non diabetic.
- 92 (13.1%) study participants had one sextant excluded of which 44 (12.6%) were diabetic and 48 (13.7%) were non diabetic. 28 (4.0%) study participants had two sextants excluded of which 24 (6.9%) were diabetic and 4 (1.1%) were non diabetic.
- 200 (28.6%) subjects had 4 – 5mm attachment loss, of which 116 (33.1%) were diabetic and 84 (24.0%) were non diabetic.
- 75 (10.7%) subjects had 6 – 8mm attachment loss of which 40 (11.4%) were diabetic and 35 (10.0%) were non diabetic, 9 (1.3%) subjects had 9 – 11mm attachment loss of which 6 (1.7%) were diabetic and 3 (0.9%) were non diabetic
- Diabetic and non diabetic had a mean DMFT Value of 4.014 and 3.020 respectively.
- The mean decayed teeth (DT) was low in diabetic group (1.89) and high among (2.04) non diabetic.
- The mean Missing teeth (MT) was 1.67 more among diabetic and less in non diabetic (0.91). The mean filled teeth (FT) was low (0.44) among diabetic and than non diabetic (0 .54).

## **CONCLUSION**

Diabetes mellitus is one of the major chronic health problems facing the world today with prevalence of approximately 285 million people worldwide (6.6%) and it is known to affect oral disease progression. Diabetes is consistently and strongly related to destructive periodontal disease and good oral health improves glycemic control and may contribute to prevention of long term oral complications of the disease.

Patients with diabetes appear to lack important knowledge about the oral health complications of their disease. The results of this study did not indicate improved preventive behaviors among the subjects with diabetes compared with nondiabetic control subjects.

The mean DMFT status, oral mucosal lesions, TMJ symptoms are also high among diabetic than the non diabetic. Furthermore, because some individuals with diabetes are not regular dental visitors, all health care professionals should be encouraged to support efforts for improvement in oral health. According to America's declaration on Diabetes mellitus states that almost 5%- 14% money is spent for the health care. In order to improve the quality of life of the individual with diabetes, dentists have an opportunity and the responsibility to promote good oral health, an integral part of general health, by regular dental examinations, proper oral hygiene instructions and smoking cessation that may significantly improve the oral health of their diabetic patients.

## **RECOMMENDATIONS**

### **To Diabetic Patients:**

1. Brush twice daily and floss once a day
2. Small headed soft bristle toothbrush should be used and changed once in four months
3. Complete or partial dentures, should be cleaned daily and should be removed each night before sleep.
4. Visit dentist at least once in every six months to prevent minor problems becoming major ones.
5. Dentist should be informed about the diabetes in every visit.
6. Blood glucose levels should be within recommended targets
7. Smoking should be stopped due to increase in resorption of bone and increases periodontal diseases along with diabetes.

### **To Dentist:**

Dental practitioners should educate the diabetic patients about the oral complications of diabetes and proper oral health behaviors that limit the risks of tooth loss, periodontal disease and oral soft-tissue pathologies.

Dental professionals need to have comprehensive knowledge of their patients about: periodontal status, duration of diabetes and its influence with respect to oral diseases and dental treatment particularly among patients with diabetes.

The diabetic patients should be recalled and reviewed twice a year. However, the short-term response to periodontal treatment was equally favourable in all the subjects.

**To Physicians:**

All diabetic patients should be referred to dentist for preventing oral health complications due to diabetes.



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Annexure I



**RAGAS DENTAL COLLEGE & HOSPITAL**

(Unit of Ragas Educational Society)

Recognized by the Dental Council of India, New Delhi

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To:

Dr. C.V. Krishnaswamy  
Head of the Dept. of Diabetology  
Voluntary Health Services  
Tharamani High Road  
Chennai – 600 113

Sir,

This is to certify that Dr. Rajeswary. K is a bonafide Second year MDS (Public Health Dentistry) student of this college. She is doing the dissertation on "Oral Self care practices and Oral Health Status of Diabetic Patients attending diabetic centres in chennai". I will be thankful if you could allow her to collect data's from the patients attending your outpatient department to proceed with her dissertation.

Thanking you,

Yours sincerely,

(Dr. S. RAMACHANDRAN)

PRINCIPAL

PRINCIPAL

RAGAS DENTAL COLLEGE & HOSPITAL  
CHENNAI

Date: 19.12.2011

Annexure II



**THE VOLUNTARY HEALTH SERVICES  
MULTI-SPECIALITY HOSPITAL & RESEARCH INSTITUTE**

President

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**Dr. E.S. KRISHNAMOORTHY**

REF:VHS:PS:2012

20 January 2012

To  
The Principal  
Ragas Dental College  
Uthandi, Chennai -119.

Sir,

Ref: Your letter dated 19.12.2011

With reference to the above letter, Dr.K.Rajeswary is permitted to do her dissertation on " Oral self care practices and Oral Health status of Diabetes patients" for a period of one month from 19.01.2012 to 18.02.2012.

*She has to pay Rs.1000/- p.m. towards her dissertation work.*

Thanking you,

Yours faithfully

*Malvi Balakrishnan*  
Administrative Officer (S)  
**Administrative Officer (S)**  
**VOLUNTARY HEALTH SERVICES**  
**CHENNAI - 600 113.**

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**ANNEXURE III**  
**INFORMED CONSENT FORM**

I Mr/Ms ..... aged ..... the undersigned hereby agree to participate in the research project titled, “Oral Self Care Practices, Oral Health Status and Treatment needs Of Diabetic and non diabetic patients- A comparative study” conducted by Dr.K Rajeswary, Postgraduate student, under the guidance of Dr.P.D.Madan Kumar MDS, Associate Professor, Department of Public Health Dentistry, Ragas Dental College and Hospital, Chennai.

I understand that as a part of this study, my oral cavity will be examined by the investigator using examination instruments.

I also understand that this examination will not include any invasive procedures or any action which might cause pain or discomfort to me.

I hereby give my voluntary consent to participate in the study voluntarily, unconditionally and freely without fear or pressure in mentally sound and conscious state.

Witness/ representative

Participant’s Signature

Date

**ஒப்புதல் படிவம்**

----- என்கின்றநான், சென்னைராகாஸ் பல் மருத்துவக் கல்லூரிமற்றும் மருத்துவமனையின் முதுநிலை (M.D.S) பட்டப்படிப்பு பயிலும் மரு. கு. இராஜேஸ்வரி அவர்கள் மேற்கொள்ளும் “நீரிழிவு நோய் உள்ளவர்கள் மற்றும் நீரிழிவு நோய் இல்லாதவர்கள் வாய் நலம் சார்ந்தஆய்வு” என்கின்ற ஆராய்ச்சிக்கான பரிசோதனைக்கு என்னை உட்படுத்துவதற்கு எனது மனமுவந்த பரிபூரணசம்மதத்தினை அளிக்கிறேன்.

மேலும் எனக்கு என்னுடைய நோயின் தன்மையைபற்றியும், அதனால் ஏற்படக்கூடிய விளைவுகளைப்பற்றியும் எடுத்துக் கூறப்பட்டுள்ளது எனவும், இந்த பரிசோதனைக்கு நான் எந்தவித அச்சமுமின்றி தன்னிச்சையாகவும், தெளிவான முழு மனதுடன் என்னுடைய பரிபூரணசம்மதத்தினை அளிக்கிறேன் என இதன் மூலம் தெரியப்படுத்துகிறேன்.

சாட்சியாளர்கள் :

பங்குபெறுபவர் கையெப்பம்

தேதி:

**Annexure IV**

**PHOTOGRAPHS**

**A. Oral Examination**



**B. Armamentarium**



ANNEXURE V

Department of Public Health Dentistry  
Ragas Dental College and Hospital  
Chennai

சமூக நல பல் மருத்துவத்துறை  
ராகாஸ் பல்மருத்துவக் கல்லூரி மற்றும் மருத்துவமனை.  
சென்னை.

Questionnaire  
வினாக்கள்

Examiner: Dr.K.Rajeswary  
Post Graduate Student

Guided by: Dr.P.D.Madan Kumar MDS,  
Associate Professor

Department of Public Health  
Dentistry  
Ragas Dental College And  
Hospital  
Dr.M.Shivakumar M.D.S,  
Professor and HOD  
Department of Public Health  
Dentistry

ஆய்வாளர்: Dr.K. ராஜேஸ்வரி  
மேல்பட்டபடிப்புமாணவி

வழிநடத்துதல்: Dr.P.D.மதன்குமார்MDS,  
இணைபேராசிரியர்

சமூக நல பல்மருத்துவத்துறை  
ராகாஸ்பல்மருத்துவக்கல்லூரி  
மற்றும்மருத்துவமனை  
Dr.M.சிவகுமார்M.D.S,  
துறைதலைவர்&பேராசிரியர்  
சமூக நல பல் மருத்துவத்துறை

Oral Self Care Practices, Oral Health Status and Treatment needs Of Diabetic and non diabetic patients- A comparative study

வாய்பராமரிப்புமுறை, வாய்க்காதாரநிலை மற்றும் நீரழிவு நோய் உள்ளவர் இல்லாதவர் சிகிச்சை தேவைபற்றிய ஆய்வு.

Instruction: Please answer the following questionnaire appropriately by marking (✓) or write in words. The information will be kept confidentially.

குறிப்பு:தயவு செய்து கீழ் கொடுக்கப்பட்டுள்ள வினாக்களுக்கு பொருத்தமான விடைக்கு(✓) செய்யவும் அல்லது உங்களது கருத்துக்களை எழுதவும். தகவல்பாதுகாக்கப்படும்.

Serial Number:

Examination date:

வரிசைஎண்:

ஆய்வுதேதி:

1. Age: வயது: 2. Sex: பாலினம்:
3. Education: கல்விதகுதி:
- |                       |                      |                          |
|-----------------------|----------------------|--------------------------|
| 1.No formal education | 2. Primary education | 3. Secondary education   |
| 4.PUC/ diploma        | 5. Degree            | 6.PG/Professional degree |
- 1.முறையான கல்விபயிலாதவர் 2.ஆரம்ப கல்வி 3.நடுநிலைகல்வி  
4. பி.யு.சி/ தொழிற்கல்வி 5.பட்டபடிப்பு 6.முதுநிலைகல்வி
4. How long do you have diabetes mellitus?  
1. Less than 1 year 2. From past 1-5 years 3. From past 6-10 years  
4. Specify. . . . .  
எத்தனை ஆண்டுகளாக நீரிழிவு நோய்ப்பாதிப்புள்ளது?  
1.1 ஆண்டுகுறைவாக 2. 1 முதல் 5 ஆண்டுகள் 3. 6 முதல் 10 ஆண்டுகள்  
4. குறிப்பிடு
5. Do you have any other medical problem?  
1. Yes 2. No If yes, specify. . . . .  
உங்களுக்கு வேறு எந்த மருத்துவம் சார்ந்த பிரச்சனை உள்ளதா?  
1. ஆம் 2. இல்லை இருந்தால்குறிப்பிடுக.....
6. Do you have the habit of smoking any tobacco products?  
a. Yes b. No  
உங்களுக்கு ஏதாவது புகையிலை பொருட்களை புகைபிடிக்கும் பழக்கம் உள்ளதா?  
a. ஆம் b. இல்லை  
If yes, what do you smoke?  
1. Cigarette 2. Beedi 3. Others, Specify .. . . . .  
ஆம் என்றால், எதை புகைபீர்?  
1. சிகரெட் 2. பீடி 3. வேறு ஏதேனும், குறிப்பிடுக.....  
How many cigarettes/ Beedis do you smoke in a day? .. . . . .  
ஒரு நாளில் எத்தனை சிகரெட் / பீடி புகைபீர்?  
How many years are you having this smoking habit. . . . .  
எத்தனை ஆண்டுகளாக உங்களுக்கு புகைபழக்கம் உள்ளது?
7. Do you have the habit of tobacco chewing /pan?  
a. Yes b. No

உங்களுக்கு புகைலை/ வெற்றிலை மெல்லும் பழக்கம் உள்ளதா?

a.ஆம் b. இல்லை

If yes, Type of tobacco used:

ஆம் என்றால், எந்த வகை

Quantity of tobacco chewed per day:

நாளொன்றுக்கு மெல்லும் புகையிலையின் அளவு.

Frequency of tobacco use

எவ்வளவு கால அளவில் புகையிலை பயன்படுத்துவீர்

Since how many years you are having the habit of tobacco chewing:

எத்தனை வருடங்களாக புகையிலை மெல்லும் பழக்கம் உள்ளது

8. Do you have the habit of consuming alcohol?

மது அருந்தும் பழக்கம் உள்ளதா?

How much of alcohol you consume per day: . . . . .

நாளொன்றிற்கு எவ்வளவுமது அருந்துவீர்

Since how many years you are consuming alcohol? . . . . .

எத்தனை ஆண்டுகளாக மதுபழக்கம் உள்ளது?

What is the type of alcohol you are consuming? .....

எந்த வகையான மது அருந்துவீர்?

Frequency of alcohol consumption. . . . .

எவ்வளவு காலஅளவில் மது அருந்துவீர்?

9. How do you clean your teeth?

- |                          |                           |           |
|--------------------------|---------------------------|-----------|
| 1. Tooth Brush and paste | 2. Tooth brush and powder |           |
| 3. finger and paste      | 4. Finger and powder      | 5. Finger |
| 6. others, specify.....  |                           |           |

பல்துலக்கும்முறை?

- |                                  |                         |            |
|----------------------------------|-------------------------|------------|
| 1.பல்துலக்கி + பற்பசை            | 2. பல்துலக்கி + பற்பொடி |            |
| 3. கைவிரல் + பற்பசை              | 4. கைவிரல் + பற்பொடி    | 5. கைவிரல் |
| 6. வேறுஏதேனும், குறிப்பிடுக..... |                         |            |

10. How many times do you clean your tooth daily?

- |               |          |                   |
|---------------|----------|-------------------|
| 1. Once daily | 2. Twice | 3. Thrice or more |
|---------------|----------|-------------------|

ஒரு நாளில் எத்தனை முறை பல்துலக்குவீர்?

- |            |               |                             |
|------------|---------------|-----------------------------|
| 1. ஒருமுறை | 2. இரண்டுமுறை | 3. மூன்றுஅல்லது அதற்கு மேல் |
|------------|---------------|-----------------------------|

11. Which method do you use to brush your teeth?

- 1.Horizontal 2.Vertical 3.Both. 4.Circular 5. Don't know

பல்துலக்கும் முறைகள்?

1. கிடைமட்டமாக 2. செங்குத்தாக 3. இரண்டுமாக 4. வட்டமாக 5. தெரியாது

12. What type of tooth brush do you use for brushing?

1. Soft 2. Medium 3. Hard 4. Dont know

எந்த வகையான பல்துலக்கி பல்துலக பயன்படுத்துவீர்?

1. மென்மையான 2. நடுநிலை 3. கடுமையான 4. தெரியாது

13. What is the time duration taken for your tooth brushing?

1. 1-2 min 2. 3-5 min 3. 5-7 min 4. Not noticed

பல்துலக்க எடுத்துக்கொள்ளும் காலஅளவு?

1. 1-2 நிமிடங்கள் 2. 3-5 நிமிடங்கள் 3. 5-7 நிமிடங்கள்

4. கவனிக்கவில்லை

14. What is the frequency of changing your tooth brush?

1. 1-2 months 2. 3 months 3. 4-6 months  
4. 7-12 months 5. Once flared 6. irregular  
7. Not noticed

பல்துலக்கியை எப்போது மாற்றுவீர்?

1. 1-2 மாதத்திற்கு ஒருமுறை 2. 3 மாதத்திற்கு ஒருமுறை  
3. 4-6 மாதத்திற்கு ஒருமுறை 4. 7-12 மாதத்திற்கு ஒருமுறை  
5. பாழானபிறகு 6. ஒழுங்கற்றமுறை  
7. கவனித்துஇல்ல

15. Do you use inter dental cleaning aids? Yes/ No

If yes, 1.interdental brush 2. Dental floss 3.Others, specify...

வேறு ஏதேனும் பல்குத்தபடுத்தும் கருவிபயன்படுத்து வீர்களா? ஆம் / இல்லை?

ஆம் என்றால், 1.பல்லிடை பல்துலக்கி 2. பல்லுக்குரியகருவி

3.வேறு என்றால், குறிப்பிடுக

16. Do you use any other dental cleaning aids?

- a. Yes b. No

வேறு ஏதேனும் பல்குத்தபடுத்தும் கருவிபயன் படுத்துவீர்களா?

- a. ஆம் b. இல்லை

17. Have you visited a dentist earlier?

- a. Yes b. No

If Yes, when was the last visit

1. With in 6 month 2. Within 1 year 3. More than 1 year

இதற்கு முன் பல்மருத்துவரை அணுகியுள்ளீரா?

- a. ஆம் b. இல்லை

ஆம் என்றால், கடைசியாக எப்பொது சென்றீர்கள்

1. 6 மாதத்திற்குள் 2. 1 வருடத்திற்குள் 3. 1 வருடத்திற்கு மேல்

If yes, what was the reason for the dental visit?

1. Tooth ache 2. Loose teeth 3. Filling 4. Cleaning  
5. Removal of teeth 6. Replacement of teeth 7. Others

ஆம் என்றால், என்ன காரணத்திற்காக?

1. பல் வலி 2. பல்இழிற்காக 3. அடைபதற்காக 4. பல்சுத்தம் செய்ய  
5. பல் எடுபதற்காக 6. மாற்று பல்வைக்க 7. வேறு ஏதேனும்

18. What dental treatment you received during your last visit?

1. Filling 2. Cleaning 3. Removal of teeth  
4. Replacement of teeth 5. Others, Specify. . . .

நீங்கள் கடைசிமுறை என்னபல்சிகிச்சை பெற்றீர்கள்?

1. பல்அடைப்பு 2. பல்சுத்தம் 3. பல்நீக்கம்  
4. மாற்றுபல்வைப்பு 5. வேறுஏதேனும், குறிப்பிடுக.....

19. Did you receive any advice by dentist for your dental care?. . . .

- a. Yes b. No

If yes what was the advice?. . . . .

பல் மருத்துவர் உங்கள் பல் பாதுகாப்புபற்றிய ஆலோசனை அளித்தாரா?

- a. ஆம் b. இல்லை

ஆம் என்றால் என்ன ஆலோசனை?.....

20. Do you know Diabetes mellitus affects oral health? Yes / No

நீரழிவு நோயினால் உங்கள் வாய்க்காதாரம் பாதிப்பு அடைகின்றது என்று உங்களுக்கு தெரியுமா? ஆம் / இல்லை

21. Have your physician referred you for the dental visit? Yes/ No

உங்கள் மருத்துவர் பல்மருத்துவரை அணுக ஆலோசனை வழங்கி உள்ளாரா? ஆம் / இல்லை



Annexure VI

WHO ORAL HEALTH ASSESSMENT FORM (1997)

Country.....

Leave blank (1) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (4)	Year (5) <input type="text"/> <input type="text"/> (8)	Month (9) <input type="text"/> <input type="text"/> (10)	Day (11) <input type="text"/> <input type="text"/> (14)	Identification number (11) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (14)	Examiner <input type="text"/> (15)	Original/duplicate <input type="text"/> (16)
--	---	---	--	--	---------------------------------------	---

<b>GENERAL INFORMATION</b>		<b>OTHER DATA (specify and provide codes)</b>	
Name .....		<input type="text"/> (29)	
Date of birth (17) <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> (20)	Occupation <input type="text"/> (25)	<input type="text"/> (30)	
Age in years (21) <input type="text"/> <input type="text"/> (22)	Geographical location (26) <input type="text"/> <input type="text"/> (27)	<b>CONTRAINDICATION TO EXAMINATION</b>	
Sex (M = 1, F = 2) <input type="text"/> (23)	Location type: 1 = Urban 2 = Periurban 3 = Rural <input type="text"/> (28)	Reason: .....	
Ethnic group <input type="text"/> (24)		<input type="text"/> (31)	
		0 = No 1 = Yes	

<b>CLINICAL ASSESSMENT</b>			
<b>EXTRA-ORAL EXAMINATION</b>		<b>TEMPOROMANDIBULAR JOINT ASSESSMENT</b>	
0 = Normal extra-oral appearance 1 = Ulceration, sores, erosions, fissures (head, neck, limbs) 2 = Ulceration, sores, erosions, fissures (nose, cheeks, chin) 3 = Ulceration, sores, erosions, fissures (commissures) 4 = Ulceration, sores, erosions, fissures (vermilion border) 5 = Cancrum oris 6 = Abnormalities of upper and lower lips 7 = Enlarged lymph nodes (head, neck) 8 = Other swellings of face and jaws 9 = Not recorded		<b>SYMPTOMS</b> 0 = No 1 = Yes 9 = Not recorded <input type="text"/> (33)	
		<b>SIGNS</b> 0 = No 1 = Yes 9 = Not recorded Clicking <input type="text"/> (34) Tenderness (on palpation) <input type="text"/> (35) Reduced jaw mobility (< 30 mm opening) <input type="text"/> (36)	

<b>ORAL MUCOSA</b>	
<b>CONDITION</b> 0 = No abnormal condition 1 = Malignant tumour (oral cancer) 2 = Leukoplakia 3 = Lichen planus 4 = Ulceration (aphthous, herpetic, traumatic) 5 = Acute necrotizing gingivitis 6 = Candidiasis 7 = Abscess 8 = Other condition (specify if possible) .....	<input type="text"/> (37) <input type="text"/> (40) <input type="text"/> (38) <input type="text"/> (41) <input type="text"/> (39) <input type="text"/> (42)
	<b>LOCATION</b> 0 = Vermilion border 1 = Commissures 2 = Lips 3 = Sulci 4 = Buccal mucosa 5 = Floor of mouth 6 = Tongue 7 = Hard and/or soft palate 8 = Alveolar ridges/gingiva 9 = Not recorded

<b>ENAMEL OPACITIES/HYPOPLASIA</b> Permanent teeth 0 = Normal 1 = Demarcated opacity 2 = Diffuse opacity 3 = Hypoplasia 4 = Other defects 5 = Demarcated and diffuse opacities 6 = Demarcated opacity and hypoplasia 7 = Diffuse opacity and hypoplasia 8 = All three conditions 9 = Not recorded	<b>DENTAL FLUOROSIS</b> 0 = Normal 1 = Questionable 2 = Very mild 3 = Mild 4 = Moderate 5 = Severe 8 = Excluded 9 = Not recorded
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<b>COMMUNITY PERIODONTAL INDEX (CPI)</b> 0 = Healthy 1 = Bleeding 2 = Calculus 3* = Pocket 4-5 mm (black band on probe partially visible) 4* = Pocket 6 mm or more (black band on probe not visible) X = Excluded sextant 9 = Not recorded * Not recorded under 15 years of age	<b>LOSS OF ATTACHMENT*</b> 0 = 0-3 mm 1 = 4-5 mm (cemento-enamel junction (CEJ) within black band) 2 = 6-8 mm (CEJ between upper limit of black band and 8.5-mm ring) 3 = 9-11 mm (CEJ between 8.5-mm and 11.5-mm rings) 4 = 12 mm or more (CEJ beyond 11.5-mm ring) X = Excluded sextant 9 = Not recorded * Not recorded under 15 years of age
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DENTITION STATUS AND TREATMENT NEED				Identification number <input type="text"/>
	55 54 53 52 51 61 62 63 64 65			
Crown (66)	18 17 16 15 14 13 12 11 21 22 23 24 25 26 27 28			(81)
Root (82)				(97)
Treatment (98)				(113)
	85 84 83 82 81 71 72 73 74 75			
Crown (114)	48 47 46 45 44 43 42 41 31 32 33 34 35 36 37 38			(129)
Root (130)				(145)
Treatment (146)				(161)

Primary teeth	Permanent teeth	STATUS	TREATMENT
Crown	Crown/Root		
A	0	0	0 = None
B	1	1	P = Preventive, caries-arresting care
C	2	2	F = Fissure sealant
D	3	3	1 = One surface filling
E	4	—	2 = Two or more surface fillings
—	5	—	3 = Crown for any reason
F	6	—	4 = Veneer or laminate
G	7	7	5 = Pulp care and restoration
—	8	8	6 = Extraction
—	9	9	7 = Need for other care (specify).....
T	T	—	8 = Need for other care (specify).....
—	—	9	9 = Not recorded

PROSTHETIC STATUS	PROSTHETIC NEED
0 = No prosthesis 1 = Bridge 2 = More than one bridge 3 = Partial denture 4 = Both bridge(s) and partial denture(s) 5 = Full removable denture 9 = Not recorded	0 = No prosthesis needed 1 = Need for one-unit prosthesis 2 = Need for multi-unit prosthesis 3 = Need for a combination of one- and/or multi-unit prostheses 4 = Need for full prosthesis (replacement of all teeth) 9 = Not recorded

DENTOFACIAL ANOMALIES			
DENTITION			
(166) <input type="text"/> (167)		Missing incisor, canine and premolar teeth—maxillary and mandibular—enter number of teeth	
SPACE			
<input type="text"/> (168)	<input type="text"/> (169)	<input type="text"/> (170)	<input type="text"/> (171)
Crowding in the incisal segments:	Spacing in the incisal segments:	Diastema in mm	Largest anterior maxillary irregularity in mm
0 = No crowding 1 = One segment crowded 2 = Two segments crowded	0 = No spacing 1 = One segment spaced 2 = Two segments spaced		Largest anterior mandibular irregularity in mm
OCCLUSION			
<input type="text"/> (173)	<input type="text"/> (174)	<input type="text"/> (175)	<input type="text"/> (176)
Anterior maxillary overjet in mm	Anterior mandibular overjet in mm	Vertical anterior openbite in mm	Antero-posterior molar relation:
			0 = Normal 1 = Half cusp 2 = Full cusp
NEED FOR IMMEDIATE CARE AND REFERRAL			
Life-threatening condition	<input type="text"/> (177)	0 = Absent 1 = Present 9 = Not recorded	Referral <input type="text"/> (180)
Pain or infection	<input type="text"/> (178)		0 = No 1 = Yes 9 = Not recorded
Other condition (specify).....	<input type="text"/> (179)		
NOTES			