

Determination of oral hygiene status in Type 2 diabetic patients and comparison with the non diabetic patients ranging from 35 to 80 years of age at a tertiary hospital in West Bengal, India

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Abstract -Diabetes has increased susceptibility to develop infections in different areas, including the oral one, is of enormous dental interest. The aim of the study is to assess the impact of diabetes on the oral health related quality of life (OHRQoL) of 35-80 years of people visiting a tertiary hospital in West Bengal, India. The objective is to assess the oral health status in patients suffering from Diabetes and to establish a comparison between diabetic and non diabetic patients w.r.t oral hygiene status. This was a cross sectional study. A convenience sample of 100 patients with 50 diabetic and 50 non-diabetic patients, all ranging in age from 35-80 years and matched by age and gender, was evaluated by calibrated dentists for caries, bleeding on probing, and plaque and calculus indexes. Descriptive statistics and chi-square test along with establishment of correlation between variables with the help of SPSS protocol were used to describe and assess the data. Our study has made an attempt to determine the association between type 2 DM and periodontal disease at a tertiary hospital. It was found that diabetic subjects manifested relatively higher severity of periodontal disease as compared with non-diabetics. Periodontal disease was more prevalent and severe in type 2 diabetic patients as compared with the non-diabetic patients.

Key Words:diabetes, oral health, periodontal disease

1.INTRODUCTION

Diabetes mellitus (DM), commonly known as diabetes, is a group of metabolic disorders characterized by increase in blood glucose level. It is often caused by autoimmune response. It is a common disorder of endocrine glands. It is also characterized by abnormalities in carbohydrate and lipid mechanism along with chronic hyperglycaemia. Symptoms often include frequent urination, increased thirst, and increased hunger. If it is untreated, diabetes can cause many complications. Acute complications varies from diabetic ketoacidosis, hyperosmolar hyperglycaemic state to death. Serious long-term complications may vary from cardiovascular disease, stroke, chronic kidney disease, foot ulcers, damage to the nerves, damage to the eyes to cognitive impairment.

Diabetes is caused either when the pancreas fails to produce enough insulin, or when the cells of the body fail to respond properly to the insulin produced. There are three main types of diabetes mellitus. Type 1 diabetes, previously referred to as "insulin-dependent diabetes mellitus" (IDDM) or "juvenile diabetes" results from the pancreas's failure to produce enough insulin. It

is due to loss of beta cells, which is caused by an autoimmune response. However, the cause of such kind of autoimmune response is unknown. Type 2 diabetes or "non insulin-dependent diabetes mellitus" (NIDDM) or "adult-onset diabetes" . It occurs due to insulin resistance. It is a condition in which cells fail to respond to insulin properly. As the disease develops, a lack of insulin may also develop. Insulin resistance is due to an abnormal insulin molecule, a large amount of circulating antagonists and defect of target tissue. Gestational diabetes occurs when pregnant women without a previous history of diabetes develop hyperglycaemia. Prevention and treatment involve a healthy diet, regular physical exercise, a normal body weight, and avoiding usage of tobacco. Control of blood pressure is also important. Type 1 diabetes is generally managed with insulin injections. Type 2 diabetes may be treated with medications containing insulin or without insulin. Gestational diabetes gets resolved after the birth of the baby. As of 2017, an estimated 425 million people had diabetes worldwide, with type 2 diabetes making up about 90% of the cases. This represents 8.8% of the adult population, with equal rates in both women and men. Trends suggest that rates will continue to rise. Diabetes at least doubles a person's risk of early death. In 2017, diabetes resulted in approximately 3.2 to 5.0 million deaths. The global economic cost of diabetes related health expenditure in 2017 was estimated at US\$727 billion. In the United States, diabetes cost nearly US\$245 billion in 2012. Average medical expenditures among people with diabetes are about 2.3 times higher. Diabetes is a common disease among Australians, affecting almost 1.5 million people (around 7.6 per cent of the population). People with diabetes who have irregular blood glucose levels have a higher risk of developing tooth problems and gum disease than people without diabetes. This is because of decreased resistance to infection and incapability of timely

healing. The most common oral health problems affecting people with diabetes are periodontal (gum) disease, gum abscesses, tooth decay, fungal infections such as thrush, lichen planus (an inflammatory, autoimmune skin condition), mouth ulcers, taste disturbances, a dry burning mouth (low saliva levels). The specialized tissues which surround and support the teeth is known as periodontium. The word comes from the Greek terms *περί* *peri-*, meaning "around" and *-odont*, meaning "tooth". It means that which is "around the tooth". The periodontium exists for providing support to the teeth . Periodontal (gum) disease is caused by an infection that destroys the alveolar structures and bones supporting the teeth. This bone holds the tooth into the maxilla and mandible. Dental plaque is generally caused by bacteria and food debris which further leads to dental plaque. If left on teeth and gums, plaque hardens and results in formation of calculus or tartar. The plaque and calculus irritate the gums around teeth so they become red, swollen and bleed. As gum disease progresses, the density of bone decreases. As a result, tooth mobility occurs. Gum disease is more common and more severe in people with sub optimal blood glucose levels due to lowered resistance to infection and reduction of healing capacity. Symptoms of gum disease includes red, swollen, tender, bleeding gums, a persistent discharge (pus) coming from the gums, gums that are loose and pull away from the teeth, a bad taste or bad breath, loose teeth , spaces opening up between your teeth. With increased blood glucose levels, glucose in saliva increases and causes dry mouth leading to the building up of dental plaque on teeth, which causes tooth decay and cavities. Moreover, evidence states that diabetes is a T cell mediated auto immune disease. Hence, diabetes leads to periodontal disease. This is a chronic, inflammatory disease which is capable to destroy the gums, all the tissues holding onto the teeth and the

bones. Periodontal disease is a dental disease affecting those living with diabetes, affecting nearly 22% of those diagnosed. With increasing age, blood sugar control becomes poor which in turn increases the risk for gum problems. In fact, people with diabetes are at a higher risk for gum problems because of the incapability of control of blood sugar. Susceptibility to infections increases with reduced ability to fight with the bacteria present in the mouth. Periodontal disease is a chronic disease that is also associated with an increased level of systemic inflammation. Like diabetes, it may have adverse effects outside the mouth like increase of chance of cardiovascular events (such as heart attack or stroke) or adverse pregnancy problems (low birth weight and preterm delivery). It has long been recognized that diabetes increases the severity of periodontal disease. That is because diabetes prunes the body's resistance to infection, making diabetics more susceptible to any kind of infections. Likewise, evidence shows that periodontitis results in worsening blood glucose control in diabetics. In addition, it can also increase the risk of diabetic complications. The two diseases however share common pathways and disease causing processes. Both undergoes the process of inflammation and immune mechanisms. Chronic or prolonged inflammation can lead to a decline in overall health, causing serious problems in different parts of the body. According to one large study, if a person is diabetic, the risk of dying from heart attack is over twice as great if he also has severe periodontitis — and for kidney disease, the risk is 8.5 times higher. Periodontal disease when uncontrolled makes it six times more likely that the ability to control blood sugar levels to get worse over time. So not only can having one condition increase the risk for worsening the other — having both can cause a significant deleterious effect in the overall health. India leads the world today with the largest number of diabetics in any given country. In the 1970s, the prevalence of diabetes

among urban Indians was reported to be 2.1%, and this has now risen to 12.1%. According to the World Health Organization (WHO) projections, the present 30 million to 33 million diabetics in India will go up to 74 million by 2025. The WHO has issued a warning that India will be the “Diabetes Capital of The World.”

2. METHODOLOGY

This was a cross sectional study. A group of 50 diabetic patients ranging from 35 to 80 years of age who visited ESI Hospital, Hooghly was compared with another 50 non diabetic patients of the same age group on the basis of the oral hygiene status. Prior to this study, each participant was asked to provide his or her consent by signing a written consent form. Ethical clearance was obtained from the headquarter of ESI Hospitals, West Bengal. The study sample is 100 (with a targeted sample of 124) consisting of people ranging from 35 to 80 years . This number was based on estimation of population from 2011 census. Mean ages were 57.5 years for diabetic patients as well as for non diabetic patients. The actual number of participants was fewer than 124 because not all patients who have diabetes visit this hospital. The study participation was voluntary and anonymous. The people who were willing to participate were given an informed consent form so that they could understand the nature of the study. For the participants who were illiterate or were unable to read English, the informed consent form as well as the questionnaire of the survey was translated into Hindi or Bengali. For such participants, the questionnaire was filled in by the survey team. For the rest of the participants, the time for completion of the questionnaire was estimated at 8 to 10 minutes. The survey responses were manually entered into Microsoft Excel. There was no missing data recorded in the survey. The samples are matched by age and gender. The sample size is calculated by using the formula:

$$n = Z^2 P (1 - P) / d^2$$

where,

n = sample size

Z = level of confidence (95%)

P = expected prevalence (64.7%)

d = precision

Thus, a sample size of 124 is obtained.

The survey instrument consist of a self – administered questionnaire, containing demographic information, personal information regarding the oral hygiene followed by assessment of diabetes with other medical history and the quality of life .The questionnaire is composed of 32 items, distributed among 6 domains. The inclusion criteria were patients with atleast 20 teeth present in the mouth, between 35 to 80 years. Patients with a defined history of heart problems that require antibiotic prophylaxis, rheumatic fever , pregnant women and lactating mothers and type 1 DM were excluded from the study. Relevant information regarding the age, Oral Hygiene aids like (Toothbrush, Tooth powder, Tongue cleaner , Mouthwash). Mode of antidiabetic therapy (Oral hypoglycaemia, insulin, combination of both) was recorded. Oral conditions were measured by clinical and X-ray examinations. Diabetes-related variables were extracted from medical records. Information on diet restriction and physical exercise was also recorded, with the consent of the patients. Clinical examination was done with a CPI Probe of 0.5mm ball tip. 2 or 3 teeth from each quadrant was assessed which included 11,16,17,26,27,31,36,37,46,47. If one of this tooth was missing the adjacent tooth was taken into consideration. Examination regarding mobility of teeth, pocket, hypersensitivity, bleeding on probing and other variables

were checked. Deeper than 4 mm of the pocket may indicate periodontitis. Statistical analysis was done using SPSS statistical software. The tests included Chi square and multiple regression analysis, to measure the association between diabetes and presence of gingival and periodontal disease in diabetic patients was compared with a like risk in non diabetic patients using Chi Square Test.

3 . DATA ANALYSIS AND FINDINGS

This cross sectional study demonstrated that diabetic patients had significantly worse oral hygiene and higher severity of periodontal disease. The study comprised of 50 type 2 DM patients and 50 non-diabetic patients with a mean age of 57.5 years, age ranging from 35 to 80 years.In our study, most of the diabetic patients brush only once a day 54% (only 24 % brushed twice a day ,74% non-diabetics who brush twice a day, and almost all of the patients in use tooth brush and tooth paste.Periodontal examination was done on all the teeth with each quadrant were compared to make the emphasis stronger.

Table 1

Distribution by age, gender, weight, height

READINGS	DIABETIC PTS	NON DIABETIC PTS
MEAN AGE	57.5	57.5
PERCENT OF FEMALES	48	30
PERCENT OF MALES	52	70
MEAN ACTUAL WEIGHT lbs	64	60
MEAN HEIGHT foot-inches	5’5	5’6

Table 1 shows the distribution by age, gender and height among the diabetic and non diabetic patients. The mean age is 57.5 years in both the groups with 48% of diabetic females to 30 % non diabetic females. The mean weight and height in diabetic group is 64 lbs and 5'5 respectively and that in non diabetic group is 60 lbs and 5'6 respectively.

DRY MOUTH	0.64	0.00
POCKET	0.72	0.16
LOSS OF TEETH	0.94	0.42
DELAYED WOUND HEALING	0.1	0.00

Table 2 BODY MASS INDEX

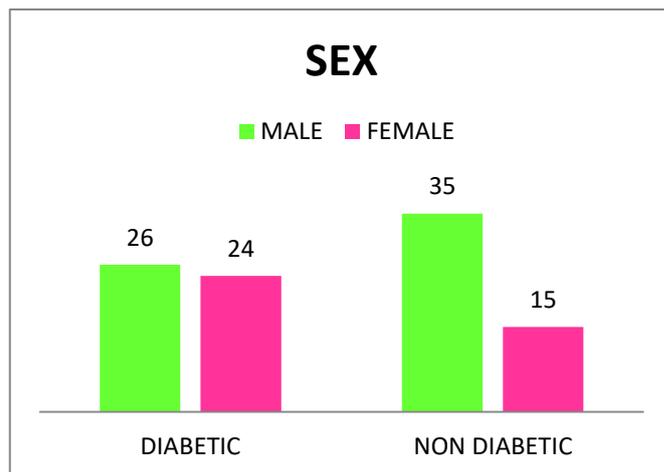
READING	DIABETIC PTS	NON DIABETIC PTS
MEAN BMI	23.5	21.3

Table 2 shows that the mean BMI is more in the diabetic group than the non diabetic patients.

Table 3

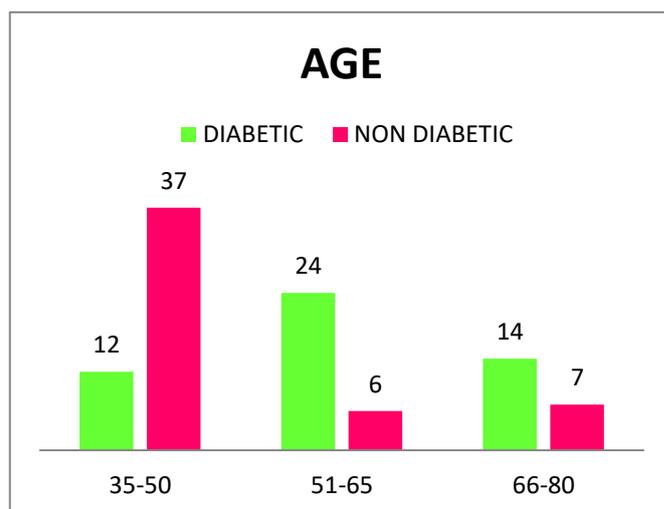
READINGS	MEAN INDEXES FOR DIABETIC PTS	MEAN INDEXES FOR NON DIABETIC PTS
ATTRITION	0.74	0.42
RECESSION	0.72	0.16
BLEEDING ON PROBING	0.78	0.28
MOBILITY	0.56	0.14
HYPERSENSITIVITY	0.52	0.12
TASTE DISTURBANCE	0.48	0.00
ORAL LESIONS	0.26	0.00
BURNING MOUTH SYNDROME	0.48	0.00
CARIOUS TOOTH	0.94	0.58

GRAPH 1



Out of 50 diabetic patients, 26 were males (52%) and 24 were females (48%). Out of 50 non diabetic patients, 35 were males (70%) and 15 were females (30%).

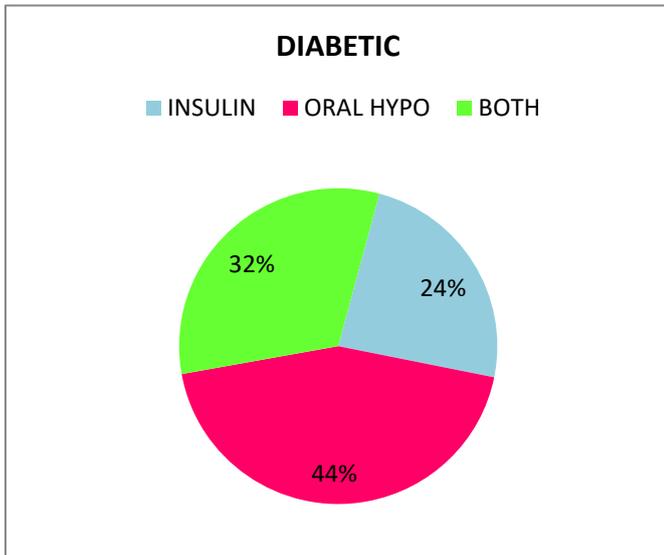
GRAPH 2



Out of 50 diabetic patients, 12 patients are in the age range of 35-50, 24 patients in the age range of 51-65 and 14 patients in the age range of 66-80 years. Out of 50 non diabetic patients, 37 patients are in the age range of

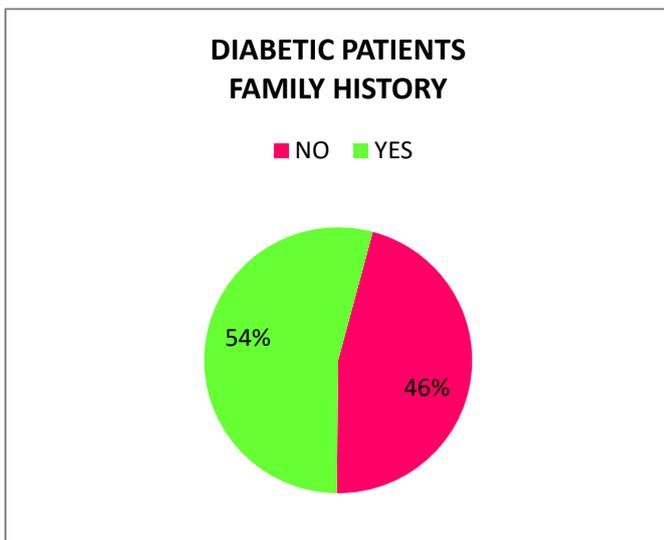
35-50, 6 patients in the age range of 51-65 and 7 patients in the age range of 66-80 years.

GRAPH 3



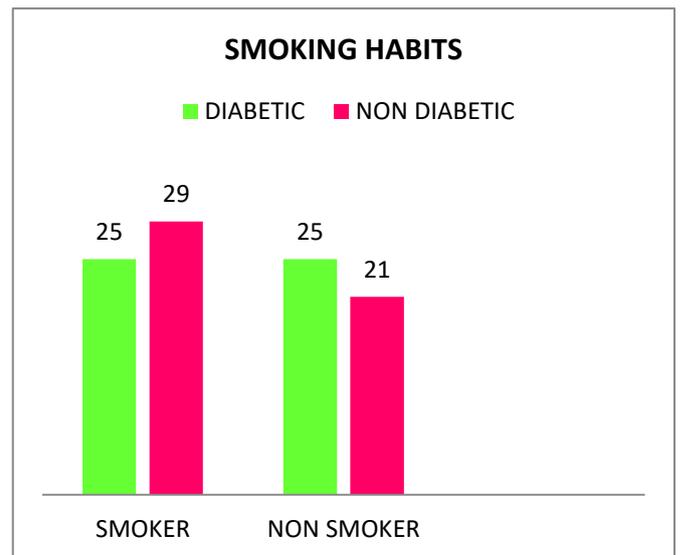
In case of diabetic patients, 24% of patients take only insulin, 44% take oral hypoglycaemic drugs and 32% of patients take both insulin and oral hypoglycaemic drugs.

GRAPH 4



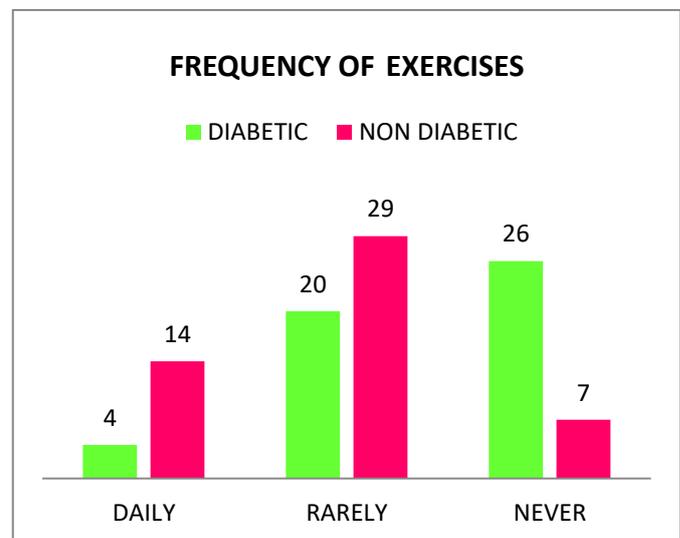
In case of diabetic patients, 54% of them have a family history of diabetes and 46% of them do not have such history.

GRAPH 5



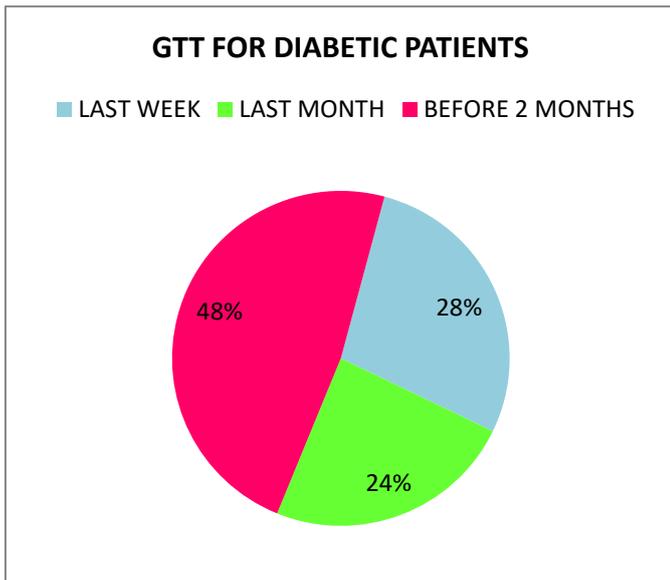
In case of diabetics, 50% are smokers and 50% are non smokers. In case of non diabetics, 58% are smokers and 42 % are non smokers.

GRAPH 6



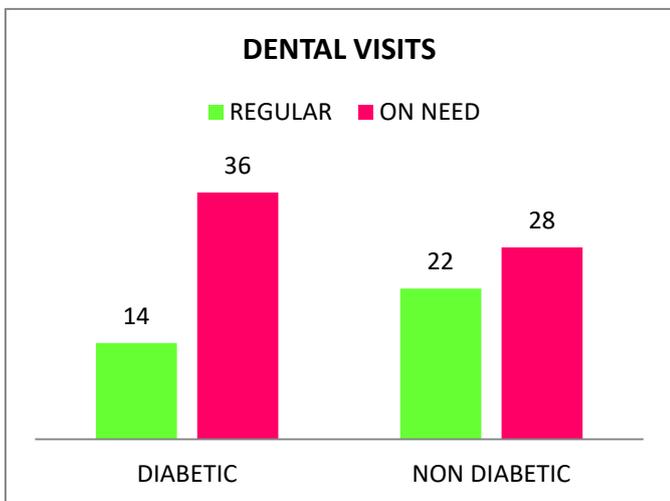
In case of diabetic patients, 8% exercise daily, 40% exercise rarely, 52% never exercise. In case of non diabetic patients, 28% exercise daily, 58% exercise rarely and 14% never exercise.

GRAPH 7



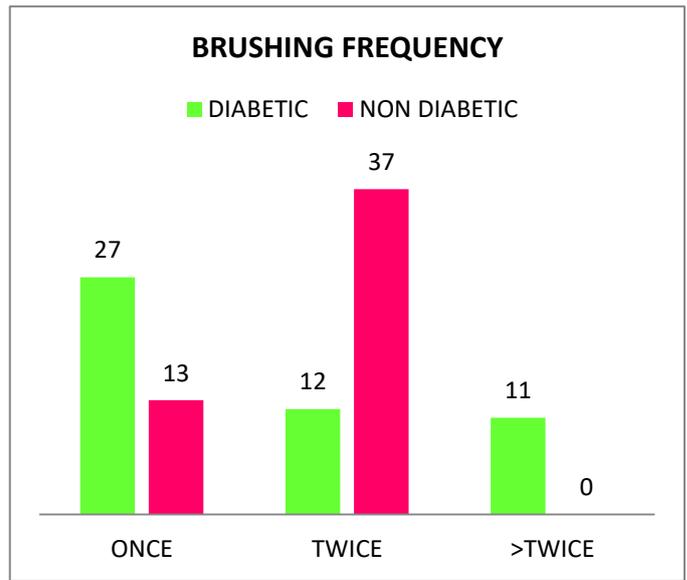
In case of diabetic patients, 28% have done a GTT test in last week, 24% in last month and 48% in before 2 months.

GRAPH 8



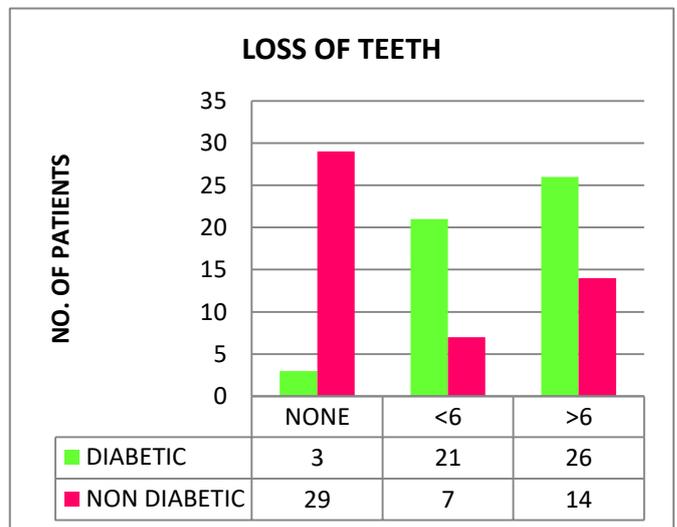
In case of diabetic patients, 28% of them visit dentist regularly and 72% of them visit on need. In case of non diabetic patients, 44% of them visit dentist regularly and 56% visit on need.

GRAPH 9



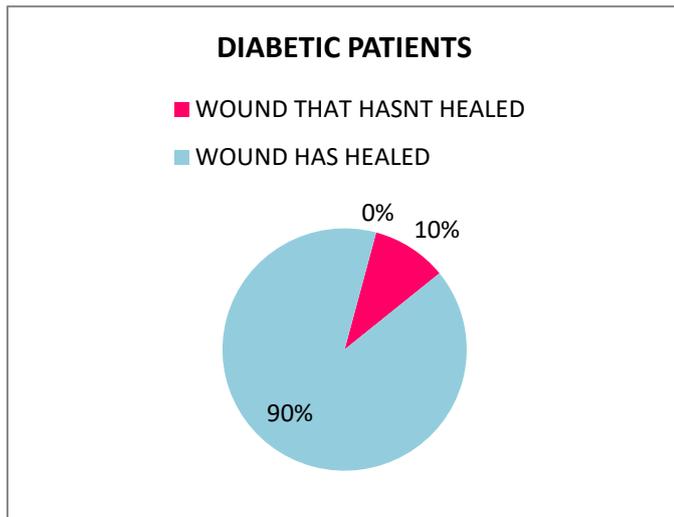
54% of diabetic patients brush once, 24% of diabetic patients brush twice and 22% brush more than twice. In case of non diabetic patients, 26% brush once, 74% brush twice with none brushing more than twice.

GRAPH 10



In case of diabetic, 6% have lost no teeth, 42% lost 0-6 teeth and 52% lost more than 6 teeth. In case of non diabetic patients, 58% have lost no teeth, 14% lost 0-6 teeth and 28% have lost more than 6 teeth.

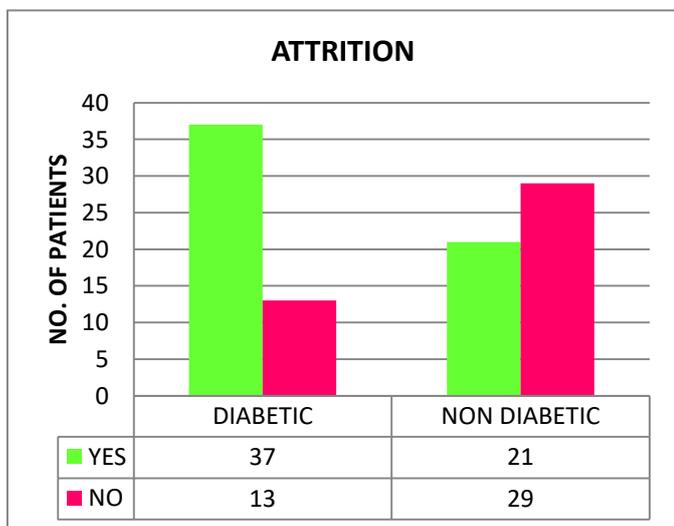
GRAPH 11



In case of diabetic patients, 10% of them have a delayed wound healing and 90% of them had wounds that had healed.

GRAPH 12

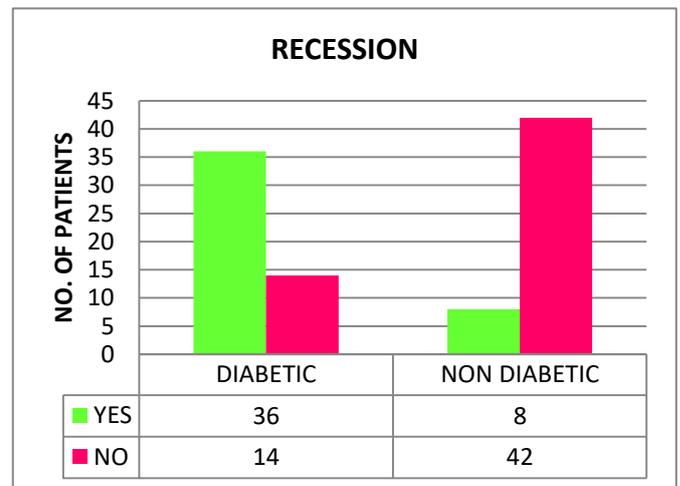
Dental attrition is a wearing of tooth caused by tooth-to-tooth contact. It results in loss of tooth tissue, that usually start at the incisal or occlusal surfaces. Advanced and excessive wearing of tooth and tooth surface loss can be defined as pathological in nature .Pathological wear of the tooth surface can be caused by bruxism, which is defined as clenching and grinding of the teeth.



In case of diabetic patients, 74% have attrition and 26% of them do not have attrition. In case of non diabetic patients, 42% have attrition and 58% do not have attrition.

GRAPH 13

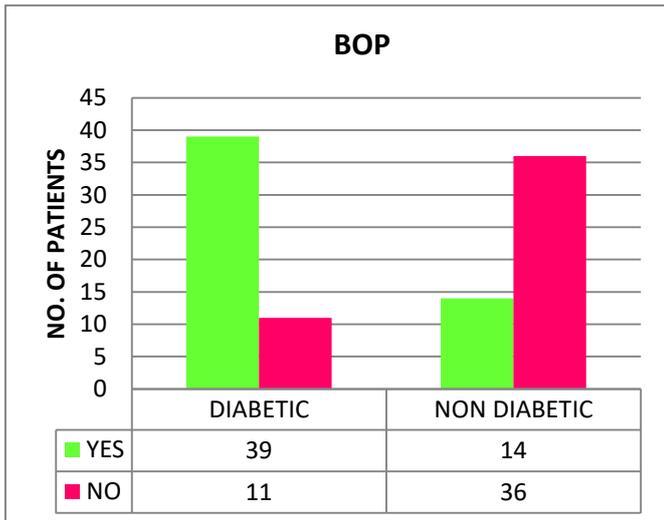
Gingival recession, also known as **receding gums**, is the exposure of roots of the teeth which is usually caused by a loss of gum tissue or retraction of the gingival margin from the crown of the teeth.



72% of diabetic patients have recession and 28% do not have recession. Only 16% of the non diabetic patients have recession and 84% do not have recession.

GRAPH 14

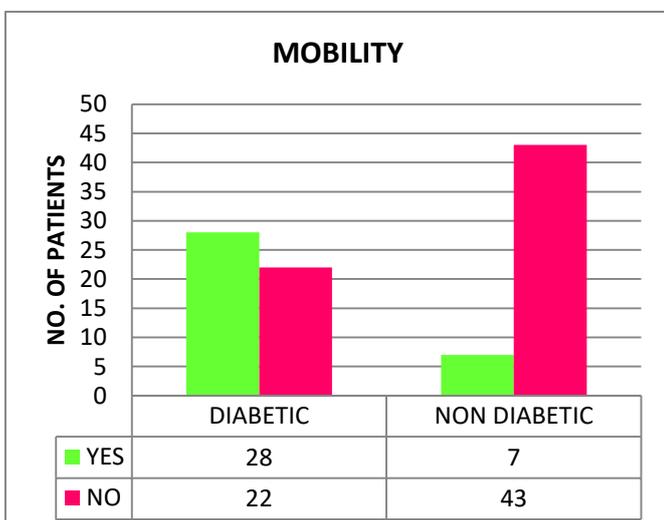
Bleeding on Probing is the bleeding which is induced by gentle manipulation of the tissue at the depth of the gingival sulcus, or at the interface between the gingiva and a tooth. Bleeding on probing(BOP), is a sign of periodontal inflammation or periodontitis.



78% of diabetic patients have bleeding on probing and 22% do not have bleeding. Only 28% of the non diabetic patients have bleeding on probing and 72% do not have bleeding.

GRAPH 15

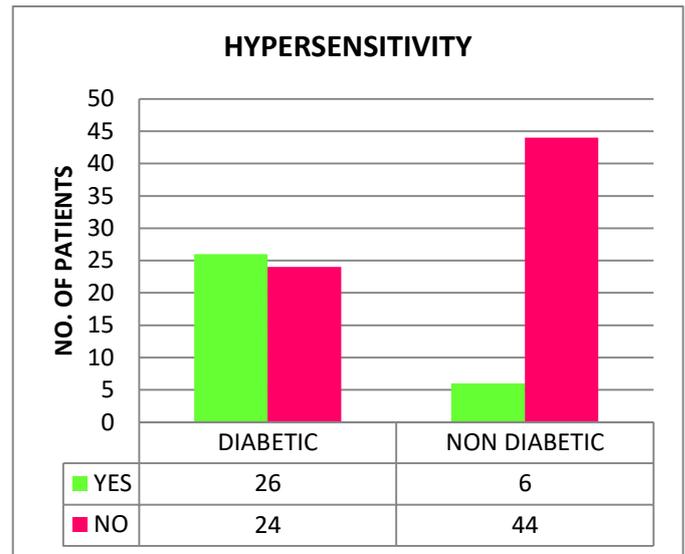
Tooth mobility is the horizontal or vertical displacement of a tooth which is usually beyond the normal physiological boundaries around the gingival area. Periodontal disease is commonly caused by a formation of plaque on the teeth. The plaque contains specific pathological bacteria which produce such an inflammatory response negatively effect the bone and the supporting tissues that hold teeth in place. It also causes bone resorption and damage to the supportive tissues, causing loss of structures that are supposed to hold the teeth firmly in place and then mobility occurs.



56% of diabetic patients have mobility of teeth and 44% do not have mobility. Only 14% of the non diabetic patients have mobility and 14% do not have mobility.

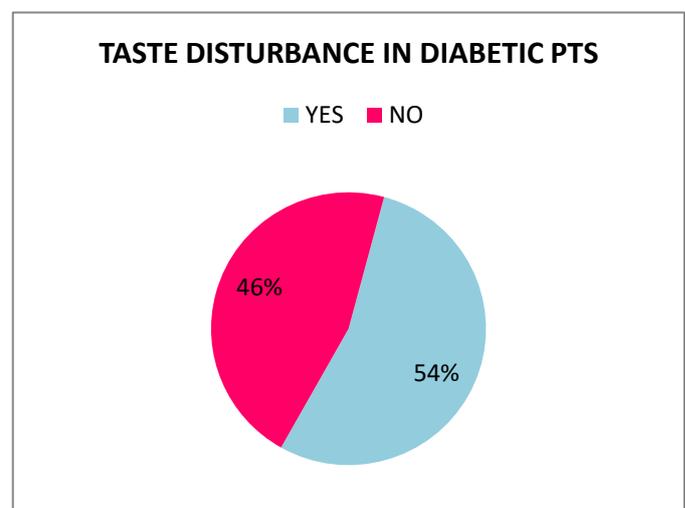
GRAPH 16

Dentin hypersensitivity is a sharp dental pain of short duration. It arises from exposed dentinal surfaces in response to various stimuli like thermal, osmotic etc.



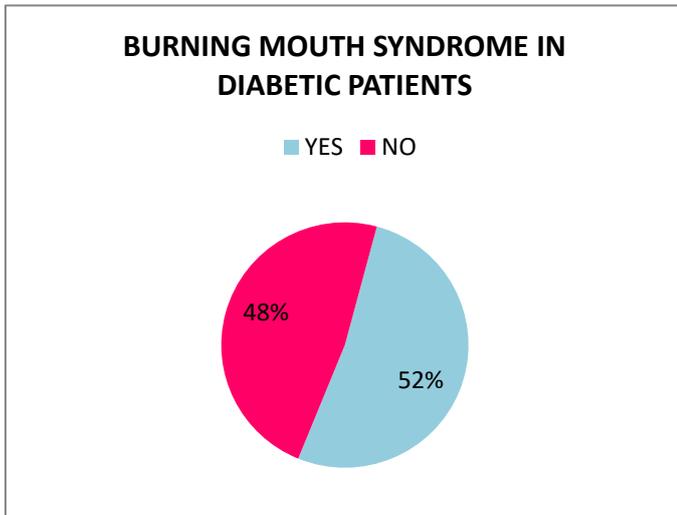
In case of diabetic patients, 52% have hypersensitivity and 48% of them do not have hypersensitivity. In case of non diabetic patients, 12% have hypersensitivity and 88% do not have hypersensitivity.

GRAPH 17



In case of diabetic patients, 54% have altered taste and 46% of them do not have any taste disturbance.

GRAPH 18

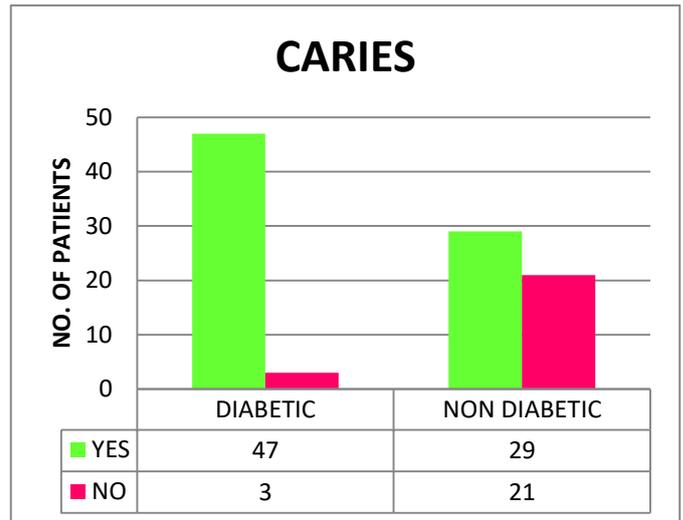


In case of diabetic patients, 52% have burning mouth syndrome and 48% of them do not have any such syndrome.

GRAPH 19

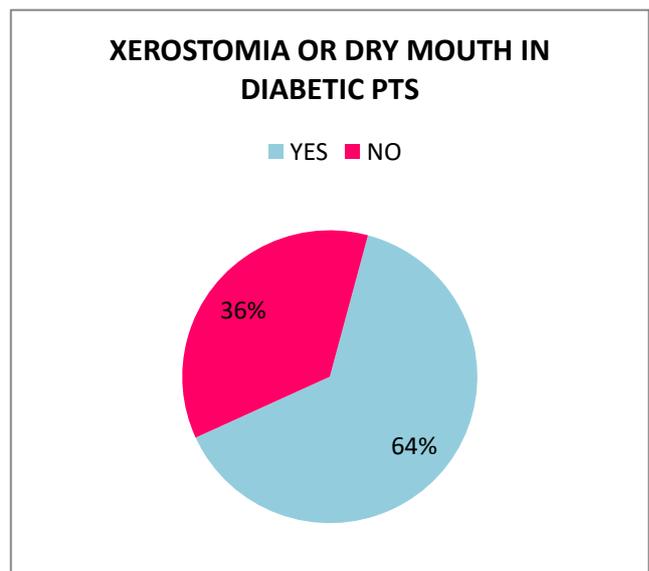
Dental caries or cavities also known as tooth decay, is a breakdown of teeth due to acids produced by bacteria. The color of the cavities may vary from yellow to black. Symptoms include pain and difficulty with mastication. Complications may include inflamed and swollen tissue, tooth loss, and infection or abscess formation.

The cause of cavities is the acid producing bacteria. This acid dissolves the hard tissues of the teeth (enamel, dentin and cementum). When the bacteria break down food debris or sugar on the tooth surface, the acid is produced. Risk factors include conditions such as diabetes mellitus where less saliva is produced. Dental caries are also associated with poverty, poor oral hygiene and receding gums. They result in exposure of the tooth structures.



In case of diabetic patients, 94% have caries and 6% of them do not have caries. In case of non diabetic patients, 58% have caries and 42% do not have caries.

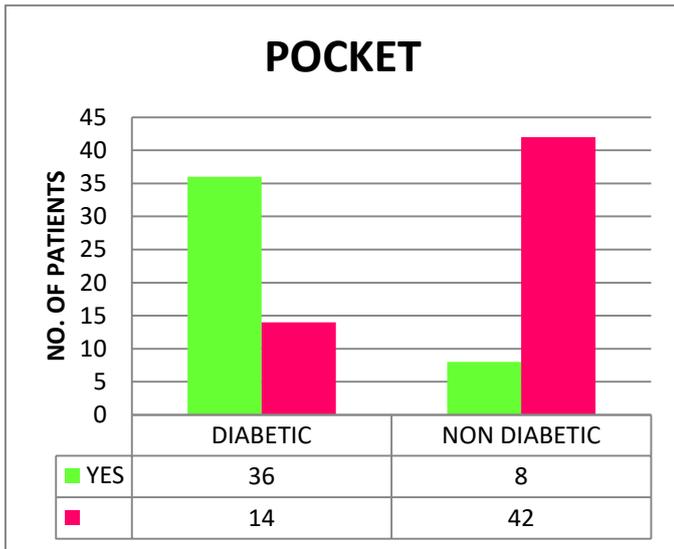
GRAPH 20



In case of diabetic patients, 64% have xerostomia and 36% of them do not have xerostomia.

GRAPH 21

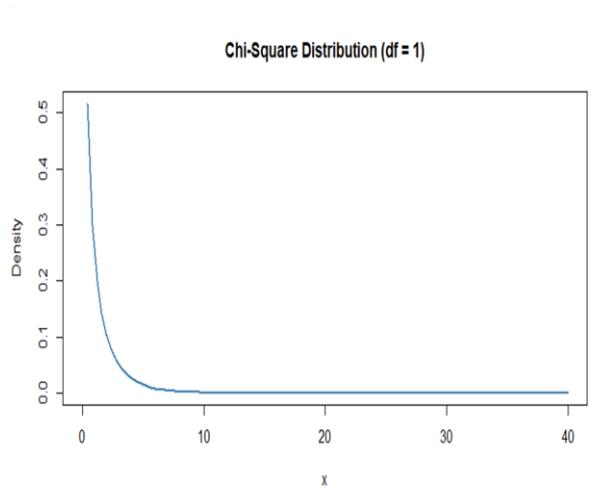
A **dental pocket** is an opening which is shaped like a tiny little pocket. It is present inside the mouth which opens up in the space between the tissue and the teeth.



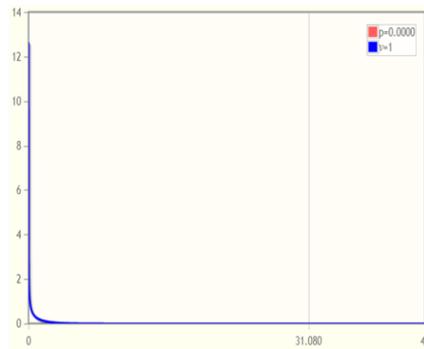
In case of diabetic patients, 72% have pockets and 28% of them do not have pockets. In case of non diabetic patients, 16% have pockets and 84% do not have pockets.

FOR STATISTICAL ANALYSIS :

Chi-square distribution for degree of freedom as 1 and x ranging from 0 to 40

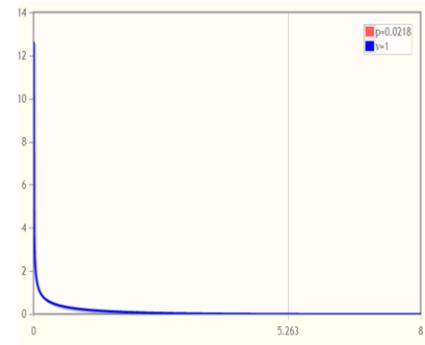


Tooth Loss case



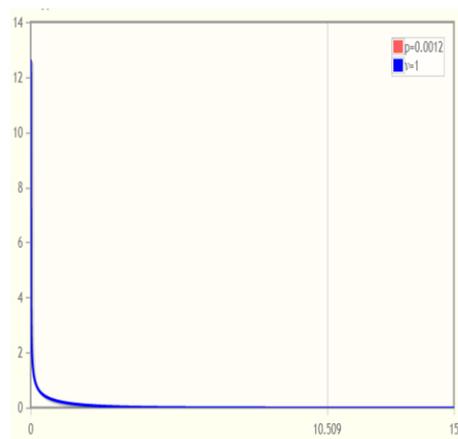
This shows that for a random variable x having chi-square distribution with $v = 1$ as degree of freedom $p = \Pr[x \geq 31.08] = 0$.

Wound healing case



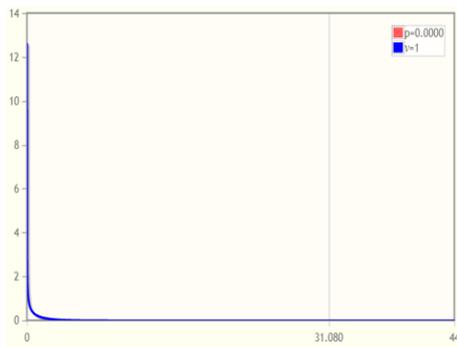
This shows that for a random variable x having chi-square distribution with $v = 1$ as degree of freedom $p = \Pr[x \geq 5.263] = 0.0218$.

Attrition case



This shows that for a random variable x having chi-square distribution with $v = 1$ as degree of freedom $p = \Pr[x \geq 10.509] = 0.0012$.

Recession Case



This shows that for a random variable x having chi-square distribution with $\nu = 1$ as degree of freedom $p = \Pr[x \geq 31.08] = 1.69 \times 10^{-8}$.

DISCUSSION

The mean age is 57.5 years in both the groups with 48% of diabetic females to 30 % non diabetic females. The mean weight and height in diabetic group is 64 lbs and 5'5 respectively and that in non diabetic group is 60 lbs and 5'6 respectively. that the mean BMI is more in the diabetic group than the non diabetic patients.

Level of significance is taken to be 0.01. Diabetic patients suffered from loss of teeth to a significantly higher degree than non-diabetic patients ($P = 0.00000002$). The P value is obtained from MATLAB by using the built in functions. Hence there was a strong association between diabetic and non diabetic patients with respect to teeth loss. Diabetic patients also suffered from attrition to a higher degree than non-diabetic patients ($P = 0.0012$). In case of recession, ($P = 0.00000001$) which is very much less than the level of significance. Hence, it does have a strong association with the diabetic patients. Bleeding on Probing ($P = 0.00000005$), Mobility ($P = 0.000001$) and caries ($P = 0.000023$) have a strong association since the values are much more less than 0.01. Hence we reject the null hypothesis. The low level of P values indicate that the effect sizes are large and standard errors are low. On comparing the variables with that of diabetic patients, we see there is strong positive correlation between female and Type 2 diabetes. There is also strong

correlation between hypersensitivity and Type 2 diabetic patients, tooth loss and Type 2 diabetes , attrition, recession and caries with that of Type 2 diabetes. Risk factors such as duration of diabetes, personal habits and oral hygiene habits showed a positive correlation with the destruction of periodontium, as calculated by multiple regression analysis.. Hence, we can say that diabetes increases the risk of hampering oral hygiene and can eventually lead to infections.

On analyzing the graphs, we see that out of 50 diabetic patients, 26 were males (52%) and 24 were females (48%). Out of 50 non diabetic patients, 35 were males (70%) and 15 were females (30%). Out of 50 diabetic patients, 12 patients are in the age range of 35-50, 24 patients in the age range of 51-65 and 14 patients in the age range of 66-80 years. Out of 50 non diabetic patients, 37 patients are in the age range of 35-50, 6 patients in the age range of 51-65 and 7 patients in the age range of 66-80 years. In case of diabetic patients, 24% of patients take only insulin, 44% take oral hypoglycaemic drugs and 32% of patients take both insulin and oral hypoglycaemic drugs. In case of diabetic patients, 54% of them have a family history of diabetes and 46% of them do not have such history. In case of diabetics, 50% are smokers and 50% are non smokers. In case of non diabetics, 58% are smokers and 42 % are non smokers. In case of diabetic patients, 8% exercise daily, 40% exercise rarely, 52% never exercise. In case of non diabetic patients, 28% exercise daily, 58% exercise rarely and 14% never exercise. In case of diabetic patients, 28% of them visit dentist regularly and 72% of them visit on need. In case of non diabetic patients, 44% of them visit dentist regularly and 56% visit on need. 54% of diabetic patients brush once, 24% of diabetic patients brush twice and 22 % brush more than twice. In case of non diabetic patients, 26% brush once, 74% brush twice with none brushing more than twice. In case of diabetic, 6% have lost no teeth,

42% lost 0-6 teeth and 52% lost more than 6 teeth. In case of non diabetic patients, 58% have lost no teeth, 14% lost 0-6 teeth and 28% have lost more than 6 teeth. In case of diabetic patients, 10% of them have a delayed wound healing and 90% of them had wounds that had healed. In case of diabetic patients, 74% have attrition and 26% of them do not have attrition. In case of non diabetic patients, 42% have attrition and 58% do not have attrition. 72% of diabetic patients have recession and 28% do not have recession. Only 16% of the non diabetic patients have recession and 84% do not have recession. 78% of diabetic patients have bleeding on probing and 22% do not have bleeding. Only 28% of the non diabetic patients have bleeding on probing and 72% do not have bleeding. 56% of diabetic patients have mobility of teeth and 44% do not have mobility. Only 14% of the non diabetic patients have mobility and 14% do not have mobility. In case of diabetic patients, 64% have xerostomia and 36% of them do not have xerostomia. In case of diabetic patients, 72% have pockets and 28% of them do not have pockets. In case of non diabetic patients, 16% have pockets and 84% do not have pockets.

3. CONCLUSIONS

Our study showed that diabetes had a significant effect on oral health leading to the destruction of periodontium. Tooth mobility and number of missing teeth has been a good indicator to examine the past periodontal disease. In our study, diabetic patients had more missing teeth compared with the non-diabetics. The prevalence of periodontal disease is found to be more severe in diabetic patients as compared with the non-diabetics. Risk factors such as duration of diabetes, personal habits and oral hygiene habits showed a positive correlation with the destruction of periodontium, a strong positive correlation between female and Type 2 diabetes. There is also strong

correlation between hypersensitivity and Type 2 diabetic patients, tooth loss and Type 2 diabetes, attrition, recession and caries with that of Type 2 diabetes, as calculated by multiple regression analysis. Hence, we can say that diabetes increases the risk of hampering oral hygiene and can eventually lead to infections. Diabetic patients suffered from loss of teeth to a significantly higher degree than non-diabetic patients ($P=0.00000002$). Diabetic patients also suffered from attrition to a higher degree than non-diabetic patients ($P=0.0012$). In case of recession, ($P=0.00000001$) which is very much less than the level of significance. Hence, it does have a strong association with the diabetic patients. Bleeding on Probing ($P=0.00000005$), Mobility ($P=0.00001$) and caries ($P=0.000023$) have a strong association since the values are much more less than 0.01. Our study has made an attempt to determine the association between type 2 DM and periodontal disease at a tertiary hospital in Hooghly, West Bengal. It was found that diabetic subjects manifested relatively higher severity of periodontal disease as compared with non-diabetics. To conclude, periodontal disease was more prevalent and severe in type 2 diabetic patients as compared with the non-diabetic patients.

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BIOGRAPHIES

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-I am a dentist by profession, with a MPH degree. I have recently completed my post graduation. Currently I am working in a clinic, and seeking good research projects in the field.



