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Impact of Diabetes Mellitus Type 2 on Oral Health among Out Patient Department of Saveetha Dental College and Hospital

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Abstract: ***Aim:To assess the impact of diabetes mellitus type 2 on oral health. Objective: Diabetes can also affect affect overall bodily health which also includes your oral health. Therefore this study is conducted thereby to assess the oral health problems associated with diabetes mellitus type 2. Background: Diabetes affects body's ability to utilize the glucose or blood sugar for energy. Diabetes can cause many complication. These include nerve damage, stroke, heart disease, kidney disease and even blindness. Another common health complication is gum disease and other oral disease. Methods: Thirty patients were selected from the clinic of Saveetha Dental College for this study. All patients underwent a comprehensive oral examination performed by a single dentist which included evaluation of bleeding gums, periodontitis and decayed and missing teeth. With the help of these indices, we were able to determine the oral health status of the selected 30 patients. Periodontal health status of the patients were determined with the help of GI, PDI,and PI. And the dental carries status was determined by DMFT. Collected data were analyzed with the help of SPSS software. Data were presented as numbers (n) and percentage (%).The sample were analyzed by frequency test. Result: From the statistical analysis we can interpret that the patients with T2DM (type 2 diabetes mellitus) are very much prone to oral diseases which are marked by increased periodontal disease and gingivitis and poor plaque status. Due to chronic periodontal disease, there is a progress in destruction of supporting tissue of teeth as well as pocket formation, recession or both which may lead to tooth loss because of destruction of alveolar bone. Conclusion: As a conclusion of this study, we can conclude that diabetic patients are much prone to oral disease. Periodontal disease is most commonly occurring among T2DM.This study clearly depicts that Diabetes increases the risk of periodontal disease.***

Keywords: T2 Diabetes Mellitus, Oral health, periodontitis, oral health indices, gingival index, periodontal and plaque index

1. Introduction

Diabetes Mellitus (DM) is metabolic disorder characterized by chronic hyperglycemia and disturbances of carbohydrate, fat and protein metabolism. Type I DM is most common in children and adolescents, whereas Type II DM affects adults.Patients with T2DM usually have insulin resistance which alters the utilization of endogenously produced insulin at the target cells(1). T2DM constitutes about 90–95% of all patients having the disease (2). Patients with T2DM usually have insulin resistance which alters the utilization of endogenously produced insulin at the target cells. During the early stage of the disease, insulin production is increased resulting in hyperinsulinemia. However, as the condition progresses, the production of insulin decreases leading to insulin deficiency(2).Type I DM results from cellular mediated autoimmune destruction of pancreatic B cells which usually leads to total loss of insulin secretion(3).Type 1 DM is most common in children and adolescents, whereas type 2 DM (T2DM) affects adults (2). Oral complication of diabetes can be devastating for the patient. These may include, but are not limited to dental caries, tooth loss, gingivitis, periodontitis, salivary dysfunction, taste impairment, gingival recession and xerostomia (4)and oral mucosal disease (like ulcers, lichen planus, delayed healing, oral fungal infection like oral candidiasis) (5).

Many researches have stated that periodontal disease is been predominant impact subsequently leading to other oral complication such as tooth loss gingival recession and dental caries. Chronic periodontal disease results in progressive destruction of the supporting tissues of the teeth as well as pocket formation, recession or both, which may lead to tooth loss because of extensive destruction of alveolar bone. It is well documented that periodontal disease is considered to be one of the main reasons for tooth loss among individuals with diabetes (2,6-8). Individuals with poorly controlled T2DM present an exaggerated inflammatory response to the bacterial challenge of periodontitis. A hyperinflammatory response coupled with impaired wound healing and repair may enhance the inflammatory reaction and periodontal tissue destruction for these patients (9,10).

It is important to know that patients with DM are susceptible to other oral conditions, such as periodontal and salivary disorders (dry mouth), which could increase their risk of developing new and recurrent dental caries (11).

2. Method

Thirty patients were selected from the Out patient clinic of Saveetha Dental College for this study. The inclusion criteria for the study were: Age above 35 and diagnosed with T2DM for more than one year duration.

Exclusion criteria for the study were those who were diagnosed with any systemic disease like Hypertension, endocrine disorders other than Diabetes mellitus.To determine the oral health status of the selected 30 patients we used various oral health indices. The following are the indices used for this study:

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GI: Gingival index
PI: Plaque index
PDI :Periodontal index
DMFT: Decayed-missing-filling teeth index

All the participants in the study were informed about the objective of the study and that participated was voluntary. Confidentiality of the participants was maintained and data was restricted to the study investigator.

All patients underwent a comprehensive oral examination performed by a single dentist which included evaluation of bleeding gums, periodontitis and decayed and missing teeth. With the help of these indices, we were able to determine the oral health status of the selected 30 patients. Periodontal health status of the patients were determined with the help of GI, PI, and PDI. And the dental carries status was determined by DMFT. Collected data were analyzed with the help of SPSS software. Data were presented as numbers (n) and percentage (%).The sample were analyzed by frequency test.

3. Results

A total of 30 patients selected for this study had experienced with diagnosis for more than 5 years. The oral examination was performed on the 30 patients. The following table depicts the result of our present study. The table 1-4 depicts the frequency and percentage of PDI, GI, PI, and DMFT.

As shown in frequency table 1,thebeginning destructive periodontal disease in these patient with T2DM interpreted to be 23.3%.Among 30 patients 7 number of patients were found to have beginning periodontal disease. Whereas the terminal destructive periodontal disease was found to be 30%.13.3% of the patients had normal periodontal status.

From frequency table 2, Normal gingival index was found with 23.3%. But moderate and severe gingivitis are found to be 40% and 16.6% respectively. Among those 30 patients, 12 and 5 number of patients respectively are found to have moderate and severe gingivitis.

From frequency table 3 which shows plaque index PI, from which we can interpret that the patients who had excellent plaque index which was just about 16.6%. And 33.3% of patients had a poor plaque status.

As shown in table 4,which depicts the DMFT index (decayed missing filling teeth index) of the patients with T2DM .From this table we can interpret that these patients had a moderate DMFT index of 33%.The severity of DMFT index was found to be less about 10% in this study.

Therefore from all the 4 tables we can interpret that the patients with T2DM (type 2 diabetes mellitus) are very much prone to oral diseases which are marked by increased periodontal disease and gingivitis and poor plaque status.Due to chronic periodontal disease, there is a progress in destruction of supporting tissue of teeth as well as pocket formation,recession or both which may lead to tooth loss because of destruction of alveolar bone.

Frequency Table 1: Periodontal index PDI

Condition	Frequency	Percent
Normal	4	13.3
Beginning destructive periodontal disease	7	23.3
Established destructive periodontal disease	10	33.3
Terminal periodontal disease	9	30
Total	30	100

Frequency Table 2: Gingival index GI

Condition	Frequency	Percent
Normal	7	23.3
Mild Gingivitis	6	20.0
Moderate Gingivitis	12	40.0
Severe Gingivitis	5	16.6
Total	30	100

Frequency Table 3: Plaque Index PI

Condition	Frequency	Percent
Excellent (Normal)	5	16.6
Good (Mild)	12	40.0
Fair(Moderate)	3	10.0
Poor (Severe)	10	33.3
Total	30	100

Frequency Table 4: Decayed-Missing -Filled Teeth

Condition	Frequency	Percent
Normal	3	10.0
Very Mild	6	20.0
Mild	8	26.7
Moderate	10	33.3
Severe	3	10.0
Total	30	100

4. Discussion

Our present study shows that the diabetes patients are much prone to many oral manifestation which is marked my periodontal disease like periodontis andgingivitis.From our study we can also interrupt that due to high periodontal index ,plaque index, gingival index there are high probability of salivary dysfunction.This periodontal disease can affect the salivary flow ,which may be a cause for dental caries.Sincesaliva forms a protective layer around the teeth which destroy the bacteria causing dental caries, less saliva flow also interrupts in oral health like carries.

The type 2 diabetic group had a higher probability of wearing removable dentures, higher plaque index, calculus index, and counts of mutans streptococci and lactobacilli than the non-diabetic group. Saliva flow rate, pH, and buffer capacity were lower in the type 2 diabetic group than in the non-diabetic group (12).Regarding the oral health outcome, deeper periodontal pockets, more attachment loss, more bleeding on probing and a higher prevalence of generalized chronic periodontitis and severe periodontitis were significantly more common in type 2 diabetic subjects than in non-diabetic subject(12).

In addition, a higher prevalence and severity of periodontitis may be a result of poorer oral hygiene care. The pH of saliva in type 2 diabetic subjects was significantly lower than that of non-diabetic subjects, although the range in both groups was within normal limits. No significant difference has been found in any of the previous studies (14,15).A more severe

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periodontitis among the type 2 DM patients was found and confirmed in a previous report (13). how- ever, alteration in host defenses, vascular changes, change in the oral microflora, and abnormal colla- gen metabolism are suggested to be major factors (13).

A study revealed that chronic periodontitis, tooth mobility, furcation involvement and OIDP were more prevalent among T2DM patients than their non-diabetic matched controls. Although pocket depths as a measure of chronic periodontitis did not associate with the level of glycemic control or the duration of T2DM, there was an association in the expected direction with tooth mobility and dental caries.(1)

Consistent with previous studies, the T2DM patients presented with more visible dental plaque, more missing teeth and were more likely to suffer from chronic periodontitis compared with the non-diabetic controls [16,17]. Although the T2DM patients presented with limited sugary drink consumption and low frequency of smoking, PI was significantly higher among the cases than the controls. Presence of more dental plaque and poorer oral hygiene among diabetic compared to non-diabetic subjects have been reported in a number of studies and might be attributed to DM patients having higher levels of glucose in gingival crevicular fluid (GCF) and saliva [18,17].

A recent report by Bandyopadhyayet al.(19), using a study population of Gullah African Americans with T2DM and no recent clinical history of periodontal therapy, concluded that there are significant associations between periodontal disease progression and diabetes control status.In addition, severe periodontitis may increase the risk of poor glycemiccontrol(20,21).A meta-analysis of four studies with a total of 3,524 adults (>18 years old) showed those with diabetes have a two-fold higher risk of developing periodontal disease compared to those without diabetes(22).A review of the literature indicates that there is no clear association between DM and dental caries, but several studies have reported a greater history of dental caries in people with DM(23,24). Decreased salivary secretion, increase of carbohydrate in the parotid gland saliva, growth of oral yeasts, increased counts of Mutans streptococci and lactobacilli are some of the factors implicated to be responsible to predispose diabetics to higher incidence of dental caries(25).Diabetes is also associated with the development of certain oral soft tissue lesions, although these associations are not consistently reported across different diabetic populations(26).Chavez et al.(27) found trends toward decreased salivary flow rates as HbA1c values increased, while other studies have reported that the use of one or more xerostomic medications resulted in significantly lower flow rates(26, 28). While many medications and treatment modalities list xerostomia as a possible side effect, very few have been tested for objective changes in salivary flow (29).

This sensory dysfunction can inhibit the ability to maintain a proper diet and can lead to poor glycemic control. Taste impairment has also been associated with the development of obesity(30), and it has been reported during the course of diabetes(31).

e s-IgA levels of the diabetic patients were not significantly higher than those of the control group among the studied population. In both groups, subjects with a higher number of DMFT, greater PDI scores and oral candidiasis were found to have significantly higher s-IgA levels. Among diabetic patients, signifcantly higher s-IgA levels were concomitant with xerostomia and denture stomatitis. Furthermore, s-IgA levels were found to be signifcantly elevated in patients with uncontrolled T2DM compared to those with controlled T2DM. Further research is needed to investigate s-IgA concentrations among diabetic patients in order to aid in the prediction and management of oral manifestations(32).Type 1 diabetics with poor glycemic control had increased gingival in ammation ($P < 0.05$), more dental plaque ($P < 0.05$), increased PPDs ($P < 0.05$) and attachment loss ($P < 0.05$) as compared to those with fair and good glycemic control, respectively.Severity of periodontal disease increases with poor glycemic control in patients with Type 1 DM(5).

5. Conclusion

As a conclusion of this study , we can conclude that diabetic patients are much prone to oral disease. Periodontal disease is most commonly occurring among T2DM.This study clearly depicts that Diabetes increases the risk of periodontal disease.

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