



Oral Manifestations in Type 2 Diabetes Mellitus and Its Association with Diabetic Complications

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ABSTRACT

Background: Diabetes Mellitus is a metabolic disorder characterised by hyperglycemia due to reduced insulin secretion or insulin sensitivity. The incidence of this disease is increasing worldwide. The onus is on early diagnosis and early identification of diabetic complications. Oral cavity examination may provide clues to the presence of these complications.

Aim: To find out the prevalence of oral manifestations in diabetes mellitus patients and to analyze the relationship between the oral manifestations and complications of diabetes mellitus.

Study design: Prospective study from April 2014 to December 2014

Material and Methods: All diabetic patients attending the medicine OP during the study period were included after obtaining their consent. These patients were subjected to complete dental examination and evaluated for end organ damage. i.e. diabetic nephropathy, retinopathy and ischemic heart disease.

Results: During the study period, a total of 101 diabetic patients were examined for oral manifestations such as periodontitis, dental caries, glossitis and oral submucosal fibrosis. Oral manifestations were present in more than 90% of all the diabetic patients. The prevalence of periodontitis was 55.4%, dental caries - 46.5%, Xerostomia - 5.9%, Glossitis - 9.9%, Oral submucosal fibrosis - 4%. Of the 101 patients, 55 of them were screened for ischemic heart disease and 19 of them had coronary artery disease (p value -0.001). In addition 89 patients were evaluated for renal complications and 58 patients had diabetic nephropathy (p value- 0.001). Further 39 patients were evaluated for diabetic retinopathy out of which 14 had fundal changes suggestive of retinopathy (p value - 0.001). Also all the three complications were associated more with periodontitis.

Conclusion: The complications of diabetes are life threatening if not detected early. Oral examination in a diabetic patient can be a diagnostic clue to these complications. Especially, presence of periodontitis can suggest the presence of complications like nephropathy, retinopathy and ischemic heart disease in diabetic patients.

Keywords: Diabetes Mellitus, periodontitis, diabetic retinopathy, diabetic nephropathy.

INTRODUCTION

Diabetes mellitus is a clinical syndrome characterized by increase in plasma blood glucose which is caused by reduced insulin secretion or insulin sensitivity. The worldwide prevalence of diabetic patients is increased in past 20 years. International diabetes Federation (IDF) estimates that India alone has 61.3 million people living with diabetes. WHO suggests that diabetic death will double by the year 2030 .India will be the “Diabetes capital” by the year of 2030⁽¹⁾. Nowadays diabetes had become a global threat to the people as the mortality caused by the complications increases even in the younger age group due to the poor glycemic control.

Diabetic complications are divided into two types 1).Macrovascular complications, 2) microvascular complications. Macrovascular complications include coronary artery disease, peripheral vascular disease and atherosclerosis. Microvascular complications are diabetic retinopathy, nephropathy, autonomic neuropathy and foot disease .Death caused by these complications usually occurs between 56-60 years⁽¹⁾. Based on Wisconsin Epidemiologic Study of Diabetic Retinopathy (WESDR) the overall prevalence of diabetic retinopathy was 74% between 1982 to 1992⁽²⁾. Mortality caused by diabetic complications in diabetic patients was found to be high when compared with non diabetic patients. Cardiovascular and renal problems were found to be the major causes for high mortality in diabetic patients ⁽³⁾.

Various inflammatory diseases and soft tissue pathologies in oral cavities are associated with diabetes mellitus. Oral manifestations of diabetes are periodontitis, salivary dysfunction, oral candidiasis, dental caries⁽⁴⁾⁽⁵⁾⁽⁶⁾. Periodontitis is more frequent and severe in diabetic patients with poor glycaemic control and it was considered as a 6th complication of diabetes⁽⁷⁾. Early identification and management of these oral diseases may help in the early diagnosis of diabetes, its complications and in attaining better glycaemic control. Awareness of these complications is lacking worldwide and we should provide better awareness to all the diabetic patients regarding the oral health.

Various clinical and laboratory parameters have been shown to be indicators of diabetic complications, one of those is microalbuminuria which indicates the presence of diabetic nephropathy. We are trying to find whether there is any association between oral manifestation and diabetic complications (ie) whether there is an increased micro or macro vascular complications in patients with oral manifestation.

AIM OF THE STUDY

- To find out the prevalence of oral manifestations in diabetes mellitus patients and to analyze the relationship between the oral manifestations and complications of diabetes mellitus.

MATERIALS AND METHODS

The study was conducted in Chettinad Medical College, Department of General Medicine.

Study Design: Prospective Study

Study Period: April 2014 - December 2014

Sample Size: 100

Inclusion Criteria

All patients with diabetes mellitus who have been diagnosed under the ADA (American Diabetes Association) criteria

Exclusion Criteria

- Patients who are not willing to participate after explaining the research methodology and purpose.
- Patients with proteinuria due to causes other than diabetes.
- Patients with hypertension and other risk factors for retinopathy and ischaemic heart disease.

METHODOLOGY

All the 100 patients were evaluated for number of decayed tooth, missing and filled permanent dentition. Patients with salivary hypo functioning will be diagnosed by doing some clinical measures include dryness of lips, dryness of buccal mucosa. Dental x-rays will reveal the loss of supporting bone. The glossitis was examined clinically using artificial light, mouth mirror, gauze and the

diagnosis was made based on clinical features according to WHO guidelines. In addition these patients were evaluated for diabetic complications as follows. Cardiac involvement of the patient was evaluated with ECG and Echocardiography. Renal involvement was found by proteinuria, serum urea and creatinine. Fundus examination was done to screen for diabetic retinopathy.

RESULTS

All the 101 diabetic patients were evaluated for the oral manifestations such as periodontitis, dental caries, glossitis, oral submucosal fibrosis. Oral manifestations were present in more than 90% of all the diabetic patients. Prevalence of periodontitis was 55.4%, dental caries - 46.5%, xerostomia - 5.9%, glossitis - 9.9%, Oral submucosal fibrosis - 4%.

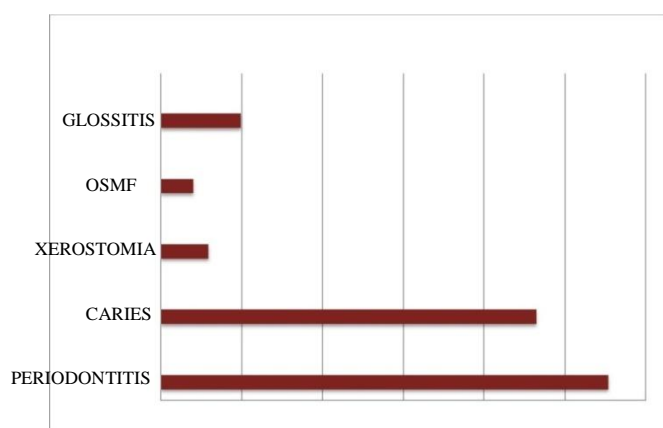


Figure 1- Prevalence of Oral Manifestations

Periodontitis is 55.4%, dental caries - 46.5%, Xerostomia - 5.9%, Glossitis - 9.9%, Oral submucosal fibrosis - 4%.

a) Cardiac complications: Of all the 101 diabetic patients, 55 patients were investigated for cardiovascular complications. Of the 55 patients, 19 patients had positive findings for cardiac complications. The observed association between the oral manifestations and cardiac complications was significant (p value is 0.001) and in addition there was a significant association between periodontitis and cardiac complications (p value is 0.0003 and z statistic is 3.619). Hence whether periodontitis could be taken as a risk factor for cardiac involvement in diabetic patients needs further study.

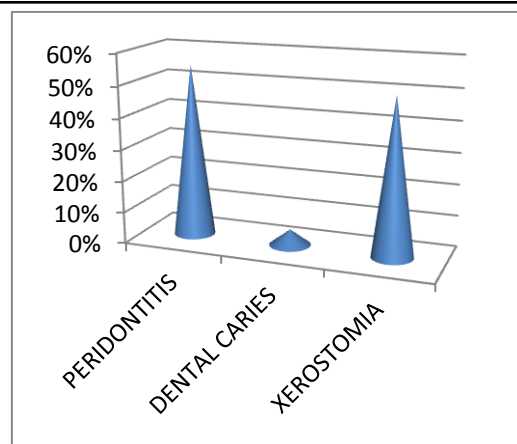


Figure 2: Prevalence of oral manifestations in patients with cardiac complications

b) Renal complications: Of all the 101 diabetic patients, 89 patients were evaluated for renal complications, 58 patients had positive findings for renal complications. The observed association between the oral manifestations and Renal complications was significant (p value is 0.001). Also there was a significant association between periodontitis and renal complications (p value is 0.0041 and z statistic is 2.668). This shows that there is an association between the periodontitis and renal complications which may infer that there is an increased risk for the patients with periodontitis to have features of diabetic nephropathy.

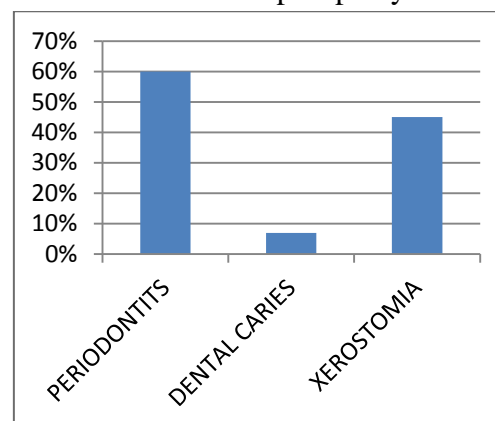


Figure 3– Prevalence of oral manifestations in patients with renal complications

c) Eye complications: Of all 101 diabetic patients, 39 patients were evaluated for diabetic retinopathy. Out of 39, 14 had fundal changes suggestive of retinopathy. The observed association between the oral manifestations and diabetic retinopathy was significant (p value is 0.001) and there was a

significant association between periodontitis and diabetic retinopathy (p value is 0.0001 and z statistic is 4.009). Thus there is an increased risk for the periodontitis patients to have retinal changes.

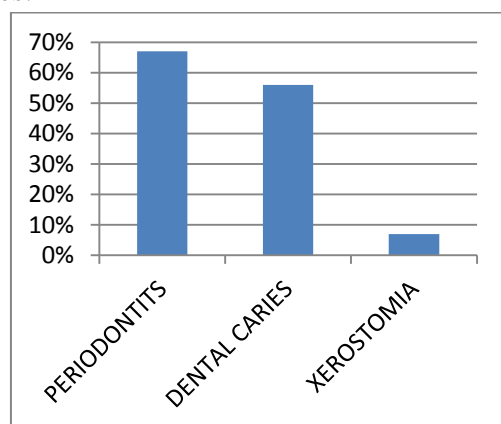


Figure 4. Oral Manifestations in diabetic retinopathy patients.

DISCUSSION

More than 90% of the diabetic patients will be having the oral manifestations due to the irregular glycemic control. These include periodontitis, oral candidiasis, Dental caries and salivary hypofunction. Of all these, periodontitis play an important role in maintaining the glycemic control and it is considered as sixth complication of diabetes mellitus. Various diabetic complications include diabetic retinopathy, Ischaemic heart disease, diabetic nephropathy gets influenced by periodontitis. Periodontitis induced bacteremia will bring about an increase in pro inflammatory cytokines which in turn leads to cardiac dysfunction. Advanced Glycation Endproducts (AGE) modified arterial collagen immobilizes circulating low density lipoprotein leading to atheroma formation. Increase in AGE products will leads to increased microvascular complications. Various research on diabetic retinopathy and periodontitis showed that periodontal examination of diabetic patients may be a diagnostic value in early detection of diabetic retinopathy and its prevention. Similarly, association between periodontitis and nephropathy is observed. Hence periodontitis is an early marker of diabetic complications.

A study was conducted on diabetic patients by Sarita Bajaj et.al in 2012⁽⁵⁾. They evaluated the

diabetic patents for oral manifestations and tried to find whether there is any association between diabetic complications and oral manifestations. They evaluated 50 diabetic patients .They observed periodontal disease in 34%, followed by oral candidiasis in 24%, tooth loss in 24% and dental caries in 24%. They found the significant association between these oral manifestations and diabetic complications such as diabetic retinopathy, neuropathy, dyslipidemia. Research conducted on Periodontal Disease by Harald L  e. Periodontitis is more frequent and severe in patients with diabetes with poor glycaemic control and it was considered as 6th complication of diabetes ⁽⁷⁾.

In another study by Debora C. Matthews in 2002 ⁽⁸⁾, periodontitis in diabetic patients was found to be at higher prevalence when comparing with non diabetic patients. He stated that effective control of periodontitis in diabetic patients reduces the level of AGE products and he also stated that those patients with poor glycemic control will have increased clinical attachment level of gingiva. A study done by Renata S. Leite explained that periodontal disease causes alterations in host response , collagen metabolism and vascularity⁽⁹⁾. This study also stated that periodontitis induced bacteremia will increase pro inflammatory cytokines which in turn leads onto cardiac dysfunction. AGE-modified arterial collagen immobilizes circulating lowdensity lipoprotein leading to atheroma formation. Increase in AGE products will lead to increased microvascular complications. In 2012, Marcia Brand  o et.al conducted a research on salivary hypofunctioning on type 1 diabetic patients. He evaluated 51 type 1 diabetic patients for the lower salivary rate and DMFT(Decayed, missing and filled teeth). And he concluded that there was a lower salivary rate and high level of gingival plaque index in diabetic patients when comparing with non diabetics⁽¹⁰⁾. In 2006, Al-Shammari KF examined 29 non diabetic patients and 43 diabetic patients. He evaluated the clinical attachment level, plaque index, pocket depth and diabetic complications. He concluded that periodontal disease severity was greater in patients with diabetic complications⁽¹¹⁾. In this study on evaluating 55 diabetic patients, 55% of patients with

ischaemic heart disease had periodontitis. The p value for the association between cardiac complication and periodontitis is 0.0003 which is significant to show the association between cardiac dysfunction and periodontitis. Thus early detection of periodontitis will help us to detect cardiac complications early. Further it may also help us in starting primary prevention of coronary artery disease in these patients.

In 2013, Asadollah Farokhfar evaluated all the diabetic patients for periodontal status and diabetic retinopathy. His conclusion was that there was a significant relationship between periodontal disease and severity of Diabetic retinopathy (DR) but it was unclear whether periodontal disease directly affects the progression of DR⁽¹²⁾. Hakem H. El Sayed conducted a study on 64 diabetic patients about diabetic retinopathy and periodontitis. Study results shows that periodontal examination of diabetic patients may be of diagnostic value in early detection of diabetic retinopathy⁽¹³⁾. In this study on evaluating 39 patients, periodontitis is found in 58% of diabetic retinopathy patients. The p value for retinopathy and periodontitis is 0.001 which was more significant to prove the association between them. Hence periodontitis can be taken as an early marker for diabetic retinopathy.

Chronic Kidney Disease have higher prevalence of periodontal disease while non-surgical periodontal therapy has been indicated to decrease the systemic inflammatory burden in patients with Chronic Kidney Disease⁽¹⁴⁾. In this study on evaluating 89 patients, 60% of diabetic nephropathy patients had periodontitis. The p value for nephropathy and periodontitis is 0.0041 which shows that there is a significant association between them.

LIMITATIONS

Even though we have taken 101 diabetic patients for the study, we were able to evaluate only 55 patients for cardiac complications, 39 patients for eye complications, 89 patients for renal complications. If we could screen large number of patients for each complications, further more information about the association between oral manifestation and diabetic complications might have been obtained.

CONCLUSION

In this study, dental complications were found to be present in 90% of diabetic patients. The prevalence of diabetic retinopathy, nephropathy and coronary artery disease were found to be high in patients with oral manifestations. Further, periodontitis is the most common oral manifestation of diabetic patients. And in addition to that, patients who were diagnosed for diabetic periodontitis have increased diabetic complications such as diabetic retinopathy, coronary artery disease, nephropathy. Early identification and management of these oral manifestation may help in attaining better glycaemic control and prompt us in starting primary preventive measures for these complications. The relationship between oral manifestations and progression of diabetic complications needs further evaluation.

SUMMARY

On evaluating 101 diabetic patients, 90% patients had oral manifestations out of which periodontitis was significantly high on comparing with dental caries, xerostomia, glossitis. The diabetic complications such as diabetic retinopathy, nephropathy, coronary artery disease are found to be highly prevalent in these diabetic patients who are diagnosed with periodontitis. Proper screening and management of periodontitis for diabetic patients will lower the risk for diabetic complications.

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