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Awareness of Effect of Diabetes on Periodontal Health: A Cross Sectional Survey

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ABSTRACT

Periodontitis is a complex multifactorial disease and similarly diabetes is a complex metabolic syndrome, diabetes has long been identified as a complicating factor in the periodontal therapy by the periodontitis. The aim of study was to evaluate the knowledge and awareness of diabetic patients about their oral hygiene care and also about the oral changes that occur during diabetes. Among 340 diabetic patients, aged 30-60 years, completed a questionnaire, which consisted of 20 questions regarding their oral health attitudes, behaviors and knowledge. Chi square test was used for comparing the observed and expected frequencies of response. Even though 88% of diabetic patients claimed to have sufficient knowledge regarding diabetes, 64% were unaware of effect of diabetes on periodontium. Only 12% of the subjects visited dentist in the last one year. In addition, patients appeared to lack important knowledge about the oral health complications of their disease. But they were eager to learn and get education about oral health and diabetes. From this study concluded that the oral health education of people with or without diabetes is very important and necessary to reduce the risk of oral complications.

Key words: Diabetes, oral health care, awareness, periodontitis, periodontium

INTRODUCTION

Periodontal disease is a chronic inflammatory condition characterized by destruction of the periodontal tissues and resulting in loss of connective tissue attachment, loss of alveolar bone and the formation of pathological pockets around the diseased teeth¹. Number of systemic diseases and disorders has been implicated as a risk indicator or risk factor in periodontal diseases. Among various endocrine diseases, diabetic condition adversely affects the condition of periodontium and also poor periodontal health acts as a risk factor for diabetes^{2,3}. Indeed, the periodontal signs and symptoms were now recognized as the "sixth complication" of diabetes⁴.

Diabetes is a complex metabolic disorder characterized by chronic hyperglycemia. There are two major types of diabetes, type 1-Insulin Dependent Diabetes Mellitus (IDDM), was caused by a cell-mediated autoimmune destruction of the insulin-producing beta cells of the islets of Langerhans in the pancreas, which results in insulin deficiency and type 2-Non Insulin Dependent Diabetes Mellitus (NIDDM) was caused by peripheral resistance to insulin action, impaired insulin secretion and increased glucose production in the liver⁵.

Diabetes mellitus affects the periodontal tissue directly or modify the tissue response to local factors and produce anatomic changes in the gingiva that may favour plaque accumulation and diseases progression. The effect of diabetes on periodontal tissue were gingival inflammation, deep periodontal pockets, rapid bone loss, frequent periodontal abscess, cheilosis, mucosal drying, diminished salivary flow, cracking, burning mouth and tongue, gingival proliferation were often associated^{6,7}.

In patients with poorly controlled diabetes, the function of polymorphonuclear leukocytes (PMNs) was deficient resulting in defective phagocytosis, or impaired adherence and also monocytes/macrophages is diminished^{8,9}. Furthermore, there was increased collagenase activity and decreased collagen synthesis were seen in chronic hyperglycemia patients, in which the synthesis, maturation and maintenance of collagen and extracellular matrix were adversely affected. In hyperglycemic state, numerous proteins and matrix molecules undergo a non enzymatic glycosylation, resulting in accumulated glycation end product which further cross link with collagen and makes it less soluble and less likely to be normally repaired or replaced^{10,11,12}.

Current scientific evidence points to a two-way relationship between DM (Diabetes Mellitus) and periodontal disease, whereby DM is associated with an increase in the incidence and progression of periodontitis, while periodontal infection is associated with worsening glycemic control in diabetic patients. It was stated that chronic gram negative bacterial infection or poor oral hygiene has been shown to increase insulin resistance and aggravate glycemic control^{13,14}. This study was conducted to evaluate the knowledge and awareness of effect of diabetes on periodontium and their oral hygiene status.

MATERIAL AND METHODS

This study was conducted among diabetic patients in Sri Ganganagar district of Rajasthan as these represent both the urban and rural prospects in the state of Rajasthan. The permission to conduct the study was obtained from Institutional Ethical Committee of Maharaja Ganga singh dental college and research centre, Rajasthan. Cross sectional data were collected from direct interviewing of the subjects through a questionnaire. About 340 diabetic patients were taken as sample population for this study. A close ended questionnaire with 20 questions related to oral changes during diabetes, oral hygiene status, awareness of diabetes and periodontium, utilization of dental health services, habits and use of medications during diabetes, gingival conditions

was prepared to assess their knowledge and attitude towards dental awareness.

Questions had multiple options which was pretested and validated as per the statistical analysis (Cronbach's alpha =0.92). A number of endocrinology and diabetic centers in Sri Ganganagar district, Rajasthan were chosen randomly and duly approached to conduct the survey. After a brief introduction, the questionnaire was distributed among the sample population and was collected immediately after completion. The collected data was subjected to analysis and the following results were obtained.

Statistical analysis: Chi square test was used for comparing the observed and expected frequencies of response.

RESULTS

The total number of diabetic patients was 340 out of which 172 were males and 168 were females whose age ranges from 30-60 years.

Among 340 patients, 288 diabetic patients brushes once daily (82.4%), 60 diabetic patients brushes twice daily (17.6%) and no one reported to brush thrice daily.

Oral hygiene and health status among diabetic patients are shown in Table 1.

Among 340 patients, 280 (82.4%) patients had noticed bleeding gums, 287 (84.5%) patients had gingival swelling and 262 (77%) patients had noticed bad breath. Oral changes that observed in diabetic patient are shown in Table 2.

Table 1: Oral hygiene and health status of diabetic patients

Sr. No.	Questions	Yes N (%)	No N (%)
1	Do you use any other dental auxiliary aids?	N= 60 (18%)	N=280 (82%)
2	Have you visited dentist in the last one year?	N=41 (12%)	N=299 (88%)
3	Are you following a proper diet for diabetes?	N=298 (88%)	N=60 (12%)
4	Are you regular in taking diabetic medication?	N=250 (74%)	N=90 (26%)

Table 2: Oral changes in diabetic patient

Sr. No.	Questions	Yes N (%)	No N (%)
1	Have you noticed bleeding gums?	N=280 (82.4%)	N=60 (17.6%)
2	Have you noticed pus formation/discharge in the oral cavity?	N=120 (35.3%)	N=220 (64.7%)
3	Have you noticed gingival swelling?	N=287 (84.5%)	N=53 (15.5%)
4	Do you have a bad breath?	N=262 (77%)	N=78 (23%)
5	Do you feel that some of your teeth are loose (i.e, mobile tooth)?	N=163 (48%)	N=177 (52%)

Table 3: Awareness of periodontal diseases among diabetes patients

Sr. No.	Questions	Yes N (%)	No N (%)
1	Do you have sufficient knowledge about diabetes?	N=298 (88%)	N=42 (12%)
2	Do you think that diabetes can affect general health?	N=328 (96%)	N=12 (4%)
3	Do you think that diabetes can affect oral health?	N=297 (87%)	N=43 (13%)
4	Do you think diabetes can affect health of gums and bone housing the teeth (i.e., progression of periodontal diseases)	N=198 (58%)	N=142 (42%)
5	Do you think poor periodontal health increases the risk of diabetes?	N=122 (36%)	N=218 (64%)
6	Do you think that use of anti-diabetic drug has an effect on periodontium?	N=98 (29%)	N=242 (71%)
7	Do you think periodontal/dental checkup and treatment for diabetic patients is necessary?	N=298 (88%)	N=42 (12%)
8	Do you think that control of diabetes can control the periodontal diseases progression?	N=120 (35%)	N=220 (65%)
9	Do you feel that dental health education for diabetic patient is important?	N=326 (96%)	N=14 (4%)
10	Are you willing to participate in dental awareness program for diabetic patients if it is conducted?	N=331 (97%)	N=9 (3%)

Among 340 diabetic patients, 298 (88%) patients had sufficient knowledge about diabetes, but only 198 (58%) patients had an awareness that diabetes can affect periodontal diseases.

Awareness of periodontal diseases among diabetes patients are shown in Table 3.

DISCUSSION

The total number of diabetic patients was 340. Oral hygiene maintenance is very important for the diabetic patient, among 340 patients, 288 diabetic patients brushes once daily (82.4%), 60 diabetic patients brushes twice daily (17.6%) and no one reported to brush thrice daily. These results were similar to the study conducted by Akyuz *et al.*¹⁵ and Tse¹⁶.

In the present study, among 340 diabetic patients, only 18% (N=60) uses other dental auxiliary aids like tongue scraper, interdental brush, dental floss, etc In the past one year, only 12% (N=41) of the diabetic patients visited dentist for oral health care which states that most of the diabetic patients found no aware of oral/periodontal hygiene care. Among 340 diabetic patients, 88% (N=298) were following proper diet for diabetes and 74% (N=250) were regular in taking medication for diabetes. These results are in consistence with the study conducted by Akyuz *et al.*¹⁵.

Numerous oral changes have been described in diabetic patients, including cheilosis, mucosal drying and cracking, burning mouth and tongue, diminished salivary flow and alteration in the flora of the oral cavity^{17,18}. In the present study, among 340 diabetic patient, 82.4% (N=280) noticed

bleeding gums, 84.7% (N=287) noticed gingival swelling, 77% (N=262) has bad breath, 48% (N=163) has mobile teeth and 35.3% (N=120) had pus formation in the periodontium/oral cavity. These results were similar to the study conducted by Akyuz *et al.*¹⁵, Bowyer *et al.*¹⁹ and Jaiswal *et al.*²⁰. Ervasti *et al.*²¹ observed that greater gingival bleeding is seen in the patients with poorly controlled diabetes than in control subjects without diabetes and also epidemiologic research supports an increased prevalence and severity of attachment loss and bone loss in adults with diabetes. In contrary, Moore *et al.*²² stated that, even though majority of them noticed the suggestive signs of gingivitis and periodontitis, the remaining subjects found no changes and some were unaware of changes that occur in oral cavity.

In the present study, among 340 diabetic patients, 297 (87%) were aware of the effect of diabetes on oral health. This study was similar to the study conducted by Jayanthi *et al.*²³ in which 95% of individual were aware of effect of diabetes on oral health, but in contrary the study conducted by Weinspach *et al.*²⁴ stated that only 29.8% of the study participants had adequate knowledge about the effects of diabetes on oral cavity which was not statistically significant. In the present study, 42% (N=142) of diabetic patient says that diabetes does not aid in progression of periodontitis as well as 64% (N=218) thinks that poor oral hygiene is not a risk factor for diabetes. Out of 340, 71% (N=242) of diabetic patient thinks that administration of anti-diabetic drug has no effect on periodontium and 65% (N=220) thinks that control of diabetes does not control the progression of periodontitis.

Even though 88% of the subjects claim to have sufficient knowledge about diabetes, there is a lack of knowledge about effects of periodontal diseases on diabetic patients and vice versa.

Out of 340, 88% (N=298) thinks that periodontal/dental checkup and treatment for diabetic patients was necessary and 96% (N=326) feels that dental education for diabetic patients was important. This study was similar to the study conducted by Jayanthi *et al.*²³.

Most of the diabetic patients (i.e., 97%, N=331) were willing to participate in the dental awareness program if it was conducted. Even though most diabetic patients appeared to be informed about dental hygiene practices and the effect of poor oral hygiene on diabetes, majority of them did not attend any dental clinic for checkup for the past one year and this finding was in accordance with the findings of the study done by Weinspach *et al.*²⁴. A similar questionnaire study involving diabetes patients was conducted by Bowyer *et al.*¹⁹ who concluded that adults with diabetes were less aware of oral care and health complications associated with diabetes and thereby receive limited advice from healthcare professionals. Increasing awareness among the diabetic patients about dental problems, especially periodontal disease is important. Dental health for diabetic patient should be educated or trained and should make dental attendance mandatory for them to lead a better dental practices, which in turn can prevent unfortunate complications like severe periodontal problems, delayed wound healing, etc.

CONCLUSION

From the study it clearly states that diabetic patients were not aware of effect of diabetes on periodontium and also there is a lack of knowledge regarding oral health care. There also believe that the oral health education of people with or without diabetes is very important and necessary to reduce the risk of oral complications.

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