



Awareness about the Bidirectional Relationship of Diabetes Mellitus and Periodontal Diseases among the Diabetic Patients

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KEYWORDS

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ABSTRACT:

Diabetes is a long-term metabolic disorder that results in hyperglycemia, which damages several organs over time, including the kidneys, heart, eyes, nerves, and vascular system, which includes the periodontium. Diabetes increases the risk of periodontitis, and periodontal inflammation negatively affects glycemic control. Diabetes has a detrimental effect on periodontal diseases, increasing its prevalence, extent and severity. Severe periodontitis is associated with compromised glycemic control in diabetic patients. Considering this established bidirectional relationship, the present study is undertaken. The aim of the study was to assess the knowledge about the bidirectional relationship of diabetes mellitus and periodontal diseases among the diabetic patients. Data was collected in the form of a questionnaire from the 61 patients with type II diabetes visiting the Department of Periodontology, Rural Dental College and Hospital, Loni and willing to participate in the study. The present study concluded that patients are unaware regarding the bidirectional relationship of diabetes mellitus and periodontal diseases and should be educated by medical and dental practitioners for the comprehensive management of both the conditions.

INTRODUCTION

Diabetes mellitus is the most prevalent endocrine disorder marked by the incapacity of the body's cells to utilize glucose. Diabetes mellitus is a metabolic disorder, characterized by altered glucose tolerance or impaired metabolism of carbohydrates and lipids. Diabetes mellitus is mainly classified into two types, type I diabetes and type II diabetes.

Type I form of diabetes, which is also termed as insulin-dependent diabetes constitutes about 5-10% of total diabetic cases. It results from cellular mediated autoimmune destruction of pancreatic beta cells which leads to no insulin secretion. Type II form known as non-insulin dependent diabetes constitutes 90-95% of total diabetic cases. It results with insulin resistance that alters the use of endogenously produced insulin at the target cells and leads to insulin deficiency. Periodontitis is a complex infection affecting the supporting periodontal

structures, as a result of host reaction to anaerobic gram-negative bacteria found in dental plaque. Long standing bacterial plaque on both hard and soft structures of the oral cavity leads to gingivitis, which, if left untreated, develops into periodontitis. Diabetes is considered a global health concern due to their increasing prevalence.¹ Approximately 1 in 11 adults aged 20–79 years are living with diabetes mellitus.² Similarly, according to recent reports, the global prevalence of periodontitis is 11.2%.³ According to the American Diabetes Association in 1997, periodontitis has been considered as the sixth complication of diabetes mellitus. Also, it has been proved that there is a bidirectional relationship between diabetes mellitus and periodontitis. There are substantial evidences supporting this two way relationship where diabetes mellitus increases the risk of periodontitis and the periodontal inflammation negatively affects the glycemic control.⁴ This study aims to assess the patient's



perception of both diabetes and periodontal disease and knowledge about the bidirectional relationship of them among diabetic patients.

MATERIALS AND METHODS

The present cross-sectional study was conducted in the Department of Periodontology, Rural Dental College and Hospital, Loni, Ahmednagar. The study was carried out among 61 individuals from the patient's visited to the department of Periodontology with chief complaints of bleeding gums, loose teeth, bad breath, etc. Ethical clearance was obtained from the Institutional Ethical Committee of Rural Dental College, Loni. Data collection was done within a set limit of 3 months. Questionnaires were made available for participants in English as well as the local vernacular, Marathi. Pregnant, lactating mothers, patients on any antibiotic therapy and participants not willing to participate in the study were excluded. The structured questionnaire consisted of about 22 questions that focused on the awareness and knowledge about the association between periodontitis and diabetes. These questions were divided under four different categories. Category 1 included questions that recorded demographic data such as age, sex, educational status, and family income (monthly). Category 2 included four questions that recorded information regarding diabetes mellitus. Category 3 consisted of nine questions that recorded participants general & oral awareness, and its practices and category 4 consisted of five questions that were referred to participants, healthcare professionals' attitude towards oral health knowledge (bidirectional relationship between diabetes and periodontal disease). All the data gathered for the study was confidential.

RESULTS

Table 1: Demographic details

	Frequency	Percentage
Gender		
a) Male	34	55.7%
b) Female	27	44.3%
Age		
a) 25-45	11	18%
b) 45-65	43	70.5%
c) Above 65	07	11.5%

Education		
a) Not educated	13	21.30%
b) 10th and below	24	39.30%
c) 12th	13	21.30%
d) UG	11	18.00%
e) PG	0	0%
f) Doctorate	0	0%
Family income		
a) Below 10,000	28	45.90%
b) 10,000-25,000	26	42.60%
c) 25,000-35,000	05	8.20%
d) Above 35,000	02	3.30%

Table 1 shows that the present study included 34 males and 27 females ranging from 25-45 years 11 cases; 45-65 years 43 cases and above 65 years 7 cases. 13(21.3%) participants were illiterate, 24(39.3%) were educated till secondary, 13(21.3%) were having higher secondary and 11(18.0%) were graduates. It also shows that 45.9% of subjects had monthly income less than 10,000; 42.6% had from 10,000 to 25,000; 8.2% had from 25,000 to 35,000 and only 3.3% had more than 35,000.

Table 2: Questionnaire about participants medical history

	Frequency	Percentage
1)Age of onset of diabetes mellitus-		
Below 40 years	17	27.9%
> 40 years	44	72.1%
2)Medication		
a) Insulin	0	0%
b) Oral hypoglycemic	53	86.9%
c) Both	05	8.2%
d) None	03	4.9%
3)Duration since onset (years)		
a) < 5 years	29	47.5%
b) ≥ 5 years	17	27.9%
c) 10+	15	24.6%



4) Family history of diabetes mellitus		
a) No	30	49.2%
b) Yes	31	50.8%

Table 2 shows that for a large number of participants the age of onset of diabetes was >40 years (72.1%) with the majority of participants having diabetes for <5 years using oral hypoglycemics to control the diabetes (86.9%).

Table 3: Questionnaire about participants General & oral awareness & its practices

	frequency	percentage
1. Exercise		
a) Daily	20	32.8%
b) Rarely	12	19.7%
c) None	29	47.5%
2. How often do you check your blood sugar levels (in laboratory)		
a) Once in a month	12	19.7%
b) Once in 3 months	29	47.5%
c) Once in 6 months	14	23%
d) Others	06	9.8%
3. Do you have a glucometer?		
a) No	56	91.8%
b) Yes -	05	8.2%
4. Visited physician for follow up in past 6 months		
a) Yes	49	80.3%
b) No	12	19.7%
c) Others	0	0%
5. Dental visits		
a) Regularly	04	6.6%
b) On need	57	93.4%

6. Oral hygiene aids		
a) Rinsing with water	0	0%
b) Finger	0	0%
c) Mishri application	14	23%
d) Toothpowder	01	1.60%
e) Toothpaste & toothbrush	46	75.40%
7. Brushing frequency		
a) Once daily	53	86.90%
b) Twice daily	07	11.50%
c) More than twice daily	01	1.60%
8. Do you use any interdental cleansing aids		
a) No	59	96.70%
b) Yes	02	3.30%
9. No. of oral health problems present		
1) Mouth dryness	05	8.19%
2) Delayed healing in the mouth	04	6.55%
3) Swollen gums	34	55.73%
4) Gums bleeding on brushing	33	54.09%
5) Loose teeth	30	49.18%
6) Bad breath	23	37.70%
7) Burning sensation	02	3.27%
8) Any altered taste perception	01	1.63%
9) Mouth ulcers	01	1.63%
10) Tooth decay	39	63.93%

Table 3 shows that participants are overall educated about diabetes and do have regular checkups for it but when it comes to the relation of diabetes with oral health, participants are oblivious about it with poor oral health

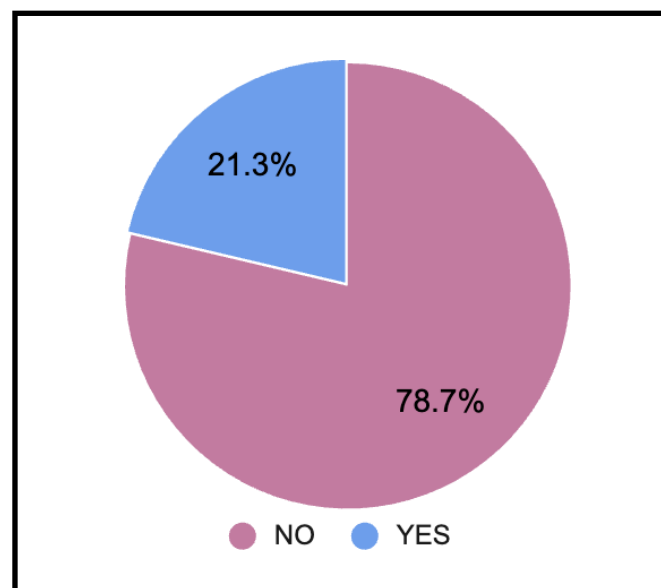


care, irregular dental visits and suffer from various oral health problems.

Table 4: Questionnaire about participants Diabetes and Periodontal disease awareness

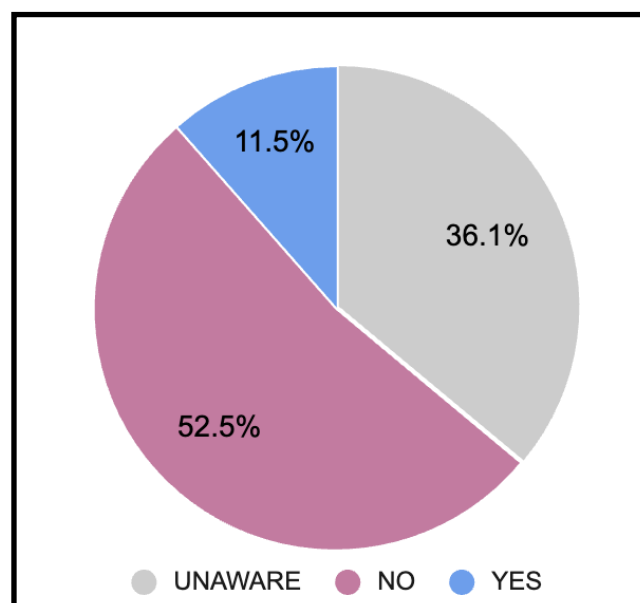
	Frequency	Percentage
Can diabetes affect your oral health?		
Yes	13	21.3%
No	48	78.7%
Does diabetes have any role in gum disease?		
Yes	07	11.5%
No	32	52.5%
Unaware	22	36.1%
Have you ever been told about the relation between diabetes and oral health by a physician?		
Yes	08	13.1%
No	53	86.9%
Has the physician ever told you to get an oral health checkup done?		
Yes	13	21.3%
No	48	78.7%
Have you ever been advised to take care & monitor diabetes by the dentist?		
Yes	32	52.5%
No	29	47.5%

Table 4 shows that a large number of participants are unaware of the effect of diabetes on oral health (78.7%). 52.5% of the participants have been advised to take care & monitor diabetes by a dentist and 21.3% of physicians asked patients to get their oral health checkup done.



Graph 1: Effect of diabetes on oral health.

The above graph denotes that 48/61(78.7%) were unaware and 13/61(21.3%) were aware about the effect of diabetes on oral health.

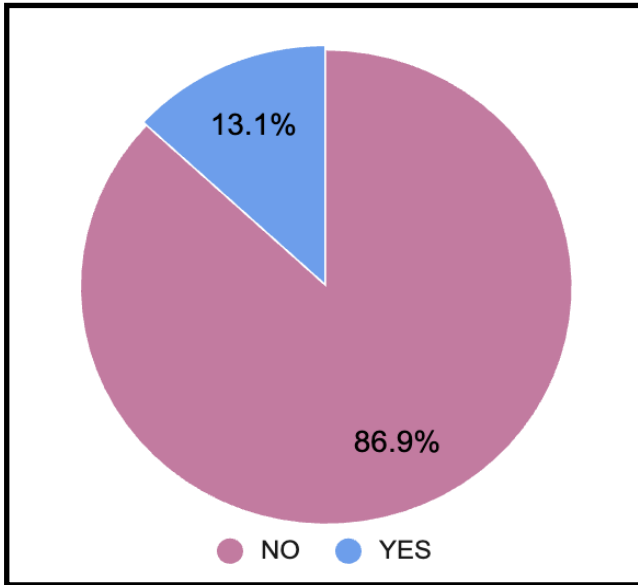


Graph 2: Role of diabetes in gum disease.

The above graph denotes that 22/61(36.1%) were unaware about the role of diabetes in gum diseases. 7/61(11.5%) said there is a role of diabetes in gum

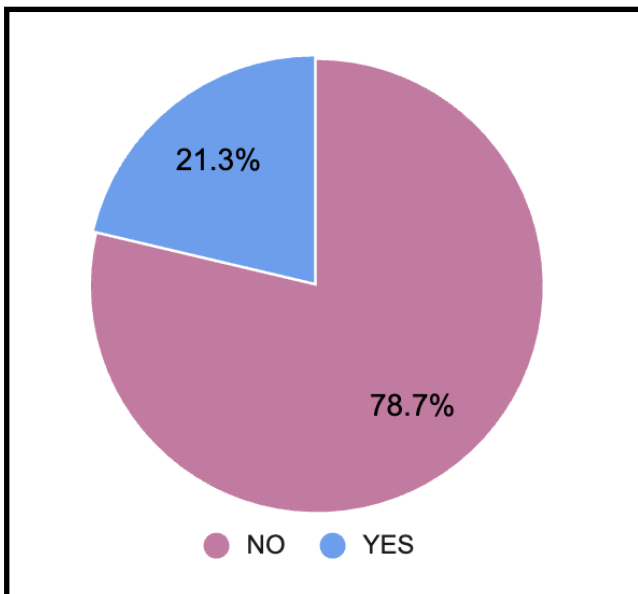


diseases and 32/61(52.5%) said there is no role of diabetes in gum diseases.



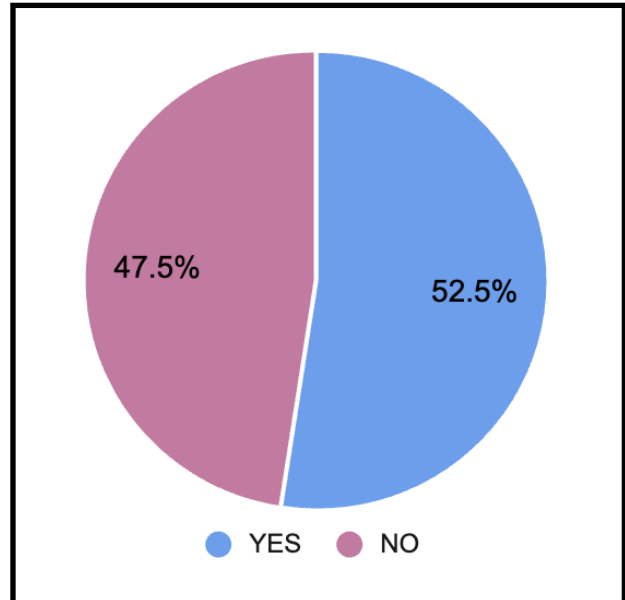
Graph 3: Awareness about the relationship between diabetes and oral health by a physician.

The above graph denotes that 53/61(86.9%) of the participants have not been told and 8/61(13.1%) participants have been told about the relation between diabetes and oral health by a physician.



Graph 4: Oral health check-up advised by the physician.

The above graph denotes that 48/61(78.7%) were not advised and 13/61(21.3%) were advised to get an oral health checkup done by a physician.



Graph 5: Monitoring of diabetes as suggested by the dentist.

The above graph denotes that 32/61(52.5%) were advised and 29/61(47.5%) were not advised to take care and monitor diabetes by the dentist.

DISCUSSION

Both diabetes and periodontitis are the most common diseases. Various studies have shown the bidirectional relationship between diabetes and periodontal disease. Grossi and Genco et al. in 1988 proposed the bidirectional relationship between diabetes and periodontitis.^{5,6} The International Diabetes Federation and World Dental Federation emphasized that there was a strong need for effective communication between practitioners and patients to foster a clear understanding of the relationship between DM and periodontal diseases.⁷ Due to the lack of awareness among health care providers regarding this association, there was a corresponding lack of awareness among diabetic patients.⁸ As highlighted by similar studies conducted in Kuwait, there was a lower awareness level than desired among dental and medical practitioners regarding the bidirectional relationship between diabetes mellitus and periodontal diseases.⁸ Sixty one patients participated in



the questionnaire-study wherein 75.4% used a toothbrush and toothpaste for maintaining oral hygiene. Out of 61 diabetic patients who were included in the study, 55.7% were males and 44.3% were females.[Table 1] The most frequent oral problems these patients experienced were tooth decay (63.93%; 39/61), swollen gums (55.73%; 34/61), bleeding of gums while brushing (54.09%; 33/61), loose teeth (49.18%; 30/61), bad breath (37.70%; 23/61), which were all commonly associated in patients with diabetes.[Table 3] Due to the significant reduction of salivary flow, dry mouth or xerostomia has been documented as the most common oral manifestation of diabetes.⁹ The primary function of saliva is to facilitate lubrication and cleansing of the oral cavity to prevent the accumulation of plaque and debris, which could be a contributing factor in diabetes increased risk for periodontal disease and dental caries.⁹⁻¹⁰ Classic signs and symptoms of gingivitis include red, swollen, tender gums that may bleed on brushing.¹¹ If gingivitis is not treated, it can and often will progress to periodontitis. Even when the disease is not very advanced, some people may still have halitosis or an unpleasant taste on a regular basis. Treatment protocol for diabetic patients with periodontal disease and gingivitis must include preventing infection by removing plaque and calculus, promoting a reduction in inflammatory response, and maintaining glycemic control. The study also showed that 78.7% of individuals had no idea that diabetes is a contributing factor to periodontal disease and can affect oral health. In addition, only 6.6% (4/61) of patients visited their dentist on a regular basis.[Table 2] It was observed that 52.5% of the participants have been advised to take care & monitor diabetes by a dentist and only 21.3% physicians asked patients to get their oral health checkup done.[Table 4] Epidemiological data confirm that diabetes is a major risk factor for periodontitis with the risk of periodontitis increasing nearly three-fold in diabetic individuals compared with non-diabetic individuals.¹² There is a clear relationship between the levels of blood sugar levels and the severity of periodontitis. The immune system, neutrophil activity, and cytokine biology all play a role in the pathways that connect hyperglycemia and periodontal disease. Diabetes and periodontitis have a bidirectional relationship that has been shown to increase the risk of periodontitis and negatively impact glycemic control when periodontal inflammation is present. Increase in anaerobic microorganisms and circulating cytokines,

which contributes to insulin resistance and leads to raised blood glucose levels. This worsens the glycemic control and the periodontal health. Advanced glycation end products (AGEs) are produced as a result of oxidative stress. These AGEs change the metabolism and turnover of collagen and enhance the production of friable glycated collagen, which results in pocket formation. Research has repeatedly demonstrated that better control of blood sugar will lower the incidence of oral problems. Furthermore, study indicates that people with diabetes mellitus who are aware of their condition and practice self-care have better glucose management over the long term. Therefore, it is essential to make sure that patients have the proper knowledge, attitudes, and practices to engage in preventive practices like brushing, flossing, and routine dental checkups.

CONCLUSION

The medical professionals and the community need to be made aware of the relationship between diabetes mellitus and periodontal disease. The medical professionals can then help patients manage their diabetes better by encouraging them to maintain good dental health. By conducting diabetes screenings in dental offices, medical and dental professionals can work together to enhance the population's oral and systemic health. The majority of diabetes patients - 53, or 86.9% - brushed just once a day. Patients with diabetes should be encouraged to brush twice a day to maintain improved oral health since their saliva and gingival crevicular fluid have greater glucose levels, which promote bacterial growth and plaque accumulation. If diabetes is properly managed, the likelihood of oral complications is reduced. Patients with diabetes should see their physician and dentist on a frequent basis to avoid and manage oral health issues. As such, medical and dental professionals should collaborate, and patient education should be regarded as a crucial component. The results of this study need to be confirmed by a larger diabetic population study in the future with inclusion of the oral examination as well, to correlate the clinical findings and the presence of periodontitis.

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