

DIABETES AND PERIODONTITIS-THE UNREVEALED FACTS

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Evaluation of awareness regarding association between diabetes and periodontitis among diabetics: A cross-sectional study

ABSTRACT

Diabetes mellitus and periodontitis both are the most prevalent diseases among adults and older individuals worldwide. The correlation between these two diseases has also been well established. However, the awareness among diabetics for their increased risk of periodontitis is still lacking. The aim of present study was to evaluate the awareness of the strong association between type 2 diabetes mellitus and periodontitis among patients with diabetes mellitus. A cross-sectional study was carried out by filling out the self-designed questionnaires by the researcher. The participants were diabetic individuals and all were registered as diabetics at "Diabetic clinic and research institute centre in Amritsar, Punjab (India)." The study sample included total 50 patients of type 2 diabetes mellitus. The data shows that diabetic individuals are not aware of having increased risk for periodontitis. Also, the diabetic patients are not being informed by their physicians regarding their higher risk of developing dental problems as compared to non-diabetic individuals.

KEYWORDS

Diabetes mellitus, oral awareness, periodontitis.

1. INTRODUCTION

Diabetes and periodontitis both are highly prevalent diseases most commonly occurring among adults and older individuals globally. The strong correlation between these two diseases has also been reported by numerous researchers. However, there is a lot more to reveal among diabetics about the association of these diseases. Although, the studies proved the strong link between diabetes and periodontal diseases, but, *are diabetics aware of their increased risk for periodontitis? Do physicians inform the diabetics about this strong correlation between diabetes mellitus and periodontitis?*

"Diabetes is believed to promote periodontitis through an increased inflammatory response to the periodontal microorganisms"

Diabetes mellitus is a chronic metabolic disorder characterized by impaired metabolism of carbohydrates, proteins and lipids. In diabetics, due to an absence of insulin production or

resistance to insulin action, there is an inability of glucose to be transported from the blood stream into cells or tissues leading to increased level of glucose in the blood. Diabetes causes severe long-term complications such as retinopathy, neuropathy, nephropathy, cardiovascular and cerebrovascular diseases. Despite these complications, periodontitis is considered to be the sixth complication of diabetes mellitus. In uncontrolled diabetes, the metabolic processes which are responsible for producing resistance against infection and trauma are also affected. There are two types of diabetes: Type 1 and Type 2. Type 1DM accounts for only 5-10% of all cases of diabetes and most commonly occurs in children and young adults. This type of diabetes occurs due to lack of insulin production. Type 2 DM accounts for 90-95% of all cases of diabetes and it commonly occurs in adults and older individuals. This type of diabetes occurs due to impaired insulin secretion or due to increased peripheral resistance of tissues to insulin action. Individuals often are unaware that they have the disease until severe symptoms and complications of diabetes develop. It has also been found that type 2 DM most commonly occurs in obese people.

Periodontitis is the inflammation and destruction or damage of supporting tissues of the teeth. In periodontitis, inflammation extends beyond gingiva causing connective tissue breakdown and hence leads to loss of clinical attachment of teeth. Periodontitis exists in three primary forms: aggressive, chronic and as a manifestation of systemic diseases. The majority of periodontal diseases are caused by bacteria due to the accumulation of plaque and calculus on teeth but these diseases also occur as a complication of some systemic diseases. Among all the systemic diseases, diabetes mellitus is most commonly associated with periodontitis. Periodontitis is characterized by increased periodontal pocket depth, bleeding on probing, clinical attachment loss, tooth mobility and eventually tooth loss. Both diabetes and periodontal diseases have been found to be strongly correlated. In diabetics, the healing process is affected because of disturbance in cellular carbohydrate metabolism. So, since periodontium is present in the oral cavity with its many factors predisposing to disease, including calculus, bacteria, and trauma, there is no doubt that this structure appears to get damaged more readily in persons with uncontrolled diabetes than in normal people. It is believed that exaggerated host inflammatory response to the periodontal microorganisms promotes the periodontitis in diabetic patients. Diabetic patients have increased level of glucose in the blood and in the gingival fluid as well. So, the availability of this excess glucose which comes in contact with structural and other proteins leading to the formation of AGE (advanced glycation end) products. These AGE's then bind with the cellular receptors called as receptors for AGE (RAGE). The RAGE is present on endothelial cells and monocytes. And this binding of AGE with RAGE leads to a sequence of reactions causing increased inflammatory response which in turn leads to the rapid destruction of the periodontium and diminished repair of damaged tissues. "It has been reported by Russel that nearly 40% of a group of 37 diabetics exhibited gingival angiopathy in the form of PAS- positive, diastase-resistant thickening of vessel walls, hyalinization of vessel walls and sometimes luminal obliteration. Similar changes were also found in the periodontal ligament vessels of patients with diabetes mellitus" [1]. Leo proposed that periodontitis is the sixth complication of diabetes mellitus [2]. One study was conducted on Pima Indians in Arizona consisting of 2180 subjects aged 15 years or older. They had undergone one or more biennial clinical exams including a comprehensive oral and dental examination in the years between 1983 and 1988. It was found that the approximately 8% of non-diabetic subjects <30 years of age had advanced periodontal disease. On the other hand, the prevalence of this level of severity of disease in persons with Type 2 DM in the same age group was 45-48%. Of the 746 individuals who were not diagnosed to have the periodontal disease at the beginning of the study in 1983 and who were followed for up to 5.5 years, 32 developed periodontal diseases; 23 were among 696 non-diabetic group and 9 belonged to a group of 50 persons with diabetes. After controlling for age and sex, the rate of periodontal disease in subjects with diabetes was 2.9 times, nearly threefold what it was in individuals without diabetes. In this way, this study proved that diabetes confers an added risk of periodontitis. Moreover, these studies provide the longitudinal data that confirm previous cross-sectional observational data of the association between diabetes and periodontal disease in this

population. It has been concluded that diabetics had 15 times more probability to be totally edentulous compared to non-diabetic individuals. Also, the edentulousness is increasing more frequently with duration of diabetes ranging from 7% edentulous for diabetes of 5-year duration to 14% for 10-year duration to 75% for diabetes of 20-year duration [3].

There are numerous studies which proved the strong association between diabetes and periodontitis. But, very few studies had been conducted regarding the awareness of the association between these two diseases. The objective of present study was to evaluate the awareness among diabetic patients for their increased risk of developing periodontitis. This study was also conducted to emphasize the need for physicians and dental professionals to work in collaboration to decrease the risk of periodontitis and to enhance the good oral health conditions among diabetic patients.

2. RESEARCH DESIGN AND METHODS

2.1. SAMPLE

The descriptive cross-sectional study sample included total 50 patients who were diagnosed with type 2 DM and registered at “*diabetic clinic and research institute in Amritsar, Punjab (India)*”. All the patients were cooperative and very well responded to the survey. Out of these 50 patients, 14(28%) were males and 36(72%) were females. The majority of patients belonged to Punjab, however, some were also from Jammu and Kashmir. The participants included in the study were from both rural as well as urban regions. All the patients surveyed under this study were above 35 years of age.

2.2. DATA COLLECTION

Self-designed and well-structured questionnaires were filled out by the researcher as the patients responded to these questions. The informed consent was taken from all the patients and they were also assured about their confidentiality. Also, permission from the head of the hospital was also obtained to conduct this survey. The study was conducted over a period of two weeks. All the patients were very cooperative and responded well. The questionnaires contained several questions regarding the socio-demographic features (i.e name, age, sex, address, education, nationality and occupation); medical history of diabetes (i.e. about medication, duration of diabetes, family history of diabetes etc.); their general and oral habits such as exercise, physician and dental visits, frequency of brushing and flossing; their awareness regarding diabetes and its association with periodontitis; regarding how they got information about diabetes and whether they are being informed by physicians about the link between diabetes and periodontitis. The questionnaire was pretested on a small sample before starting the study and that test sample was excluded from the study. After filling out the questionnaires, the participants were informed about the association between diabetes and periodontitis and they were told about the need to take good care of their oral health.

2.3. STATISTICAL ANALYSIS

SPSS 16.0 software was used to do the statistical analysis of the collected data. The hypothesis was tested by using the $P < 0.05$ as statistical significant value. The correlation between different variables was also tested.

3. RESULTS

3.1. DEMOGRAPHIC CHARACTERISTICS OF SAMPLE POPULATION

Out of total population studied (50 patients), 14 were males comprised of 28%, whereas, 36 were females comprised of 72%. (Figure 1). The majority of the population had a primary level of education constitutes of 26(52%), whereas the percentage of the population with secondary level education was 12(24%). And also, 12(24%) of the total population was found to be illiterate (Figure 2). Average age of patients under study was 55.8 years with 4(8%) were above 35 yrs of age, 3(6%) of patients were above 40 years of age, 28(56%) of participants were above 50 years of age and 15(30%) of them were above 60 years of age. (Figure3).

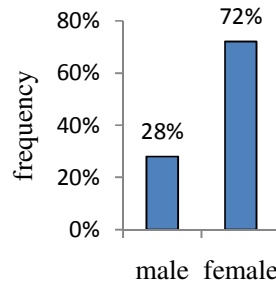


Figure 1 Percentage Distribution Of Study Population As Per Gender

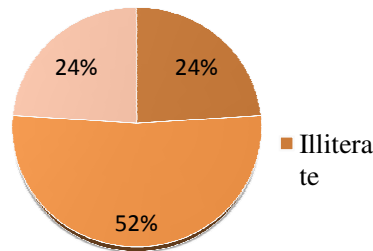


Figure 2 Percentage Distribution Of Study Population As Per Educational Status

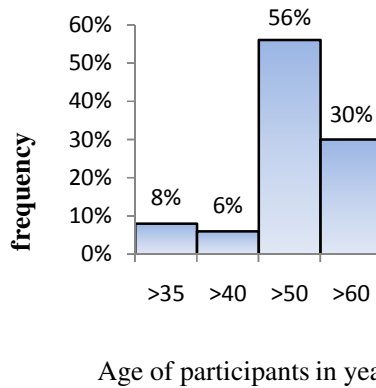


Figure 3 Age-Wise Distribution Of Study Population In Percentages

3.2. MEDICAL HISTORY

All the reported participants were the known patients with Type 2 diabetes mellitus. The majority, that is 60% of patients had taken the oral hypoglycaemic drugs for the treatment of diabetes. 12% of them were on insulin injection and 28% of diabetic patients received both oral as well as insulin treatment. The average onset of the duration of diabetes was found to be 6 years among these patients.

3.3. GENERAL AND ORAL HABITS

Among the studied population, only 8% did regular exercise whereas the rest 92% of patients reported that they exercised occasionally. 90% of diabetic patients had been reported to their physicians regularly and only 10% had not visited their physician at regular intervals. On the contrary, only 8% of patients visited the dentist on regular basis and 92% of them had not either visited or visited dentist occasionally. 84% of diabetic patients reported of brushing once daily and only 16% had brushed twice a day. Flossing was used by only 4% of patients whereas, 96% of them had never used floss in their life to clean the teeth.

		Number (n)	Percentage (%)
1.	<i>Exercise</i>		
	Regularly	4	8
	Occasionally	46	92
2.	<i>Physician visit</i>		
	Regularly	40	90
	Occasionally	10	10
3.	<i>Dental visit</i>		
	Regularly	4	8
	Occasionally	46	92
4.	<i>Brushing</i>		
	Twice daily	8	16
	Once daily	42	84
5.	<i>Flossing</i>		
	Occasionally	2	4
	Never	48	96

Total number (n) = 50

Table 1 General and oral habits of sample population

3.4. AWARENESS OF PATIENTS REGARDING DIABETES

Almost all the patients were aware of that they have diabetes and all patients had checked their blood glucose level within last six months. They were also aware of the readings of their last blood sugar test.

3.5. SOURCES OF DIABETES-RELATED INFORMATION

76% of sampled population got information related to diabetes from health care providers and 24% of them reported that they received information about diabetes from their friends and family members.

3.6. AWARENESS OF PATIENTS REGARDING ASSOCIATION BETWEEN DIABETES AND TOOTHLOSS

32% of total participants reported that they were aware of the increased risk of tooth problems due to diabetes, however, 68% were found to be unaware of the link between diabetes and periodontitis. (Figure 4).

3.7. AWARENESS LEVEL RELATED TO THE EDUCATIONAL STATUS OF STUDY POPULATION

Among all the participants, only 16% knew the link between diabetes and periodontitis and these belonged to the 24% of those who received the secondary education ($r\ square=0.138$). Whereas, other patients who completed only primary education and who were not educated did not show awareness regarding the association between these two diseases. (Figure 5).

3.8. PHYSICIANS INFORMING THE DIABETICS ABOUT THE INCREASED RISK OF PERIODONTITIS

Only 16% of total participants were informed by their physicians that they are more susceptible to have dental problems and 84% of them were never advised by their health care providers to take good care of oral health as diabetics are at increased risk of developing periodontitis. (Figure 6).

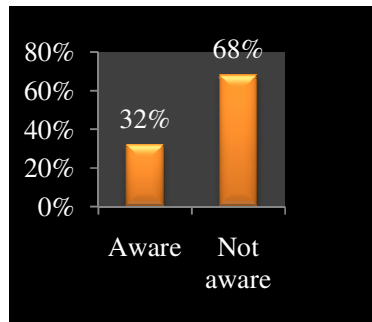


Figure 4 Awareness level (in percentage) regarding association of diabetes and periodontitis among study population

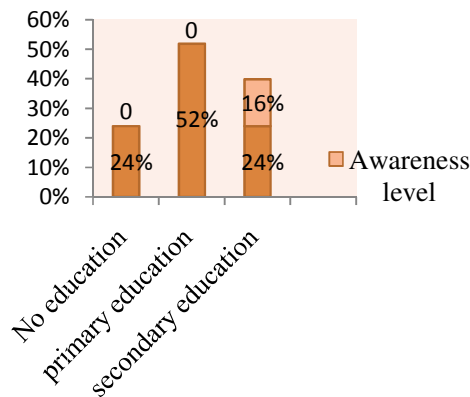


Figure 5 Awareness level among study population as per educational status (in percentage).

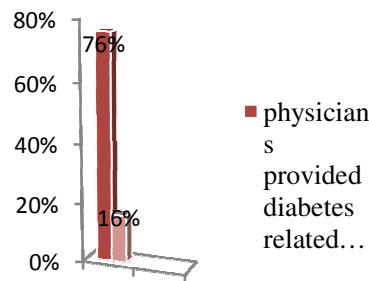


Figure 6 Percentage of diabetic patients who received information regarding their diabetes from physicians and percentage of patients who were aware of its association with periodontitis.

4. DISCUSSION

The data obtained through this study showed that among all the diabetic participants, 72% were females suffering from this disease whereas only 28% of males were reported to be suffering from diabetes. This reflects that diabetes is more common among females as compared to males. All the patients were above 35 years of age and the average age of studied population was found to be aged 55.8 years with 56% patients were above 50 years of age and 30% were above 60 years of age. The remaining 14% of participants were between 35 and 50 years of age. As per educational status, majority of participants had received only primary education (52%), only 24% had secondary education, and 24% of total patients were reported as illiterate that is with no education. All the patients were diagnosed with Type 2 DM. Majority, that is 60% of the patients were on oral hypoglycaemic drugs whereas 12% of patients received diabetic treatment as insulin injection. And, the patients who received the treatment for diabetes in both forms (i.e oral as well as insulin injection) comprised of 28% of total studied sample. All the patients have been suffered from diabetes for more than 5 years with the mean duration of onset was 6 years. The patients who exercised on a regular basis comprised of only 8%, however, 92% had never exercised or exercised occasionally. 90% of participants had told that they visited their physicians regularly and percentage of patients who had not visited the physician at regular intervals was only 10%, shows that most of the patients were keeping up the appointments with their physicians. On the other hand, only 8% of diabetic patients had visited the dentist on a regular basis and 92% of them had either visited the dentist only occasionally or had never visited their dentists. This shows that these patients were not as compliant with their dental care as they were shown to be more compliant with their treatment for diabetes. As per the oral habits, only 16% of patients had brushed their teeth twice in a day and 84% of them reported that they brushed only once daily. A community trial in Finland also concluded that self-reported twice-daily tooth brushing is less frequent in diabetic patients than in non-diabetic individuals [4]. Flossing habit was not common among these patients, as, only 4% had used floss to clean the teeth and 96% of patients had never flossed to clean their teeth. So, it was observed that the oral hygiene practice was not the main priority among the studied sample. Regarding the awareness of link between diabetes and periodontitis, percentage of patients who reported that they were aware of this association was only 32% and 68% of them did not know about the association of these two diseases. This study was found to be consistent with one another study that was “conducted in the USA involving 390 patients with diabetes found that only 18.2% recognized that their oral health might be affected by diabetes” [5]. “Also, In the Arab countries, a study conducted on a random sample of 405 diabetic patients in Jordan showed that approximately 48% were aware that diabetic patients are more susceptible to periodontal diseases and oral health complications” [6]. It had been observed

that the awareness level was also related to their educational attainment. As, patients who had received the secondary education (24%) were found to be more aware (16%) than those who were not educated or who had received only primary level education. On the contrary, almost all the patients were aware of their diabetes and they also knew their blood glucose levels in the last test. Regarding physician's advice to take care of oral health to these diabetic patients, 16% reported that they had been advised regarding the complications of diabetes including its effects on teeth, whereas, the remaining 84% were never informed by their physicians about their increased risk of developing periodontitis. Although, the majority of patients 76% got the information regarding their diabetes from health care providers and only 24% had received the information regarding diabetes from friends or family members, but still the majority of participants were unaware of this association.

5. CONCLUSION

As it is observed from this study that there is very scant knowledge among diabetics regarding the strong link between diabetes and periodontal diseases, also, the physicians do not advise these patients to take care of their dental health. These high-risk patients are more susceptible to suffer from dental problems. There are strong evidences showing that the diabetic patients tend to lose their tooth at an earlier age than non-diabetics. This highly pressing problem can be solved through interdisciplinary approach by providing the comprehensive training to medical and dental professionals. Although, majority of diabetic patients are being informed by the physicians regarding their diabetes but, still these patients are not aware of the association between diabetes and periodontitis. In India, the periodontitis is highly prevalent and its strong association with systemic diseases requires the patients to have appropriate knowledge and guidance to prevent from increased risk of periodontitis. For better interdisciplinary understanding and comprehensive treatment for patients, it is essential for physician to understand the relationship between periodontal disease and diabetes mellitus to provide appropriate assessment and management of health care needs of these patients. Since diabetic patients visit physicians more often than a dentist, it is their responsibility to make the patients aware of this association and motivate them to give priority to the dental treatment as well. These findings from this study encourage the further research in this area to evaluate the awareness among diabetic population on a larger scale so that the need for physicians and dental care professionals to work collaboratively towards the oral health of these patients can be emphasized. And, also the required efforts and measures should be planned and implemented to achieve this goal.

6. LIMITATIONS

This study was carried out in only one hospital or setting. Therefore, sample size was very small, hence the findings may not be applicable on the national scale. Also, the sample was not chosen randomly which may have led to some bias. Therefore, a similar study on a larger scale is required to provide more representative findings.

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