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Original Article

A Prospective Study Establishing Correlation between Diabetes and Tooth Loss

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ABSTRACT:

Background: Diabetes is one of the international public health concerns; it is a non communicable, chronic systemic condition affecting a vast majority of subjects. Tooth loss generally occurs due to periodontal problems and it is basically gingivitis which is an inflammatory condition of the gingiva and the adjoining periodontal tissues leading to destruction of bone, cementum and ligament. They do not have any knowledge that even tooth loss can occur in diabetes. Because of the lack of awareness, the present study was conducted with the aim to establish the number of missing teeth amongst diabetics and to create awareness about this issue amongst the study population. **Materials and methods:** The present observational study was conducted in the department, Institute, state during a period of 1 year. The study enrolled total of 220 subjects were enrolled, out of these 110 were having diabetes and other 110 were controls. Questions like gum swelling, malodour, reasons for teeth extraction were asked from them. These questions were generally open ended type. Thereafter every patient's oral cavity was examined by single examiner using probe and mirror. All the data was arranged in a tabulated form and analyzed using SPSS software. Student t test was applied as a test of significance. Probability value of less than 0.05 was considered significant. **Results**: The present study included total of 220 subjects, out of these there were 110 diabetics and other 110 were controls. The mean age of the population was 36.65 +/- 8.6 years. There were 49.1% males and 50.9% females in the non diabetic group. There was no significant difference between the two groups. There were 16.4% subjects between 30-40 years of age, 51.8% subjects between 41-50 years of age, 20% subjects between 51-60 years of age and 11.8% subjects 61-70 years of age. The most common age group amongst diabetic and non diabetic subjects was 41-50 years of age. The mean number of missing teeth amongst diabetics was 5.11+/-0.69. The mean number of missing teeth amongst non diabetics was 3.05 +/-0.52. There was a significant difference in the mean missing teeth amongst both the groups as p value was less than 0.05.

Conclusion: From the above study we can conclude that there is significant difference in teeth loss amongst diabetics and non diabetics.

Key words: Diabetes, Periodontal disease, Significant, Teeth.

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INTRODUCTION

Diabetes is one of the international public health concerns, it is a non communicable, chronic systemic condition affecting a vast majority of subjects.[1] Tooth loss generally occurs due to periodontal problems and it is basically gingivitis which is an inflammatory condition of the gingiva and the adjoining periodontal tissues leading to destruction of bone, cementum and ligament.[2] Various studies have suggested that diabetes is a chief risk factor for periodontitis and the risk of periodontitis is three times in diabetics compared to non diabetics.[3] Periodontal disease is also considered a complication of diabetes, it is regarded as a sixth complication.[4] In diabetes, there is growth of anaerobic microaerophilic gram negative bacteria at the sub gingival sites.[5] There is persistence inflammation as a host response which leads to destruction of the periodontal ligament, bone and hence leading to tooth loss.[2,5] Various factors have been implicated to cause periodontal disease in diabetics, those are: alteration in immune response[6], cytokines[7], products of glycosylation[8]. It has been estimated by world health organization that by 2025, there would be 300 million would be diabetic. The number of diabetics in 2010 was 221 million.[9] Metabolic state in diabetes is also affected by periodontal disease. Presence of gram negative anaerobic bacteria leads to poor glycemic control and increased chances of complications associated with diabetes.[10-12]Various epidemiological surveys have proved the fact that there is significant affect of diabetes mellitus on the periodontal status of the subjects affected by it.[13,14] People are generally not aware of the oral complications associated with diabetes. They do not have any knowledge that even tooth loss can occur in diabetes.[15] Because of the lack of awareness, the present study was conducted with the aim to establish the number of missing teeth amongst diabetics and to create awareness about this issue amongst the study population.

MATERIALS AND METHODS

The present observational study was conducted in the department, Institute, state during a period of 1 year. The study enrolled total of 220 subjects were enrolled, out of these 110 were having diabetes and other 110 were controls. Only subjects who were more than 18 years of age were included in the study. Patients with diabetes less than 6months or any other uncontrolled systemic disease like hypertension were excluded from the study. Patients with conditions having known effect on periodontium like AIDS etc, known smokers, pregnant and lactating mothers and patients on anti-inflammatory drugs were excluded from the study. A predesigned proforma was used to fill the details about every subject like gender, age, occupation, religion etc. In both the groups blood sugar was estimated at fasting time and it was recorded in the proforma. Patients were made to fill certain questionnaires that contained questions regarding their oral health status. Questions like gum swelling, malodour, reasons for teeth extraction were asked from them. These questions were generally open ended type. Thereafter every patient's oral cavity was examined by single examiner using probe and mirror. Examinations were performed in sitting upright position. The number of teeth present was recorded and reason for loss of teeth was also noted. All the data was arranged in a tabulated form and analyzed using SPSS software. Student t test was applied as a test of significance. Probability value of less than 0.05 was considered significant.

RESULTS

The present study included total of 220 subjects, out of these there were 110 diabetics and other 110 were controls. The mean age of the population was 36.65 +/- 8.6 years.

Table 1 shows the demographic details of the study. There were 45.5% males and 54.5% females in the diabetic group. There were 49.1% males and 50.9% females in the non diabetic group. There was no significant difference between the two groups. There were 16.4% subjects between 30-40 years of age, 51.8% subjects between 41-50 years of age, 20% subjects between 51-60 years of age and 11.8% subjects 61-70 years of age. The most common age group amongst diabetic and non diabetic subjects was 41-50 years of age. There were 53.6% Hindus, 33.6% Muslims and 12.7% Christians in the diabetic group. There were 55.5% Hindus, 30.9% Muslims and 13.6% Christians in the non diabetic group. There was no significant difference of religion between the two groups. There were 29.1% subjects who were primary educated, 37.3% subjects secondary educated, 21.8% subjects' tertiary educated and rest were 10.9% who belonged to others category. In both the groups' majority were educated till secondary level. There was no significant difference in the level of education between the two groups.

Table 2 denotes the mean fasting blood glucose levels amongst the study and control subjects. The mean glucose levels amongst diabetic subjects aged between 30-40 years were 102.40±11.52. The mean glucose levels amongst diabetic subjects aged between 41-50 years were 102.45±9.83. The mean glucose levels amongst diabetic subjects aged between 51-60 years were 126.41±21.31. The mean glucose levels amongst diabetic subjects aged between 61-70 years were 157.42±18.14. The mean glucose level was 125.87±14.27. The mean glucose levels amongst non diabetic subjects aged between 30-40 years were 64.16±8.71. The mean glucose levels amongst non diabetic subjects aged between 41-50 years were 69.50±10.40. The mean glucose levels amongst non diabetic subjects aged between 51-60 years were 71.25±25.65. The mean glucose levels amongst non diabetic subjects aged between 61-70 years were 75.54±29.16. The mean glucose level was 71.36±12.62.

Table 1: Shows the demographic details of the study population

VARIABLE	DIABETIC (N=110)	NON DIABETIC (N=110)	TOTAL	P VALUE
Gender				>0.05
Male	50/45.5%	54/49.1%	104/47.3	
Female	60/54.5%	56/50.9%	116/52.7	
Age group				>0.05
30-40 years	17/15.5%	19/17.3%	36/16.4	
41-50 years	56/50.9%	58/52.7%	114/51.8	
51-60 years	24/21.8%	20/18.2%	44/20	
61-70 years	13/11.8%	13/11.8%	26/11.8	
Religion				>0.05
Hindu	59/53.6%	61/55.5%	120/54.5	
Muslim	37/33.6%	34/30.9%	71/32.3	
Christian	14/12.7%	15/13.6%	29/13.2	
Education				>0.05
Primary	34/30.9%	30/27.3%	64/29.1	
Secondary	40/36.4%	42/38.2%	82/37.3	
Tertiary	22/20%	26/23.6%	48/21.8	
Others	14/12.7%	12/10.9%	26/11.8	

Table 3 denotes the periodontal status amongst both the groups. There were 69.1% diabetics and 48.2% non diabetics who had painful gums. There were 62.7% diabetics and 46.4% non diabetics who had gingival swelling. There was a significant difference between the two groups as the p value was less than 0.05. There were 21.8% diabetics and 17.3% non diabetics who got their teeth extracted due to periodontal reasons. There were 18.2% diabetics and 12.7% non diabetics who had breathe malodor. There was no significant difference between the two groups as the p value was more than 0.05.

Table 4, graph 1 denotes the mean number of missing teeth amongst the study subjects. The mean number of missing teeth amongst diabetics was 5.11+/-0.69. The mean number of missing teeth amongst non diabetics was 3.05 +/-0.52. There was a significant difference in the mean missing teeth amongst both the groups as p value was less than 0.05.

Table 2: Mean fasting blood glucose levels amongst diabetics and non diabetics

GROUPS	BLOOD GLUCOSE LEVELS
Diabetics	
30-40 years	102.40±11.52
41-50 years	102.45±9.83
51-60 years	126.41±21.31
61-70 years	157.42±18.14
Mean	125.87±14.27
Non diabetics	
30-40 years	64.16±8.71
41-50 years	69.50±10.40
51-60 years	71.25±25.65
61-70 years	75.54±29.16
Mean	71.36±12.62

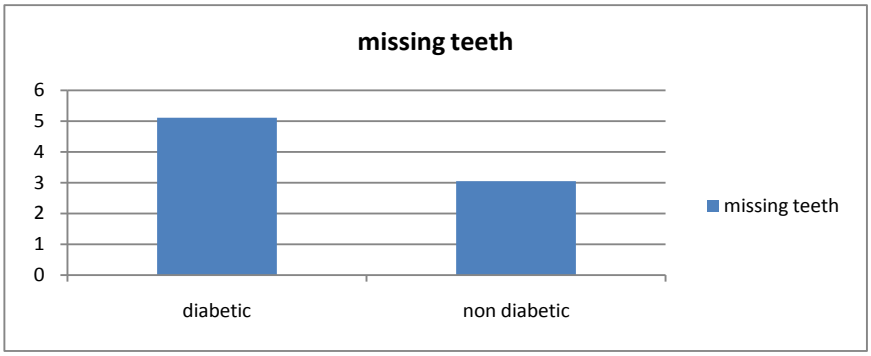
Table 3: Periodontal status amongst diabetic and non diabetic patients

VARIABLE	DIABETIC (N=110)	NON DIABETIC (N=110)	TOTAL	P VALUE
Presence of painful Gums				<0.05
Yes	76/69.1%	53/48.2%	129/58.6%	
No	34/30.9%	57/51.2%	91/41.4%	
Presence of Gingival swelling				<0.05
Yes	69/62.7%	51/46.4%	120/54.5%	
No	41/37.3%	59/53.6%	100/45.6%	
Extraction of teeth because of periodontal reasons				
Yes	24/21.8%	19/17.3%	43/19.5%	>0.05
No	86/78.2%	91/82.7%	116/52.7%	
Foul mouth odour				
Yes	20/18.2%	14/12.7%	34/15.5%	>0.05
No	90/81.8%	96/87.2%	186/84.5%	

Table 4: Mean missing teeth amongst the study population

GROUP	MEAN +/- SD	P VALUE
Diabetic	5.11+/-0.69	<0.05
Non diabetic	3.05 +/-0.52	
Total	4.21+/-0.71	

Graph 1: mean missing teeth amongst the subjects



DISCUSSION

Diabetes is one of the important risk factors for periodontal disease. Diabetic patients get their teeth extracted due to periodontal problems. In a study conducted by Ogunbodede et al.[15], the female: male ratio was positive, indicating more number of females are involved as compared to males. In a similar study conducted by Chinenye et al.[16], the male to female ratio of diabetic subjects in their study was 2:1. But in various other studies, the male to female ratio was 1:1.[17-19] As per the WHO criteria, if fasting blood glucose is between 100 mg/ dl-125 mg/dl, it is regarded as pre diabetic stage. If it is above 126 mg/dl is diabetes mellitus.A post prandial blood glucose levels below 140 mg/dl is considered normal. Levels above 200 mg/dl is indicative of type 2 diabetes mellitus . In a study conducted by Ochao et al, at Columbia there were 47.4% diabetic subjects who had increased number of missing teeth and suffered from gingival disease in the past.[20] As per the World Health organization, teeth extraction below the age of 34 is generally due to caries and extractions above the age of 34 are mostly due to periodontal reasons.[21] In a study conducted in the Irish population, as age and duration of diabetes increase, the number of teeth extracted also increases.[22] According to the present study, there were 45.5% males and 54.5% females in the diabetic group. There were 49.1% males and 50.9% females in the non diabetic group. There was no significant difference between the two groups. There were 16.4% subjects between 30-40 years of age, 51.8% subjects between 41-50 years of age, 20% subjects between 51-60 years of age and 11.8% subjects 61-70 years of age. The most common age group amongst diabetic and non diabetic subjects was 41-50 years of age. The present study was also in accordance with the study conducted by Bacic et al.[23] who reported the mean number of missing teeth amongst diabetic subjects to be 16.2. The number of missing teeth was higher in diabetics compared to non diabetics. There were 34.4% subjects who were above 54 years of age and were partially edentulous and there were 60.9% subjects above 64 years of age who were completely edentulous. In the present study, the mean number of missing teeth amongst diabetics was 5.11+/-0.69. The mean number of missing teeth amongst non diabetics was 3.05 +/-0.52. There was a significant difference in the mean missing teeth amongst both the groups as p value was less than 0.05. In a study conducted by Kapp et al, there was an increased prevalence of tooth loss upto 5 to 6 teeth amongst diabetic subjects compared to non diabetics.[24] In a study conducted by Chinenye S et al amongst Nigerian subjects found the mean number of missing teeth were more amongst diabetics compared to non diabetics.[16] In our study, there were 69.1% diabetics and 48.2% non diabetics who had painful gums. There were 62.7% diabetics and 46.4% non diabetics who had gingival swelling. There was a significant difference between the two groups as the p value was less than 0.05. There were 21.8% diabetics and 17.3% non diabetics who got their teeth extracted due to periodontal reasons. There were 18.2% diabetics and 12.7% non diabetics who had breathe malodor. There was no significant difference between the two groups as the p value was more than 0.05. Most of the diabetic patients are unaware of the fact that diabetes can have an effect on periodontal status and can be a cause of loss of teeth. Periodontal disease leads to insulin resistance and hence cause tooth loss if there is no control on glycemic index. Various physiological processes have been put forward that are responsible for this. Altered microflora, cytokines and products of glycosylation can contribute towards periodontits amongst diabetics.[6-8] In cases of increased blood glucose levels, periodontal tissue is unable to carry its reparative function leading to formation of periodontal pockets and eventually loss of tooth.[25] Patients with diabetes should get their blood sugar levels regularly checked and they should also visit dentist for regular oral health evaluation so that teeth loss due to periodontal disease can be avoided.

CONCLUSION

From the above study we can conclude that there is significant difference in teeth loss amongst diabetics and non diabetics. People with diabetes should be aware about the periodontal complications associated with it and should go for regular dental visits.

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