A clinical study of the relationship between Diabetes Mellitus and periodontal disease

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Abstract:

*Aim: The present study was to clinically evaluate the relationship of diabetes mellitus with periodontal disease. **Method:** A descriptive type of cross sectional study was conducted to determine the status of periodontitis among the 145 diabetic patient at out patient department of Gonosasthaya Samaj Vittik Dental College and Hospital, Savar, Dhaka. A thorough oral examination was carried out and relevant history was recorded for all the patients. **Study Place & Year:** The study was conducted at out patient department of Gonosasthaya Samaj Vittik Dental College and Hospital, Savar, Dhaka. The total period of the study was January to June 2012. Data were collected from 1st[st] April to 30th April 2012. **Results:** Patient of long term diabetes are high risk of getting periodontitis (p<0.001). Uncontrolled blood sugar is also found significant, out of 98 patients who are not well controlled 59 suffers from moderate to severe periodontitis (p<0.001). In sub group analysis we found periodontitis is highly associated with uncontrolled blood sugar level (p<0.05), not associated with the age of the patients (p>0.119). **Conclusion:** The study shows that diabetic patient are at risk of periodontitis but if the patients are aware of their blood sugar level and regular dental check-up patient will remain safe.*

Key words: Periodontitis, Diabetes.

Introduction:

Diabetes mellitus is a complicated metabolic disorder characterized by hypofunction or lack of function of the beta cells of the islets of langerhans in the pancreas, leading to high blood glucose levels and excretion of sugar in the urine. Diabetes is the commonest among metabolic disorders and its incidence is on the increase all over the world. It affects 2 to 10% of the human population.[1]

Periodontal disease is an infectious and inflammatory disease, which destroys the periodontal tissues.These tissues consist of the gums and the bone that supports the teeth.Periodontal disease has been labeled as the "Sixth Complication"of diabetes[1]. But it often goes unrecognized by physicians who treat diabetic patients. People with diabetes are much more susceptible to periodontal disease and once periodontal disease establish in a diabetic patient, metabolic control(blood sugar level control) of diabetes is complicated from the constant reservoir of gram-negative anaerobic bacteria that sit at the bottom of the gum pockets producing infection and low-grade inflammation throughout the body. That is why the relationship between diabetes and periodontal disease is sometime refer as a two-way street[2], and the reason why diagnosis and treatment of periodontal disease, just like optimal glycemic control, are essential in the medical management of diabetes.

Diabetic patient who have good control over blood sugar levels (good glycemic/metabolic control) can prevent or delay the onset and slow the progression of the complications associated with diabetes, particularly retinopathy, nephropathy and neuropathy. The same is true for delaying the onset or slowing the progression of periodontal disease. However ,for people with diabetes who have poor glycemic control(high blood sugar levels),the risk of infection becomes much greater. For instance it is estimated that poorly controlled diabetic people are at a 2 to 4 times greater risk for developing periodontal infection than non-diabetic people.[3] That is why it is important for diabetic patients to achieve and sustain the same level of glycemic control as a healthy, non-diabetic individual. Another important aspect of this two-way street[2] is, the research that suggests chronic periodontal infection causes systemic inflammation that enhances insulin resistance and hyperglycemia. Insulin

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resistance makes it difficult for patients and their physicians to achieve and sustain optimal glycemic control, and increases the risk for coronary heart disease. Diabetic patients were twice as likely an non-diabetic subjects to have attachment loss.[3] Most importantly when a periodontal infection goes untreated in diabetic patients, this puts them at greater risk for developing long-term complications associated with diabetes and cardiovascular disease.[5] These diseases requires frequent monitoring and careful attention to immune systems response to treatment, and monitoring of both glycemic control and periodontal status.

Objectives: The study was undertaken in diabetic patients with the following objectives.

1. To find out prevalence and severity of periodontal disease.

2. To determine age influence on the prevalence and severity of periodontal disease.

3. To evaluate the relationship between duration of diabetes and prevalence and severity of periodontal disease.

Materials and Methods:
It was a cross sectional type of study. Data were collected from 145 patients attending at out patient department of Gonosasthaya Samaj Vittik Dental College and Hospital, Savar, Dhaka. Study period was January to June 2012. Pre-tested interview schedule in bangla were administered to interview the respondents. The investigator interview the every respondents by asking questions, the medical information was collected by reviewing the diabetic record book, and oral cavity was examined by torch light, dental mirror, dental probe, the attachment loss was measured by periodontal probe. The patients were categories according to the severity of the periodontitis following the American dental association guide line, the categories are:

Grade I : 0-2 mm of attachment loss, No periodontitis

Grade II : 2-4 mm of attachment loss, Mild periodontitis

Grade III : 4-6 mm of attachment loss, Moderate periodontitis

Grade IV : 6-8 mm of attachment loss, Severe periodontitis

And the oral hygiene status is also measured by following the WHO guideline. All the data were analyzed and necessary statistical tests were done using statistical software.

Results:
In this study patients are divided into two groups one that bear blood sugar level in control that is below 8mmol/

dl and other having blood sugar level with out control i.e. more than 8mmol/dl.The study shows that 59 patients develop moderate to severe periodontitis out of 98 patients. On the other hand the group contain blood sugar level below 8 mmol/dl develop moderate periodontitis among the 9 person with in 47 are (p<0.001) which is highly significant, and patients with high blood sugar are at risk of periodontitis.

In sub group analysis, among the duration of diabetes, level of blood sugar, and grade of periodontitis, respondents were divided according to blood sugar level into two groups, one who bearing the blood sugar level less than 9 mmol/dl and other group more than 9mmol/dl.Respondents further divided in two groups, one group is carrying diabetes for 5 years or less and the other group developed at least for 5 years and more.

Table-I
Distribution of the respondents depending on their blood sugar level, grade of periodontitis and duration of diabetes n=77

Blood sugar level	Grade of periodontitis	Duration of diabetes	
	Periodontitis	>5years	<5 years
<9mmol/dl	Grade I	15(38.5%)	9(31.0%)
	Grade II	18(46.2%)	7(24.1%)
	Grade III	6(15.4%)	7(24.1%)
	Grade IV	0	6(20.7)
P=0.011	Total	39	29
>9mmol/dl	Grade I	3(8.6%)	2(4.8%)
	Grade II	15(42.9%)	8(19.0%)
	Grade III	14(40.0%)	17(40.5%)
	Grade IV	3(8.6%)	15(35.7%)
P=0.018	Total	35	42

When this two variable is measured with dependent variable grade of periodontitis, the out come shows, patient with blood sugar <9mmol/dl and carrying diabetes less than 5 years had higher grade periodontal disease than patient with blood sugar >9mmol/dl and carrying diabetes for less than 5. In both case we found p<0.05.So blood sugar level plays significant role in the development of periodontitis.

In another sub group analysis among level of blood sugar, grade of periodontitis, and age group of the respondents. We divide patients according to the blood sugar level and patients age. In a group patients blood sugar level is <9mmol/dl here patients are divided into two groups,<50 years and >50 years. In <50 years group, about 43%

patients are free from periodontitis 2% suffering from severe periodontitis in more than 50 years group 15.8% are free from periodontitis and 26.3% are suffering from severe periodontitis (p<0.05). It is significant that age can cause periodontitis if blood sugar remain control i.e. less than 9 mmol/dl.

Table-II

Distribution of the respondents depending on their blood sugar level, grade of periodontitis and age group n=77

Blood sugar level	Grade of periodontitis	Age	
		<50years	>50years
>9mmol/dl			
	Grade I	21(42.9%)	3(15.8%)
	Grade II	18(36.7%)	7(36.8%)
	Grade III	9(18.4%)	4(21.1%)
	Grade IV	1(2.0%)	5(26.3%)
P=0.011		49	19
<9mmol/dl	Grade I	4(8.3%)	1(3.4%)
	Grade II	18(37.5%)	5(17.2%)
	Grade III	18(37.5%)	13(44.8%)
	Grade IV	8(16.7%)	10(34.5%)
P=0.119	Total	48	29
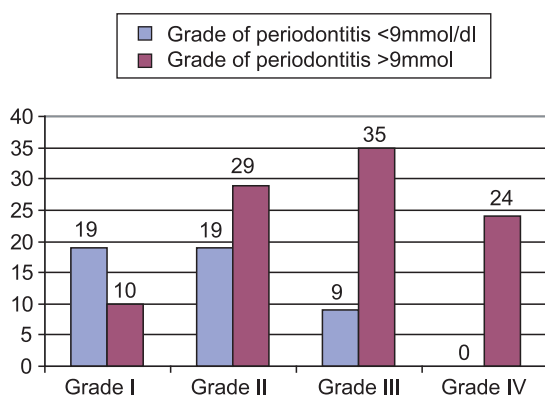
Fig-1: *Distribution of periodontal patients depending on the blood*

In other group patients blood sugar level is >9mmol/dl here patients are divided into two groups, one is less than 50 years and one is more than 50 years. In less than 50 years group 8.3% patients are free from periodontitis and 16.7% suffering from severe periodontitis.in more than 50 years group 3.4% are free from periodontitis and 34.5% are suffering severe periodontitis (p>0.05). Here p value is not significant and showing us that if blood sugar is not in control than periodontitis can occur in any age.

Discussion:

Regarding blood sugar, in this study blood sugar plays a significant role in developing periodontitis(p<0.000). It shows that patient with blood were from sugar under control that is 8 mmol/dl have less chance to developing periodontitis. It shows out of 47 patients who have blood sugar level is below 8mmol/dl are not a single patient suffers from severe periodontitis. Only 6.1% suffers from moderate periodontitis and 13.1% are free from periodontitis.On the other hand, 98 patients with the blood sugar level 8 mmol/dl are suffered more in moderate and severe periodontitis.

The result of this study finds similarity with the study done by T. Tervonen, RC.Oliver[11], long term control of diabetes mellitus and periodontitis. National Health and Nutrition Examination Survey, which included thousands of Americans, adults with poorly controlled diabetes had an almost threefold increased risk of having periodontitis compared with that in adult subjects without diabetes, while subjects with diabetes and good glycemic control had no significant increase in risk.

Effects of blood sugar level, and duration on diabetes on periodontitis, the duration of diabetes appears to be an important factor in the evaluation of diabetes as a risk factor for periodontital disease. Patients age 40 to 50 years with type 1 diabetes with long duration exhibited significantly more sites with advanced periodontitis and bone loss than did age matched controls without diabetes.

Poor metabolic control appears to increase the likelihood of periodontitis among people with type 1 diabetes. More than one-quarter subjects with type 1 diabetes with poor metabolic control had sites with attachment loss of 5 millimeters or greater, compared with 10 percent of the subjects with good metabolic control.[11] Metabolic control of type 2 diabetes is equally as important, based on data, from the Third national Health and Nutrition Examination Survey, which reported that the odds of having severe periodontal disease in patients with fair-to-good or poor glycemic control were approximately 50 percent or 200 percent higher than the odds among subjects without diabetes,respectively.[10]

In this study, we divided the patients according to blood sugar level into two groups, one who bearing the blood sugar level with in control that is below 9mmol/dl and other group having more than 9mmol/dl. Also divide the patients in another two groups, one group is carrying diabetes for 5 years or less and the other group developed at least for 5 years and more. When this two variable are

measured with dependent variable grades of periodontitis, the out come shows, blood sugar level and duration of diabetes suffering both are significant for developing periodontitis.

Effects of blood sugar level, and age of the respondents on periodontitis,patients with poorly controlled diabetes and attachment loss of 2 mm or greater at an average of 24 percent of sites, while patients with good-to-moderate diabetes control had similar levels of attachment loss at only 10 percent of sites.[1] The percentage of sites in patients with well-controlled diabetes, suggesting that patients with well-controlled diabetes may not be at an increased risk of developing periodontal diseases.[4]

In a study of periodontal disease in a Mexican population of people with type 2 diabetes. Researchers conducted that the number of years since diagnosis of diabetes was a more significant factor than, the age of the person. When considering the severity of periodontal disease.[7]

In our study, we divide patients according to the blood sugar level and age of the patient into two groups. In a group patients blood sugar level is <9mmol/dl here patients are divided in two groups one is <50 years and one is >50 years. In <50 years group, we found p<0.007. It is significant that age can cause periodontitis if blood sugar remain control.i.e. less than 9mmol/dl. In other group patients blood sugar level is >9mmol/dl. In this analysis we found p>0.05. Here p value is not significant that showing us that if blood sugar is not in control than periodontitis can occur in any age.

Conclusion:

This study was conduct to explore the magnitude of periodontitis among the diabetic patients, and to investigate the factors, associated with the periodontitis in the urban communities of Bangladesh.

Dental care seeking behavior is reviled to be an important factor that prevent in developing periodontitis. Patients, who didn't visit Dental surgeon for regular check up, and not visited to dental surgeon at least in a year were suffered more in periodontitis. Providing adequate information to the patient about periodontitis and its prevention, is an essential part of any program of preventive dentistry. Motivation is the most important part of education for it has been clearly shown that merely

knowing that, something should be done is not sufficient in itself to cause a person to do it.

Public Dental Health programs seek to achieve dental health in a specific population, and so their administration should involve prevention, treatment, education and supporting researches activities. It is acceptable that in any society, a treatment program without a preventive component can never achieve the long-term objective of dental health for all.

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