Original Article

The Proportions of Periodontal Diseases among Type 2 Diabetes Mellitus Patients Attending at the National Healthcare Network (NHN), Mirpur Centre, Dhaka

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Abstract

This cross sectional study was conducted to find out the proportions of periodontal diseases among type 2 diabetes mellitus patients attending at the National Healthcare Network (NHN), Mirpur centre, Dhaka using a pre-tested semi-structured questionnaire. The sample size was 120 patients. The mean age of the patients was 46.95±10.31. Proportion of periodontitis was the highest 56% followed by gingivitis 32.5%, periodontitis with endodontic lesions 5%, necrotizing periodontal diseases 4.2% and periodontal abscesses 2.5%. A highly significant association was found between education and knowledge about cleaning teeth before going to bed and after breakfast (p=0.000). More than half of the patients (55%) applied improper technique or method of tooth brushing followed by 39.2% who applied mixed technique and the rest 5.8% applied proper technique respectively. There was no significant relationship between current smokers and periodontal diseases, chewing betel leaf was significantly associated with occurrence of periodontal diseases (p=0.048). These periodontal diseases are multi-factorial and the factors responsible for these diseases are preventable.

Key words: *Diabetes mellitus, glycosylated hemoglobin, oral hygiene, periodontal diseases, periodontal pocket*

Introduction

The oral cavity provides a continuous source of infectious agents, and its condition often reflects progression of systemic pathologies. Historically, oral infections are thought to be localized to the oral cavity except in case of some associated syndromes and untreated odontogenic abscesses. A change in paradigm has dispelled this notion, and a whole new concept of the status of the oral cavity and its impact on systemic health and disease has evolved.[1] Systemic diseases and hormonal changes have been implicated as complicating factors for periodontal diseases. Gingivitis and periodontitis are sometimes the first evidence that a patient has diabetes. Given that diabetes may be present for a number of years before it is diagnosed, dentists may be the first health professional to detect patients with diabetes.[2] Diabetes mellitus and periodontal diseases are two common chronic diseases that have long been considered to be biologically linked.[3] The term periodontal diseases usually refers only to plaque related inflammatory diseases of the dental supporting tissues.[4] Diabetes mellitus (DM) is becoming a pandemic worldwide.[11] The prevalence of DM for all age groups worldwide was estimated to be 2.8% in 2000 and an anticipated 4.4% in 2030. The total number of people in the world with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030.12 This has been estimated to increase to 333 million, or 6.3% of the world population in the year 2025.13 Patients with uncontrolled diabetes specially type-2 have poor resistance to infection with effects in mouth cavity and elsewhere in the body, show an unusually high susceptibility to periodontal diseases and increased susceptibility to acute lateral periodontal abscesses.[17] Periodontal diseases have been reported as the sixth complication of diabetes, along with neuropathy, nephropathy, retinopathy, altered wound healing and macrovascular diseases.[1] The relationship between oral diseases and type 2 diabetes has become a recent focus of attention among healthcare professionals because of substantial evidence supporting the role of diabetes and poor glycemic control as important risk factor for periodontal diseases.[19] In Bangladesh a few studies have been conducted to observe the relationship and factors associated with periodontal disease patients.[23,25,26] But a few studies have been conducted among the diabetic

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patients. This small scale study attempted to find out the proportions of periodontal diseases among type 2 diabetic patients. **Materials and Methods**

This cross sectional study was conducted to assess the proportions of periodontal diseases among type 2 diabetes mellitus patients attending at the National Healthcare Network (NHN), Mirpur Centre (An Institute of Diabetic Association of Bangladesh), Dhaka. The study was carried out among 120 type 2 diabetic patients who have been suffering from different periodontal diseases and attended this centre for routine checkup. To get the target sample quickly purposive sampling technique was followed by using a pre-tested semi-structured questionnaire and a check list.

Inclusion criteria were: (1) patients aged more than 35 years diagnosed with type 2 diabetes mellitus, (2) patients having glycosylated hemoglobin (HbA1c) levels equal to or more than 7.0%. Exclusion criteria were: (1) patients who refused to give consent after having been informed about the purpose of the study, (2) patients with co-morbid psychiatric conditions (i.e., drug abuse, suicidal ideation, and psychosis) and (3) handicapped patients.

The severity of periodontitis was assessed clinically by measuring the depth of periodontal pocket using periodontal probe graduated in millimeters was passed through the pocket up to the bottom. Probe was placed parallel to the long axis of individual tooth at six sites and the depth of the periodontal pocket was taken. Pressure during probing was exerted within the range of 20-25 gm. Periodontal index was followed according to Ramfjord (1967) whilst assessment of gingivitis was done according to Loe and Silness index (1967).

Data were checked, cleaned and edited properly before analysis. The data were analyzed by using the software SPSS (Chicago), version 11.5. Descriptive statistics were used for interpretation of the findings. Associations were made by using the Chi square test [2].

Results

The socio-eco-demographic characteristics of patients are shown in Table 1. Maximum 34.2% were in age group 36 to 45 years and minimum 7.5% were in age group more than 65 years, 60.8% were female and 39.2% male. The overwhelming majority 90.8% were Muslims followed by 5.8% Hindus, 2.5% Christians and the rest 0.8% were Buddhists. The highest 45% patients' family income was in between 16 to 20 thousand BDT per month and the lowest 4.1% had more than 30 thousand BDT. About 25% patients were illiterate and 21.7% were graduates. In addition, patients age, religion and educational level were significantly associated with periodontal diseases. Maximum 45.8% were housewives and minimum 1.7% were farmers. Majority of the patients (64.2%) live in urban followed by 14.2% in rural areas, 13.3% in slum and 8.3% in sub-urban areas respectively. There is significant association between age and periodontal diseases (p-value=0.004), religion and periodontal diseases (p-value=0.009), education and periodontal diseases (p-value=0.039).

Table 1: Distribution of the patients according to socio-demographic characteristics and its association with periodontal diseases (n=120)

Characteristics	Frequency	Percentage	p-value
Age			
35	16	13.3	0.004
36-45	41	34.2	
46-55	34	28.3	
56-65	20	16.7	
>65	9	7.5	
Sex			
Male	47	39.2	0.430
Female	73	60.8	
Religion			
Muslim	109	90.8	0.009
Hindu	7	5.8	
Christian	3	2.5	
Buddha	1	0.8	
Family Income (BDT)			
10000-15000	27	22.5	0.251
16000-20000	54	45.0	
21000-25000	24	20.0	
26000-30000	10	8.3	
>30000	5	4.1	
Education			
Illiterate	30	25.0	0.039
Primary	18	15.0	
Secondary	16	13.3	
SSC or equivalent	17	14.2	
HSC or equivalent	13	10.8	
Graduation	26	21.7	
Occupation			
Service holder	41	34.2	0.765
Businessman	10	8.3	
Farmer	2	1.7	
Labour	12	10.0	
House wife	55	45.8	
Residency			
Urban	77	64.2	0.250
Rural	17	14.2	
Sub-urban	10	8.3	
Slum	16	13.3	

The distribution of the patients according to oral health related knowledge, oral hygiene related behavior and tobacco related habit variables, in relation to periodontal diseases is shown in Table 2. Here about three-fourths majority (71.7%) of the patients had gum problem or gum infection and 32.5% required adult teeth extraction or lost their tooth due to gum infection or tooth mobility. More than half (55%) of the patients applied improper technique or method of tooth brushing. More than three-fourths (77.5%) of the patients never received any periodontal treatment. Moreover, maximum 84.2% of them never visited any dentist for oral and dental check up, 22.5% were current smokers and 31.7% always chewed betel leaf. Gum infection, history of tooth loss due to tooth mobility, regular oral and dental check up and frequency of visit of a dentist are

statistically highly significant association with periodontal diseases (p=0.000).

Table 2: Distribution of the patients according to oral health related knowledge, oral hygiene related behavior and its association with periodontal diseases (n=120)

Variables	Frequency	Percentage	p-value
Gum diseases			
No	34	28.3	0.000
Yes	86	71.7	
History of extraction or tooth loss due to gum infection or tooth mobility			
No	81	67.5	0.000
Yes	39	32.5	
Method of tooth brushing			
Proper technique	7	5.8	0.013
Improper technique	66	55.0	
Mixed technique	47	39.2	
Any periodontal treatment received			
No	93	77.5	0.112
Yes	27	22.5	
Regular oral & dental check up by a dentist			
No	101	84.2	0.000
Yes	19	15.8	
Frequency of visit of a dentist			
6 month interval	12	10.0	0.000
1 year interval	5	4.2	
>1 year interval	2	1.7	
Never visited before	101	84.2	
Current smoker			
No	93	77.5	0.598
Yes	27	22.5	
Chewing betel leaf (Paan)			
No	82	68.3	0.048
Yes	38	31.7	

The distribution of the patients according to the proportion of periodontal diseases is shown in Table 3. Proportion of periodontitis was the highest 55.8% followed by gingivitis 32.5%, periodontitis with endodontic lesion 5% and necrotizing periodontal diseases 4.2% whereas periodontal abscesses was the lowest 2.5%.

Table 3: Distribution of the patients by the pattern of periodontal diseases (n=120)

Pattern of periodontal diseases	Frequency	Percentage
Gingivitis	38	32.5
Periodontitis	68	55.8
Necrotizing periodontal diseases	5	4.2
Periodontal abscesses	3	2.5
Periodontitis with endodontic lesion	6	5.0
Total	120	100.0

The distribution of the patients according to criteria of gingivitis is shown in Table 4. About 57.9% of them suffered from moderate gingivitis followed by 39.5% from mild gingivitis and 2.6% from severe gingivitis respectively.

Table 4: Distribution of the patients by criteria of gingivitis (n=38)

Criteria of gingivitis	Frequency	Percentage
Mild gingivitis	15	39.5
Moderate gingivitis	22	57.9
Severe gingivitis	1	2.6
Total	38	100.0

The distribution of the patients according to criteria of periodontitis is shown in Table 5. Approximately, 38.2% suffered from marginal periodontitis followed by 30.9% suffered both from moderate periodontitis as well as severe periodontitis.

Table 5: Distribution of the patients by criteria of periodontitis (n=68

Criteria of periodontitis	Frequency	Percentage
Marginal periodontitis	26	38.2
Moderate periodontitis	21	30.9
Severe periodontitis	21	30.9
Total	68	100.0

Discussion

This cross-sectional study was conducted to assess the proportions of periodontal diseases among type 2 diabetes mellitus patients, 60.8% were female while 39.2% were male. To minimize bias due to misclassification of diabetes type, this study included only those subjects 35 years of age and older because it is recognized that over 95% of individuals with diabetes are 35 years of age and older have type 2 diabetes mellitus. In 2002, one of the population-based survey in the US adult population showed that type 2 diabetes occurs mainly in people aged over 40 years, although it is affecting a large number of young people.[12] The current study also depicted that 34.2% of the patients were from age group of 36 to 45 years followed by 28.3% from age group 46 to 55 years. Moreover, there was statistically significant association between age of the patients and periodontal diseases(p-0.004). In addition, mean age and mean monthly family income of the patients were 47±10.31 years and 18200 ±10899.74 BDT(Mean ± SD) respectively. Several studies highlighted the link between gum inflammation and periodontal diseases.[23,29] Current evidence also emphasized highly significant relationship between gum problem of the patients and periodontal diseases (p-0.000). In the present study 37.5% of the patients required adult teeth extraction or lost their teeth due to gum infection or tooth mobility. Also there was a highly

significant association between patients' tooth loss or adult tooth extraction due to gum infection or tooth mobility and manifestation of periodontal diseases as the p value was 0.000. This result was comparable to many other studies found in the body of literature.[2,24,27,30]

The data of the present study showed that 50% of the patients clean their teeth and mouth once daily. Further more, only 2.5% of them always used dental floss for cleaning the interproximal area of teeth and of them, only 1.7% flossed their teeth once daily, only 15.8% of them visited any dentist for regular oral and dental checkup. Also, there was a highly significant association between regular oral and dental checkup and manifestation of periodontal diseases (p=0.000). Among them, 10% visited a dentist every six month interval followed by 4.2% every one year interval and 1.7% more than one year interval respectively. In fact, frequency of visit to a dentist was found to be highly significantly associated with the number of periodontal diseases (p= 0.000). Almost similar result was found in many other studies.[26,32] According to the data of the present study, more than half of the patients (55%) applied improper technique or method of tooth brushing followed by 39.2% applied mixed technique or method of tooth brushing. However, method or technique used for tooth brushing was found to be significantly associated with the manifestation of periodontal diseases (p=0.013). This finding was not comparable to a study done on 'Prevention of Periodontal Disease' where it was found that there was no scientific evidence to support the superiority of any of the techniques (or styles) of tooth brushing.[34] Researchers opined that both smoking status and amount of sub-gingival calculus might have significant associations with severe periodontal diseases.[25] Several studies found that smoking increases the risk of periodontal diseases by nearly 10 times in diabetic patients.[5,28,31] Accordingly, it was found in the current study that 22.5% of the patients were current smokers though vast majority 80% of them had knowledge about cigarette smoking and chewing tobacco are bad for health and raise periodontal diseases as well. However, no strong relationship was found between current smokers and periodontal diseases (p= 0.598). This may be due to less number of male patients among the study population. Many studies have been conducted to highlight the link between betel leaf (Pan) chewing and periodontal diseases, many authors stressed that the effects on periodontal diseases and periodontal therapy are heavily influenced by chewing betel leaf (Pan).30,33 Nevertheless, data of the present study showed that chewing betel leaf (Pan) was significantly associated with occurrence of periodontal diseases. In 2000, the American Academy of Periodontology (AAP) took a strong public stand on this issue in their 1999 position paper that acknowledges a bi-directional relationship between periodontal diseases and diabetes.[9] Periodontal diseases are classified according to the severity of the disease. In fact, gingivitis and periodontitis are sometimes the first evidence that a patient has diabetes.[2] Gingivitis was seen in approximately 75% of U.S. adults, about 13% have severe periodontitis and 35% of those over age 30 have some form of periodontitis.[22] In contrast, the present study showed that proportion of periodontitis was 56% followed by gingivitis 33%, periodontitis with endodontic lesion 5% and necrotizing periodontal diseases 4.2% and periodontal abscesses 2.5% respectively.

Conclusion

In the light of the findings of the present study and discussion thereof, it can be concluded that diabetes is associated with a greater likelihood of developing certain periodontal diseases which result from opportunistic infections, poor glycemic control and lack of information about oral diseases. Of the opportunistic infections, periodontitis and gingivitis are commonly encountered. Education and knowledge of diabetic patients are very important to prevent periodontal and oral diseases. The treatment of periodontal diseases such as scaling, root planning, curettage of pocket etc. as well as other periodontal surgery is a way to control periodontal infections which lead to reduce blood sugar levels in type 2 diabetes and control of diabetes is another way to remain free from periodontal diseases and dental surgeons should raise the suspicion whenever their patients come with such kind of periodontal diseases.

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