



A Cross-Sectional Study of Glycemic Status and its Effects on Oral Hygienic Condition of the Diabetic and Non-Diabetic Patients in Bangladesh

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Abstract

Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to an absolute or relative deficiency of insulin. It is a heterogeneous primary disorder of carbohydrate metabolism with multiple etiologic factors that generally involve absolute or relative insulin deficiency, insulin resistance, or both.

Objective: Aim of this study is to find out the differences in the oral health condition of the diabetic and non-diabetic populations.

Material and Methods: A cross-sectional comparative study was conducted where 120 samples were distributed equally among both diabetic and non-diabetic respondents.

Results: Regarding age group, mean age of the diabetic group was 42.42 ± 16.232 and non-diabetic group was 39.40 ± 15.086 . For educational status, most of the diabetic and non-diabetic patients read in class VI-XII, which is 30% for each group. The mean income of the non-diabetes group (29800.00 ± 15731.648) is greater than the diabetes group (27700.00 ± 11962.229), which is associated with quality of life. In this study, only 23.3% of diabetes and 33.3% of non-diabetes respondents had good oral hygiene. The mean value of the oral health of the diabetes group was 2.38 ± 1.027 and the non-diabetes was 1.98 ± 0.854 , which indicates the worse oral health of the diabetes patient. Periodontitis was absent in 40% of the diabetic and in 63.3% of the non-diabetic patients.

Conclusion: This study revealed that the non-diabetic population had a better oral health condition than the diabetic population, and sociodemographic conditions had a significant role to maintain and control both diabetes and the oral hygiene condition of the diabetic population.

Keywords: Glycemic status, Diabetes, Non-diabetes, Oral health, Periodontitis.

Abbreviation

SES: Socioeconomic Status; WHO: World Health Organization; OHL_S: Oral Hygiene Index; DM: Diabetes Mellitus

Introduction

According to estimates of the International Diabetes Federation, 463 million adults worldwide have diabetes in 2019 and that

number is expected to rise to 700 million by 2045 [1], with 79% of those affected living in low and middle-income nations. According to projections, the number of cases of diabetes in Southeast Asian countries would rise by 74% over the next 20 years, from 88 million in 2019 to 153 million by 2045^[2], it is expected that the number of diabetic adults in Bangladesh which is 8.4 million now would be nearly doubled to 15.0 million by the year 2045 [2]. In Bangladesh,

an additional 3.8 million people are predicted to have pre-diabetes in 2019 [2]. Chronic diabetes mellitus, which is typified by hyperglycemia (high blood glucose), is brought on by insulin malfunction and deficiency [3,4]. Chronic hyperglycemia leads to abnormalities and malfunctions in various physiological systems including the kidneys, eyes, nervous system and heart [5,6]. Variable oral and dental complications are also associated with diabetes including xerostomia [7], vesiculobullous lesions, oral fungal infections, impaired wound healing [8-10], gingival issues, periodontal abscess, and periodontitis [11,12], as well as dental caries [7]. According to a number of studies, issues with dental health can have a negative impact on one's emotional state, social standing, psychological comfort and physical function [13-15]. Thus, it is indisputable that dental and oral health is related and this has potential effects on overall quality of life. Furthermore, diabetes was taken into account in a few of the initial research as a potential factor influencing oral health-related quality of life [16-20].

As it will be simpler to treat this illness properly at an early stage, early diagnosis is crucial. It will also lessen the likelihood that major issues won't arise as a result of it [21]. Additionally, there will be a decrease in the financial strain associated with managing this illness. Periodontitis [22] also called gum disease may refer as a sixth complication of diabetes mellitus. One of the pathological disorders frequently identified in diabetics is periodontitis, according to a report by the expert committee on diagnosis and classification of diabetes mellitus [23]. A number of researches have proved that individuals with diabetes have a markedly higher prevalence, severity and development of periodontal disease [24]. If periodontitis is not treated, it can result in tooth loss, which can lower a patient's quality of life and make it more difficult for them to follow a healthy diet.

Additional oral symptoms associated with diabetes include fungal infection, burning mouth syndrome, mucosal ulcers, dry mouth, geographic tongue and oral lichen planus. Changed taste, delayed wound healing, and fissured tongue insufficient eruption of teeth, benign parotid hypertrophy, dental caries, periodontal disease, tooth loss and xerostomia illness [25]. Multifactorial behavioral issues such as cigarette smoking, physical inactivity, consumption of saturated fatty acids and sugar-sweetened beverages are considered to be risk factors for diabetes mellitus [26]. Socioeconomic status (SES) is a comprehensive indicator of a person's or family's social and economic standard [27]. A few SES variables have also been found as risk factors for diabetes mellitus [28]. The socioeconomic variables include gender, age, marital status, income, education level, occupation, residential area, region and the amount of

debt that is still outstanding. Javed, *et al.* [29]. found that a superior SES people with well-controlled T2D may have permitted them to use conventional treatments for diabetes and to maintain their oral health compare to poorly control people.

Therefore, it is imperative to include management of the periodontal condition for routine care provided to diabetes patients. Patients who are struggling to control their diabetes by medication or dietary methods should be referred for a dental periodontal evaluation and treatment.

Methodology

This cross-sectional comparative study was done to find out the differences in the oral cavity of both healthy and diabetic patients. For that face-to-face interviews were done with all the outdoor patients and their attendance in the diabetic hospital Chapainawabgong, Bangladesh in order to collect data using a questionnaire that was partially organized. In this study, the purposive sample technique was applied. During collection of the data, the study population was informed about the purpose of the study in detail and consented to, where each participant was taken with confidential assurance of secrecy. A code number for each patient was used both in the questionnaire and in the specimen label. WHO Oral Health criteria 2013 was followed to determine oral hygiene, and the Community Periodontal Index was utilized [31].

The same size (n) was estimated using the formula as, $n = (z^2pq)/d^2$; where, $z = 1.96$ at 95% of confidence interval (CI); $p = 0.04$ (prevalence of orodental problems among the diabetic patients); $q = 0.96$ (since, $p + q = 1$); $d = 0.05$ (margin of error is the amount of error that would be tolerate); therefore, $n = [(1.96)^2 (0.04) (0.96)] / (0.05)^2 = 0.1475 / 0.0025 = 59.0070 \approx 60$. So, the total sample size 60 was considered for each of the diabetic and non-diabetic group.

Every effort was made to collect accurate data, respondents were given the opportunity to openly express their opinions in open-ended questions in a neutral and friendly tone. Three categories of data viz. sociodemographic comparison, orodental comparison and diabetes measurement of the population were collected for this investigation and shown in table1, table2 and table3, respectively. The data was then analyzed by using IBM SPSS in keeping view with the objectives of the study.

Results

Table 1 displays the fifteen sociodemographic variables for both diabetic and non-diabetic respondents among the 120 patients.

Parameters	DM Patients Number (%)	Non-DM Patients Number (%)
Age		
Before 20	7 (11.7%)	6 (10.0%)
21-40	19 (31.7%)	29 (48.3%)
41-60	25 (41.7%)	16 (26.7%)
After 61	9 (15.0%)	9 (15.0%)
	42.42 ± 16.232	39.40 ± 15.086
Educational status		
Illiterate	13 (21.7%)	9 (15.0%)
Up to Class V	15 (25.0%)	18 (30.0%)
Class VI - XII	18 (30.0%)	18 (30.0%)
Graduate plus	14 (23.3%)	15 (25.0%)
X̄ ± SD	2.55 ± 1.080	2.65 ± 1.022
Occupation		
Housewife	27 (45.0%)	28 (46.7%)
Service	9 (15.0%)	13 (21.7%)
Business	10 (16.7%)	10 (16.7%)
Farmer	4 (6.7%)	3 (5.0%)
Day laborer	4 (6.7%)	1 (1.7%)
Students	5 (8.3%)	5 (8.3%)
Others	1 (1.7%)	0 (0.0%)
X̄ ± SD	2.47 ± 1.751	2.18 ± 1.524
Family type		
A Nuclear	25 (41.7%)	31 (51.7%)
Joint/Extended	35 (58.3%)	29 (48.3%)
X̄ ± SD	1.58 ± 0.497	1.48 ± 0.504
Religion		
Islam	59 (98.3%)	60 (100.0%)
Hindus	1 (1.7%)	0 (0%)
X̄ ± SD	1.02 ± 0.129	1.00 ± 0.000
Residence		
Rural	26 (43.3%)	18 (30.0%)
Urban	34 (56.7%)	42 (70.0%)
X̄ ± SD	1.57 ± 0.500	1.70 ± 0.462
Monthly family income (in Taka)		
Before 20000	20 (33.3%)	16 (26.7%)
21000-30000	19 (31.7%)	24 (40.0%)
41000-50000	9 (15.0%)	9 (15.0%)
After 50000	12 (20.0%)	11 (18.3%)
	27700.00 ± 11962.229	29800.00 ± 15731.648
Marital status		
Married	41 (68.3%)	53 (88.3%)

Unmarried	7 (11.7%)	4 (6.7%)
Divorced/Separated	1 (1.7%)	0 (0%)
Widow	11 (18.3%)	3 (5.0%)
X ± SD	1.70 ± 1.169	1.22 ± 0.691
Smoking habit		
Yes	12 (20.0%)	13 (21.7%)
No	48 (80.0%)	47 (78.3%)
X ± SD	1.80 ± 0.403	1.78 ± 0.415
If yes, duration of smoking (In years)		
1-10	3 (25.00%)	4 (30.77%)
11-20	8 (66.67%)	6 (46.15%)
20+	1 (8.33%)	3 (23.08%)
X ± SD	14.58 ± 6.721	15.85 ± 7.798
Taking average stick per day		
1-5	5 (41.67%)	0 (0.00%)
6-10	6 (50.00%)	8 (61.54%)
10+	1 (8.33%)	5 (38.46%)
X ± SD	7.25 ± 2.896	9.46 ± 2.696
Tobacco chewing habit		
Yes	16 (26.7%)	5 (8.3%)
No	44 (73.3%)	55 (91.7%)
X ± SD	1.73 ± 0.446	1.92 ± 0.279
If yes, duration of chewing (In years)		
1-10	8 (50.00%)	2 (40.00%)
11-20	5 (31.25%)	3 (60.00%)
20+	3 (18.75%)	0 (0.00%)
X ± SD	13.06 ± 8.330	10.60 ± 5.030
History of others systemic disease		
Yes	33 (55.0%)	25 (41.7%)
No	27 (45.0%)	35 (58.3%)
X ± SD	1.45 ± 0.502	1.58 ± 0.497
If yes, name of the disease		
HTN	24 (72.73%)	15 (60.00%)
CKD	7 (21.21%)	7 (28.00%)
CVD	2 (6.06%)	3 (12.00%)
X ± SD	1.33 ± 0.595	1.52 ± 0.714

Table 1: Sociodemographic comparison of diabetic and non-diabetic population.

Most of the respondents of diabetic patients (41.7%) were of 41-60 years old, while non-diabetes (48.1%) were of 21-40 years old. In diabetic group, 31.7% were of 21-40 years old, 15% were after 61 years old, and 11.7% were before 20 years. In non-diabetes group, 26.7% were of 41-60 years, 15% were after 61 years and 10% were before 20 years. The mean age of diabetic and non-diabetic group was 42.42 ± 16.232 and 39.40 ± 15.086 years, respectively.

The educational status of respondents had a similarity and 30% of both groups read between class VI-XII. Education had an effect on general as well as oral health, it may lead to quality of life. The mean result of the education was 2.55 ± 1.080 and 2.65 ± 1.022 recorded for diabetes and non-diabetes group, respectively. In terms of occupational status, 45% of housewives are from the diabetic group and 46.7% are not diabetic. Among the diabetic respondents, 15% were in service, 16.7% were businessmen, 6.7% were farmers, 6.7% were day-laborers and 8.3% were students, while in non-diabetic respondents, 21.7% were in service, 16.7% were businessmen, 5% were farmers, 1.7% day-laborers and 8.3% were students. 58.3% diabetic respondents belong to joint/extended family whereas, 51.7% non-diabetic respondents belong to nuclear family. The mean results were found to be significant in both cases.

The present study revealed that among the diabetic respondents, 98.3% were Islam and 1.7% were Hindus, where cent percent were Islam from non-diabetic group. Out of the total population, 43.3% rural and 56.7% urban respondents were diabetic group as well as 30% rural and 70% urban respondents were non-diabetic group. Hindus were absent during this study in the non-diabetes group.

Monthly income is associated with quality of life, when earning is sufficient, then family members can afford each parameter of a healthy life. Most of the diabetic family's monthly income was 33.3% before 20000 taka, 31.7% was 21000-30000 taka, 20% was after 50000 taka, and 15% was 41000-50000 taka. On the other hand, the non-diabetes family income pictures were 40% was 21000-30000 taka, 26.7% before 20000 taka, 18.3% was after 50000 taka and 15% was 41000-50000 taka. The mean monthly income of the diabetic group was 27700.00 ± 11962.229 taka and non-diabetic group was 29800.00 ± 15731.648 taka. According to marital status, 68.3% were married, 11.7% were unmarried, 1.7% were divorced or separated, 18.3% were widows from the diabetic

group, and 88.3% were married, 6.7% were unmarried, 0% were divorced or separated and 5% were widows from the non-diabetic respondent group.

Studies had shown that some habits like smoking and chewing tobacco had an impact on our health and may lead to systemic diseases. 80% of diabetic people had no smoking habit, but 20% were addicted with smoking. Among this group, 66.67% had 11-20 years, 25% had 1-10 years and 8.33% had more than 20 years of smoking experience. In case of non-diabetic respondent, 78.3% and 21.7% had no smoking and smoking habit, respectively. This group 46.15% had 11-20 years, 30.77% had 1-10 years and 23.08% had more than 20 years of experience. The values of 14.58 ± 6.721 and 15.85 ± 7.798 recorded as the mean duration of smoking for the diabetic and non-diabetic group, respectively and both were significant.

Among the diabetic respondents, 50% of those who had smoking habit took 6-10 sticks, 41.67% took 1-5 sticks and 8.33% took more than 10 sticks per day. While in the non-diabetic group, 61.54% took 6-10 sticks and 38.46% took more than 10 sticks per day. The mean stick took per day in diabetic group was 7.25 ± 2.896 and the non-diabetic group was 9.46 ± 2.696 .

In the diabetic group 73.3% respondents don't had tobacco chewing habit and 26.7% of them had that habit, where 50% of them had 1-10 years, 31.25% had 11-20 years and 18.75% had more than 20 years of chewing habit. In the non-diabetic group 91.7% respondents don't had tobacco chewing habit and only 8.3% had this habit, where 60% had 11-20 years and 40% had 1-10 years of experience. The mean value of tobacco chewing in diabetic respondent was $1.73 \pm 0.446\%$ and in non-diabetic group was $1.92 \pm 0.279\%$.

When disease persists in our body for a long time, it is referred as a chronic disease and it hampers our body system. This study revealed 55% of diabetic patients had a systemic disease and 45% had not. When checking it in the non-diabetic group, it was found 58.3% had no systemic disease but 41.7% were positive. The mean value of systemic disease in the diabetic group was 1.45 ± 0.502 and non-diabetes was 1.58 ± 0.497 , both the values are found to be significant. Within this systemic disease, 72.73% were hypertensive (HTN), 21.21% were kidney (CKD), and 6.06% were cardiovascular (CVD) patients in the diabetes group, whereas in the

non-diabetic group, 60% were HTN, 28% CKD, and 12% were CVD patients. The mean value of diabetes and non-diabetes respondent are 1.33 ± 0.595 and 1.52 ± 0.714 , respectively.

Regarding orodental comparison, four variables viz., dental plaque index, oral hygiene index, periodontal index and bacterial culture were included in table 2. Plaque or calculus is aggrega-

tions of dead organisms. Among the diabetic patients, 46.7% had mild, 25% had moderate, 15% were absent and 13.3% had severe plaque. In the non-diabetes group, 45% were mild, 31.7% were absent, 18.3% were moderate and 5% were severe. The mean value of plaque formation was 2.37 ± 0.901 in diabetes respondent and was 1.97 ± 0.843 in non-diabetic patients. The both groups were found to be significant. Figure 1 in the below indicates the dental plaque.

Parameters	DM Patients Number (%)	Non-DM Patients Number (%)
Dental plaque index		
Absent	9 (15.0%)	19 (31.7%)
Mild	28 (46.7%)	27 (45.0%)
Moderate	15 (25.0%)	11 (18.3%)
Severe	8 (13.3%)	3 (5.0%)
X ± SD	2.37 ± 0.901	1.97 ± 0.843
Oral hygiene index		
Good	14 (23.3%)	20 (33.3%)
Average	19 (31.7%)	23 (38.3%)
Poor	17 (28.3%)	15 (25.0%)
Very poor	10 (16.7%)	2 (3.3%)
X ± SD	2.38 ± 1.027	1.98 ± 0.854
Periodontal index		
Absent	24 (40.0%)	38 (63.3%)
Mild	19 (31.7%)	15 (25.0%)
Moderate	8 (13.3%)	5 (8.3%)
Severe	9 (15.0%)	2 (3.3%)
X ± SD	2.03 ± 1.073	1.52 ± 0.792
Bacterial culture		
Positive	36 (60.0%)	29 (48.3%)
Negative	24 (40.0%)	31 (51.7%)
X ± SD	1.40 ± 0.494	1.52 ± 0.504

Table 2: Orodental comparison of diabetic and non-diabetic population.



Figure 1: Plaque in the oral cavity.

Oral hygiene practice had great effect on oral health as well as general health. It was observed from the Table 2 that 31.7% had average, 28.3% had poor, 23.3% had good and 16.7% had very poor oral hygiene in diabetic group. In non-diabetes respondents it was 38.3% average, 33.3% good, 25% poor and only 3.3% very poor oral hygiene maintained. The mean value of oral hygiene recorded as 2.38 ± 1.027 for the diabetes group and noted as 1.98 ± 0.854 for the non-diabetes group, confirming significance in both cases.

When calculus persists for a long time in the oral cavity then periodontitis develops. In diabetic respondents periodontitis was absent in 40% cases, was mild in 31.7%, was severe in 15% and

was moderate in 13.3%. In non-diabetes respondents periodontitis was absent in 63.3% cases, was mild in 25%, was moderate in 8.3% and was severe in 3.3%. The mean value of periodontitis in the diabetes and non-diabetes group was 2.03 ± 1.073 and 1.52 ± 0.792 , respectively.

This study revealed that 60% gram-positive and 40% gram-negative organisms were found in diabetic respondents, whereas 48.3% gram-positive and 51.7% gram-negative were recorded in non-diabetic group. The mean value of bacterial culture in the diabetic and non-diabetic populations recorded as 1.40 ± 0.494 and 1.52 ± 0.504 , respectively. Figure 2 indicates the bacterial growth in the different media.



Figure 2: Bacterial growth in blood base, Nutrient and MacConkey's agar media respectively

Regarding diabetes measurement four variables viz. RBS/2ABF, duration of DM in years, family history of DM, and if yes who had DM were considered and the values of these parameters are shown in table 3. During random blood sugar (RBS) measurement, 24.24% was urine sugar, 15.15% was impaired, 15.15% was normal sugar and 45.45% was provisional sugar found in diabetic respondent whereas, 11.11% normal, 15.51% impaired and 70.37% diabetes were found 2 hours after breakfast (2ABF) from same group. When diabetes was measured in non-diabetes respondent, 16.66% impaired and 83.33% normal glucose was found. Non-diabetes or healthy patient did not require to measured 2ABF diabetic examination. Respondents who had impaired conditions can be diabetes positive in the future. The mean value of diabetic sugar was 8.57 ± 6.05 in diabetic respondent and 30.00 ± 28.28 in non-diabetic respondent.

Diabetes measurement results showed that 73.3% of the subjects had diabetes within 1-10 years, 20% within 11-20 years and 6.7% more than 20 years, which indicates that it's a chronic dis-

ease. 53.3% diabetic respondent and 20% non-diabetic respondent had relation with family history, among them 53.13% was from fathers side and 21.88% was from mothers side of diabetic respond but 58.33% was from fathers side and 41.66% was from mothers side of non-diabetic respondent. So on the basis of the above observations, it can be said that it's a hereditary disease.

Discussion

It is thought that a person with a systemic ailment may be more susceptible to various linked health problems in their body. For the oral health, diabetes mellitus is one of the risk factors that develop a periodontal disease. Since the beginning of time, oral complications have been a significant consequence of diabetes that requires prompt and early treatment. This study had 120 patients, distributed evenly among those with or without diabetes.

In regards to age, it was found that the mean age of the diabetic population was 42.42 ± 16.232 and non-diabetic was 39.40

Parameters	DM Patients Number (%)	Non-DM Patients Number (%)	
RBS/2ABF			
RBS	Urine sugar	8 (24.24%)	-
	Impaired	5 (15.15%)	10 (16.66%)
	Normal glucose	5 (15.15%)	50 (83.33%)
	Provisional diabetes	15 (45.45%)	-
2ABF	Normal	3 (11.11%)	-
	Impaired	5 (15.51%)	-
	Diabetics mellitus	19 (70.37%)	-
	8.57 ± 6.05	30.00 ± 28.28	
Duration of DM in years			
	1-10	44 (73.3%)	-
	11-20	12 (20.0%)	-
	20+	4 (6.7%)	-
		7.83 ± 5.672	-
Family history of DM			
	Yes	32 (53.3%)	12(20%)
	No	28 (46.7%)	48(80%)
If yes, who had DM			
	Father	17 (53.13%)	7(58.33%)
	Mothers	7 (21.88%)	5(41.66%)
	Both father & mother	8 (25.00%)	-

Table 3: Diabetes measurement of diabetic and non-diabetic population.

± 15.086. The similar report was found as 45.81 ± 5.05 in diabetic and as 40.85 ± 7.7 in non-diabetic study by Dipshikha, *et al.* [32]. For diabetic patients in Bangladesh, there was a huge association between educational attainment and oral health. Health literacy, or the capacity to absorb, acquire and understand the health information required to make appropriate health decisions, will increase as people get more educated. For diabetic patients who were educated, regular tooth brushing, flossing, and the use of mouthwash were more regularly practiced. It was found that oral health results were positively correlated with educational status according to status done across different regions of Bangladesh. The current study found 30% of the population from both groups had study VI-XII class, where illiterate 21.7% and 15% for diabetic and non-diabetic study, respectively. This type of person cannot acquire appropriate oral health and general health education. This result is in agreement with the findings of Bobby, *et al.* [33]. where they indicates literates and higher SES (Class I) study cases had more “good practices” compared to illiterates.

In the present study, 40% of the diabetic population and 63.3% of the non-diabetic population reported the absence of periodontitis, meaning the rest had periodontitis. Similar findings are reported by Botero, *et al.* [34]. and indicated that diabetics had a greater proportion of periodontitis (75.3%) compared to non-diabetics 64.1%. In addition, numerous observational studies had already examined the impact of diabetes on periodontal tissues in great detail, showing that diabetes is linked to heightened deterioration of periodontal tissue. Poor glycemic management is linked to periodontal tissue degeneration, according to 5-year follow-up research [35]. Although glycemia regulation is one of the primary etiologic processes linked to periodontal breakdown, the length of diabetes was thought to be the primary factor when addressing the vulnerability to periodontal disease and other systemic problems [36,37]. As a result, the study addresses the high correlation between the length of diabetes and both periodontal disease and attachment loss. Juan, *et al* [38]. made a conclusion that the severity of periodontal disease was significantly influenced by the length of diabetes.

In the aspect of oral hygiene, 23.3% of diabetics and 33.3% of non-diabetics studied had good oral hygiene means when compared to non-diabetics, diabetics' oral hygiene condition was marginally worse, which was consistent with a study by Hintao., *et al.* [39] found that non-diabetics had superior oral health status. Caries and gingival irritation may result from the incorrect removal of dental plaque and debris, which sticks to the tooth surface and gingiva.

Systemic disease in the case of the diabetic population was common. In this study, 55% of diabetic and 41.7% of non-diabetic people knew about their disease. Among them, 72.73% hypertension, 21.21% kidney disease, 6.06% cardiovascular disease of diabetic study, and 60% hypertension, 28% kidney disease, and 12% cardiovascular disease were noted for non-diabetic population. This study was similar to Allen., *et al* [40]. where they found that about 80% of the respondents knew the major complications of diabetes as heart disease, circulatory problems, eye disease, and kidney disease.

Habits like smoking and chewing are bad, they can hamper oral health as well as general health. Tobacco chewing is a bad habit that causes periodontitis. In this study, 8.3% of non-diabetics and 26.7% of diabetics responded had this habit. Shaikh Zakir and Mohammad Shoheilul [41] reported comparable outcomes from a trial they did with 120 people with type 2 diabetes. The link between periodontal diseases and chewing betel leaves strong evidence that tobacco products could be directly connected to the emergence of periodontal disorders.

Diabetes had a strong family history, in the present work, 53.3% diabetic and 20% non-diabetic people were associated with diabetes. Another study in Tamil Nadu by Geetha., *et al.* [42]. and Dipshikha., *et al.* [32]. found 64% of the diabetic population had a positive family history. The most likely explanation was that diabetes was a genetically based disease that strongly clusters in families. When one or both parents have Type 2 DM, the likelihood of getting the disease increases by about two to four times [42,43]. Therefore, a family history of diabetes may be a helpful tool for identifying those who are more likely to get the condition and for focusing on behavioral changes that may postpone the beginning of the disease and enhance health outcomes.

Is diabetes a chronic disease? Yes, it is. The current study found that 73.3% of the population had diabetes near about a decade, while 20% had 11-20 years. In the another study in Nigeria [44]. reported that 30% of respondents had suffered from diabetes for

more than 10 years. It was clear from this point that diabetes was a chronic condition that can go untreated or unrecognized for a long time. This disease was therefore best described as a silent killer.

The American diabetes association said that all patients with diabetes must be referred to dental check-ups to provide the oral health assessment as part of complete diabetes management [45]. As a result of the current investigation, supported the idea that periodontal therapy could be a crucial part of the diabetes patient care regimen.

Conclusion

This study found that people with diabetes had poorer oral health and less awareness of diabetes-related oral health problems compared to people without diabetes. Researchers also found a lack of awareness of the risks of periodontal disease associated with good oral health. The relationship between diabetes and dental health is still being studied. To fully comprehend the implications of such prevalent, systemic manifestations in an individual's mouth cavity, more research is desperately needed in this area.

Conflict of Interest

The authors declare that there is no conflict of interest.

Author's Contribution

Data collection, analysis and manuscript preparation was carried out by Mashum Uzzaman Chowdhury, reviewed by Abdul Awal and the concept, design and technical thinking was done by Anil Chandra Deb.

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