Identify the Periodontal problems Among Adults with (Type 2) diabetes Mellitus (DM).

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Abstract: Over the past decade, there has been a serious interest in the interrelationship between systemic conditions and oral health. Diabetes is perhaps one of the best documented conditions that have been closely linked with periodontal disease. This study reviews the role of diabetes as a risk factor in periodontal disease. The treatment implications in the management of periodontal disease as an integral component of diabetic care is also discussed in light of the current understanding of the pathogenesis of this chronic conditions. **Material and Methods**: The clinical assessment of oral condition and laboratory studies examining the relationship between diabetes and periodontal diseases. The 100 adult with DM type 2 were selected randomly from both setting out patients' diabetic clinic at the Main University Hospital& ElQbarry hospital in Alexandria. There age was ranged between20 to 60 - from both sex, with type 2 DM and not visit the dental clinic at least since six months ago. **Results:** There is positive correlation between periodontal problems as shown to be related to the direct and indirect effects of glycaemic control among **(98. 9%)** from studied subject with significances correlation, with other factors also being implicated. Although some studies have pointed towards a bi-directional relationship between glycaemic control and periodontal health, it is still not clear if improvement in periodontal health could lead to improved metabolic control. **Conclusion**: Diabetes and periodontal disease are closely related though a lot of channel, though the effect of periodontal disease on diabetes control remain to be determined, with larger intervention studies. In the light of the increasing evidence of the relationship between diabetes and periodontal disease, management of oral health should form an integral serious part of diabetes patients.

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Key wards: Diabetes mellitus, effect of oral health promotion; oral health behaviors; periodontal health, Periodontitis

1. Introduction

Periodontal diseases (also known as gum disease) are bacterial infections that when, left untreated, may cause damage to the bone and even tooth loss.[1] Diabetic patients are three-to-four times more likely to develop these types of chronic periodontal infections, which, like any other infection in the body, can impair their ability to process and/or utilize insulin. By the way infections may cause diabetes to be more difficult to control, and the infection may be more severe than someone without diabetes.[2] However, diabetic patients tend to have a higher incidence of periodontal diseases, more severe levels of bone loss and periodontal infection, and often experience acute episodes of more aggressive disease activity, ultimately leading to the loss of teeth. Tooth loss can make it difficult to chew and digest food. As evidenced the diabetic patients, usually have a devastating impact on the ability to maintain proper nutrition as well as control the blood sugar levels. **(1, 3)**

There are two way relationships between diabetic control and periodontal disease. Just as diabetes can increase a patient's chance for having periodontal problems, recent research suggests that periodontal diseases may make it more difficult for diabetic people to control their blood sugar. By the way the periodontal diseases increase the body's systemic inflammatory signals that serve to increase blood sugar. This contributes to increased periods of time when the body functions with an unhealthy blood sugar level. Consequently, it is important for diabetic patients to treat the periodontal diseases to eliminate the infection with optimal metabolic control.**(4,5)**

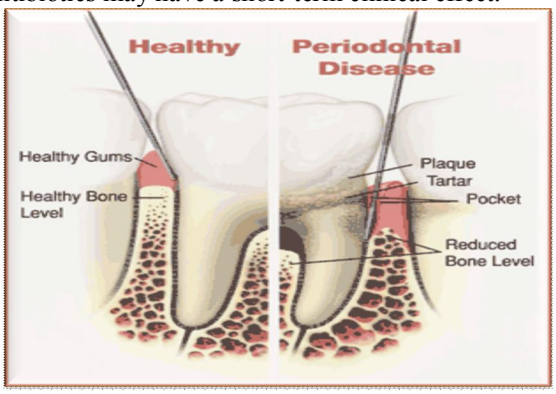
Periodontal diseases are bacterial infections of the gums, bone and attachment fibers that support the teeth and hold them in the jaw. The main cause of the diseases is bacterial plaque, a sticky, colorless microbial film that constantly forms on your teeth. If the plaque is not removed everyday by brushing and flossing, it anchors onto your teeth as a rough, porous substance known as calculus or tartar. Toxins (or poisons) produced by the bacteria in plaque irritate the gums, causing infection. By the way keeping the diabetes under control will also make patients less likely to develop periodontal diseases. Now a days recent study have concluded that poorly controlled diabetic patients respond differently to bacterial plaque in gum line than well controlled diabetic patients. However, Poorly controlled blood glucose level also have more destructive inflammatory activities in their gum tissue causing more severe loss of gums, bone and teeth. **(1, 6, 7)**

While the periodontal disease is the sixth leading complication among diabetic patients; therefore, it is urgently for them to know their therapeutic options. By the fact if it is detected early the treatment that may arrest gum disease and bring the gums back to a state of health. As well as can prevent additional bone or tooth loss.[1] As evidenced, the periodontal treatment usually combined with antibiotics to improve blood sugar levels among diabetic patients as well, suggesting that treating patients' periodontal diseases could decrease insulin requirements. If the diabetes is well controlled, periodontal treatment will be similar to a non-diabetic one. Whatever, during early stages of gum disease the treatment usually involves scaling and root planning. This procedure aimed to remove the plaque and calculus from the pockets around the tooth and the root surfaces must be maintained smoothed. [8, 9]

On the other hands the advanced cases may require further treatment. However, patients who are having problems keeping their diabetes under control may require a tailored treatment plan, as some diabetics heal more slowly. Diabetic patients may also want to schedule their dental appointments early in the morning, after they have eaten a normal breakfast, in order to stabilize and prevent a severe or sudden drop in blood sugar levels. Upon determining a treatment plan, the periodontis, nurses and physician will be work together to help those patients to control both diabetes and gum disease. While many people probably visit a dentist when they are in pain and perhaps expect a drill to be used to remove decayed material from a tooth), they are less likely to be aware of changes occurring in the tissues which surround and support the teeth, known collectively as the 'periodontium'. Those able to access preventive care will have their periodontal health assessed and maintained by their dentist. [10, 11]

Gingivitis is a reversible inflammation of the gum (gingiva) which may or may not lead on to the more serious periodontitis, affecting the connective tissue and bone supporting the tooth. Dental plaque, which builds up on the tooth surfaces, is a sticky 'biofilm' containing colonies of bacteria. Most of the 600 species of bacteria which may be found in the mouth are likely to be harmless, but some are known to be involved in oral disease. Oral hygiene (self-care), which includes brushing with or without toothpaste and flossing and/or mouth-rinses, aims to remove plaque Dentists use a plaque index to assess oral hygiene.[2,12]

Current understanding is that periodontal diseases mainly begin with an inflammatory response to Gram-positive bacteria, manifested as gingivitis (red and swollen gums). In susceptible individuals the effects spread into the periodontium, down into a pocket between the gum and the tooth. Where there is a change to Gram-negative bacteria and more inflammatory response leading to breakdown of the connective tissue and bone. Unchecked, there will be further changes in micro-flora, with further inflammation and further destruction. Although this process is localized, it has systemic inflammatory effects detectable through increased serum levels of inflammatory markers such as C-reactive protein (CRP) and interleukin-6 (IL-6). Treatment using antibiotics may have a short-term clinical effect. [3, 8]



Thus the role of health care givers in the prevention of the adverse effects of poor oral care as well as nursing assessment of the oral cavity for all patients especially diabetic one is very important part to maintain the general health and control blood sugar level for DM patients. So early detection for stages of gum disease, and its management is urgently recommended .As well as manage the dryness of oral cavity and finally proper oral hygiene consider as basic nursing role for maintenance of health and glysemic control among those patients[3,7]. This will be archived thorough proper care of oral cavity in-addition to control of blood sugar level as well as instruct the patients about the importance of oral health follow up.

Aim of the study:

1. Identify the most frequent periodontal problems among those patients, which affect their safety and comfort. Importances to help caregivers for prepare a proper plan of care, consider as safety, and comfort aspect for those patients.
2. Enhance the nurses to prepare counseling sessions and contents of instructional guidelines for patients about oral care and follow-up to fulfill the different needs arising form oral cavity alterations with safety consideration.
3. Integrate the periodontal care aspect in all health alteration in medical and surgical conditions with team work considerations.

Study hypothesis:

If periodontal disease affecting the blood glucose level among DM patients.

2. Material & Methods:

Material

Setting: The study was conducted in the Diabetic out patients' clinics at the Main University Hospital& El Qabbary hospital in Alexandria.

Subjects:. A convenient sample of 100 adults with DM type 2 were selected randomly from both mentioned setting

Tool

The tool used to collect data in the current study include assessment tool for the periodontal condition among diabetic type II adult patients' & assessment the general health problems among those patients. Medical records were used to collect data about diagnosis, type of medication as well as FBS level data.

Inclusion criteria

- Male and female subjects, with age groups ranging from 20 to 60 or more years.
- Subjects with Type 2DM and receiving oral anti-diabetic therapy.
- Subjects presenting with no evident, major diabetic complications.
- Subjects with no history of any systemic antibiotic administration within the previous 6 months at lest.
- Subjects with no history of any periodontal treatment 6 months prior to the study.

Exclusion criteria

- Subjects with any systemic disease other than T2DM.
- Pregnant female subjects.
- Last visiting to the dentist clinic less than 6 months.
- With bleeding disorders disease.

Part one:

Structured sheet was developed and used to collect the personal & socio-demographic data such as age, sex, level of education, Occupation and past history of periodontal problem

Part two:

IT consists of the following 4 items to assess these conditions**:-**

A- **Condition of gum regarding the presence of**

1. pain
2. Retraction
3. Ulceration
4. Bleeding, or pus
5. Necrotic process

B- Oral cavity was assessed regarding the

1. Poor oral hygiene (poor ,very poor)
2. Irritation
3. Ulceration
4. Infection
5. Dryness

C-Teeth was assessed regarding the

1. Presence of tartar or calculus
2. Presence of infection
3. pain
4. Presence of plaques
5. Decayed teeth
6. Bonked teeth
7. Loosing of teeth
8. Presence of artificial teeth.

D-Presence of halitosis as

1. Severe & continues
2. Moderate
3. Some times

Methods

- Permission to conduct the study was obtained from the authorized persons at mentioned settings.
- Approval of ethical committee was obtained.
- Patient's approval & consent to be included in this study was obtained.
- The sample selected was 100 and during data collection one subject refuse to complete the participation in the study and another one was died.
- Data was collected by interviewing with the subjects by the researcher individualized.
- The session of data collection ranged from 25-40minute according to the patient's tolerance and some the subjects were needed 2 sessions for completion of data collection (16 patients).
- Each subject was completing the questionnaire and oral assessment by interviewing with the researcher.
- Pilot study was applied on to 10 subjects to ensure the tool applicability. This sheet was evaluated by the expertise in the field of medical surgical nursing and dental
- The needed modification was done (The sheet tested for reliability.)
- As regards the statistical analysis it was done by utilized SPSS version 16.

3. Results:

The results of this study as (table one) revealed that, nearby 80% from studied subjects of their age was between <40 to <50 and 50 years or more (41.4 & 39.4%) respectively. As regards sex the ratio between male and female was observed nearby equality (51.5 &48.5) female and male respectively. While, the vast majority of studied subjects noticed from urban (86 .9%). As regards the oral hygiene (figure one) shows that, the most of studied subjects their hygienic level of oral cavity were very bad among more than ¾ of them. While, the poor level was observed among the ¼ of them.

In relation to salivation more than 80% from the subjects were mentioned that they suffering from dryness of their mouth .While less than 20% of them mentioned that their problems appear in form of sticky and less salivation.

Table (1):- Distribution of subjects based on the personal data.

Variables	Frequency n= 99	%	Total
Age			
- 20<30 years	12	12.1	99
- 30 - less than40	7	7.1	
- 40-less 50	41	41.4	
- 50 or more	39	39.4	
Sex			
- Female	51	51.5	99
- Male	48	48.5	
Setting			
- Main University Hospital	50	50.5	99
- El Qabbary hospital	49	49.5	
Residence			
- urban	86	86 .9	99
- Rural	13	13.1	

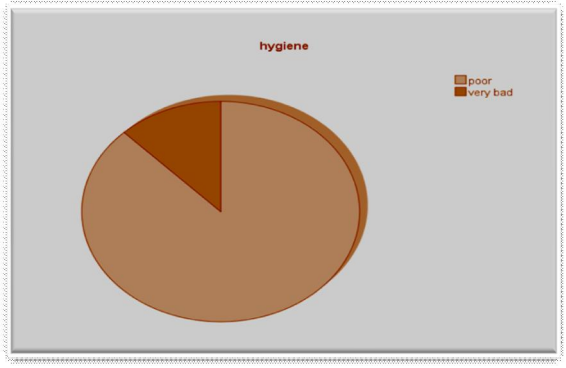


Fig.1: Distributions of patients according to oral hygiene

Table (2) shows that, the correlation between oral hygiene with age and sex. poor oral hygiene was observed among all female 50% in total subject. While it noticed among (36.4%) in male as well as very bad level of oral hygiene was noticed among male only with (12.1%). On the other hands there is highly a statistical significance was detected with *P*= 0.000 at level of P<0-001. As regards the correlation between age and level of oral hygiene it was found that, the poor oral hygiene was noticed among most of subjects in different age group, on the other hands the very bad oral hygiene was observed among 12.1% of age group from (less than 40toless than 50). Additionally to there is a highly statistical significance correlation was detected with *P*= 0.000*** Sig. at level of P<0-001. As regards the correlation between conditions of teeth and follow up Table (3).

Shows that, poorly fixed teeth were noticed among the non compliance subjects to the routine of follow up care or seeking for health care only when suffering from health problem with ratio equal 12.1 for both. On the other hand, decayed teeth was observed among (38.4%) of them. However, there is a highly statistical significance was detected with *P* value =0.000***.

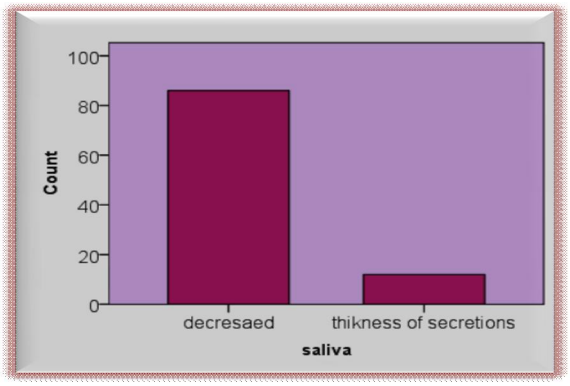


Fig. 2: Distributions of sample according to alter the salivations

Table (2):- Distribution of subject based on the correlation between oral hygiene with Sex and Age.

Sex	Level of hygiene Poor No	%	Very bad No	%	Total No = 99	%
- Female	50	50.5	0	-	50	50.5
- Male	36	36.4	12	12.1	48	48.5
Total	86	86.9	12	12.1	99	100%
Sig. at level of =0.000***						

Age\ years	Level of hygiene Poor No	%	Very bad No	%	Total No = 99	%
-20<30	12	12.1	0	0	12	12.1
-30 - < 40	7	7.1	0	0	7	7.1
-40-< 50	29	29.6	12	12.1	41	41.4
- 50 or more.	38	38.8	0	0	38	38.8
Total	86	87.6	12	12.1	99	99.7 %
Sig. at level of Sig. =0.000***						

Sig. at level of P<0-001

In relation to correlation between pain, teeth brushing and halitosis table **(4)** revealed that, the most of studied subjects were detected with the presence of moderate pain (86.9%). Inspit of teeth brushing was noticed among (50.5%) after each meal only specially lunch (main meal). Other wise, more than one third of them (36.4%) mentioned that, they not concerned about teeth brushing. While 12.1% of them said that, they severing from sever pain and not used to practice the oral hygiene in general. As well as there is a highly statistical significance correlation was detected with *P*= 0.000*** related to teeth brushing and pain. Additionally this table shows that, there is no statistical significance difference was found regarding to pain and halitosis with P= (0.351).Furthermore there is a highly statistical significance relation was detected with P= (0.001 **) regarding the artificial teeth and pain as well as more than one third of them (38.4%) were suffering from moderate pain with utilization of complete artificial teeth. While near-by half of total subjects were complaining from bleeding or ulceration (48.5%).

Table (3):- Distributions of patients according to the correlation of follow up and Condition of the teeth

Follow up	Condition of the teeth: Decayed N	%	unusual space N	%	poorly fixed N	%	Total N	%
1-Non compliance for routine of care	0	-	0	-	12	12.1	12	12.1
2-When a raised any problem only.	0-		0	-	12	12.1	12	12.1
3-None	38	38.4	36	36.4	0	-	74	74.5
Total	38	38.4	36	36.4	24	24.2	98	98.7
Sig. with *P*=0.000***								

Table (4):-The correlation between pain, teeth brushing and halitosis

Frequency of teeth brushing	Pain: Moderate No	%	Severe No	%	Total N o	%
After each meal	50	50.5	0	-	50	50.5
Others	36	36.4	12	12.1	48	48.5%
Total	86	86.9	12	12.1	98	100%
Sig. P= 0.000***						

Pain	halitosis: Continuous & severe N0	%	Some times N0	%	Total No= 98	%
Moderate	12	12.1	74	74.8	86	86.9
Severe	0	-	12	12.1	12	12.1
Total	12	12.1	86	86.9	98	100%
P= 0.351 not Sign.						

Artificial teeth	Pain: Moderate No	%	Severe No	%	Total No	%
-partial	12	12.1	0 - 0 -		12	12.1
(complete)-	38	38.4	12	12.1	38	38.4
-bleeding or ulceration	48	48.5			50	50.5
Total	86	86.9	12	12.1	98	100%
Sign with *P* value= .001*						

As regards the correlation between sex and plague (table5) revealed that almost of male subjects had a heavy layer of plague (48.5%) as well as it noticed among(38.45%) of female from total subject . By the way there is a highly statistical significance relation was detected as *P*= (0.001 **). On the other hands this table revealed that, almost of the subjects were suffering from Dry& cracked lips (86.9%) among male and female subjects respectively (48.5% &38.4%).While corner ulceration was noticed among12.1% of female only. As well as there is a highly statistical significance relation was detected as (*P* value = 0.003).

Table (5):- The correlation between sex and presence of plague

Sex	plaque				Total	
	Moderate		Heavy			
	No	%	No	%	No	%
Male	0	-	48	48.5	48	48.5
Female	12	12.1	38	38.4	50	50.5
Total	12	12.1	86	86.9	98	100%
Sig. with P= 0.000**						

Condition of Lips	Sex				Total	
	Male		Female			
	No	%	No	%	No	%
-Dry& crackedCorners	48	48.5	38	38.4	86	86.9
ulceration	0	-	12	12.1	12	12.1
Total	48	48.5	50	50.5	98	100%
Sig. with *P*= 0.003**						

However, the chronicty of the DM and plague table (6) shows that, around ⅔ of the total noticed they had a heavy layer of plague in subjects with disease period ranged from 5 to less than 10 years. While moderate level was detected among (36.4%)in group of subjects with disease period ranged from 10 to less 15 years. Finally there is a highly statistical significance relation was observed as (P value= 0.003).

Table (6):- The correlation between chroinicty and presence of plague

Period of illness	Plague				Total	
	Moderate		Heavy			
	No	%	No	%	No	%
-5 to less than 10	12	12.1	50	50.5	62	62.6
- 10 to less 15 years	0	-	36	36.4	36	36.4
Total	12	12.1	86	86.9	98	100%
P value = 0.003*						

Furthermore, table (7) reflected that, heavy layer of plague was noticed among (74.4%) of subjects due to poor level of oral hygiene. On the other hand heavy layer of plague was observed only among (12.1%) with very bad level of oral hygiene. On the other hand there is no statistical significance correlation was detected as P= (0.351).

Table (7):- The correlation between level of hygiene and condition of plaque

Level of hygiene oral	plaque				Total	
	Moderate		Heavy			
	No	%	No	%	No	%
poor	12	12.1	74	74.4	86	86.9
very bad	0	-	12	12.1	12	12.1
Total	12	12.1	86	86.9	98	100%
P value= 0.351						

In relation to the control of blood sugar (BS) level and alter the tongue condition the results of the current study revealed that (74.4 %) in the subject their BS level was poorly control as noticed accompanied with dry and cracked tongue. As well a patched tongue was observed among (12.1%) of them. On the other (12.1%) of subject were detected with seriously uncontrolled BS level and suffering from patched tongue only. However, there is a highly statistical significance correlation was detected as P = 0.000**.

Table (8)The correlation between blood sugar and condition of tongue

Blood sugar Level	Tongue Dry & cracked No	%	Presence of patches or others No	%	Total No	%
Poorly control	**74**	**74.4**	**12**	**12.1**	**86**	**86.9**
-Seriously uncontrolled	**0**	**-**	**12**	**12.1**	**12**	**12.1**
Total	**74**	**74.4**	**24**	**24.2**	**98**	**100%**
Sig *P*. =0.000* **						

4. Discussion

Periodontitis is the characteristic complication of diabetes mellitus and significantly varies with the glycemic control. [1.3] In the current study, there was a higher frequency of periodontitis as shown among all most of the subjects as poorly controlled and seriously uncontrolled blood sugar level. This finding concurs with that of many previous studies proposing that diabetes is a risk factor for periodontal disease. [2, 14]

Another study reported that the, pocket depth was considered as a marker for severity of periodontal disease. On the other hand moderate disease was more common among diabetic patients.[6,10] By the way this finding may be translating the presence of halitosis among diabetic patients and it was noticed in this study among **(86.9%)** from participated subjects. However another study ascertained than no significant association between DM and periodontal disease was found by using the deep periodontal pockets as the clinical parameter for periodontal disease severity as mentioned by **Curtiss*etal.*[14]** Furthermore, this finding was lined with the result of the present study.

We can conduct this systematic review to summarize the factors associated with poor control of BS level. Ten studies qualified for Meta-analysis as follow life style modification is one of the major determinants of diabetes control.[10,15] In this study patients had heavy plague, dry as well as cracked lips detected among (48.5%& 38.5%), males and female respectively. Whatever, this finding may attributed to poor oral hygiene as trans-cultural aspect and lack of awareness about the seriousness of neglecting oral hygiene as well as dental follow up which reflect negatively on BS control. This is matched with the results of the current study as (86.9% with poor hygienic level and 12.1% with ever bad level of hygiene. Probably, the chronic diabetic one did not care about the disease control as well as, females usually take the disease only as a second priority if compared to males. [3, 14]

However, individuals in the current study with more plaque, despite the fact that, the use of a toothbrush was more common, the proportion of people cleaning their teeth daily. It is suggested that, the probable reason for the accumulation of more plaque among uncontrolled diabetic subjects could be return to poor self-efficacy, resulting in less effective cleaning. Additionally to elevate the blood glucose level in gingival crevicular fluid (GCF) and decreased saliva per say could be another possibility, leading to a higher accumulation of plaque and calculus. [16]

As evidenced the diseases like coronary heart disease, neuropathy, retinopathy, renal failure and neurological disorders were associated with poor BS control. This shows the importance of diabetic control to prevent such complications. However recent studies mentioned that, foot problems and fatty liver were not related to poor BS control. [6, 10] Probably there could be other factors that are responsible for poor BS control. By the fact with the consumption of insulin, improves the BS control. While the metformin reduces insulin resistance, thereby BS control takes place. This is lined with the results of the present study as detected the poor control of BS among 86.9% from total subject.

Surprisingly, poorly controlled BS level of patients were more adhered to diet, exercise, medication and regular glucose monitoring. One of the reasons could be that once these patients notice that, their diabetes is poorly controlled, they are more likely to get adhered to the good behavior as oral healthcare and proper hygiene. Thus we must focus on the team work during caring diabetic people by integrating the plan of care between physician, dietitian, peridontist as well as nurses.

Conclusion

While type 2 diabetes mellitus (type2DM) is a complex metabolic disease that can result in various complications in human subjects [1]. The prevalence of periodontal diseases in individuals with type 2DM is significantly higher than in non-diabetic counterparts [4, 10]. A large body of literature addresses the interrelationship between periodontal diseases and diabetes mellitus [2, 3]. Periodontal disease has been noted to be the sixth complication of DM [4]. While DM is also considered to be a risk factor for peri-odontitis, especially in subjects with poor glycemic control.

Despite being extensive research, mechanism underlying the association of periodontitis and diabetes mellitus is not clear. However, while investigating the mechanism relating the link between these two chronic diseases, several studies have been

focused on microbial flora of the dental plaque which is the primary etiologic agent of the periodontal disease [3, 5]. Although our sincere attempt to consolidate all studies, which provide evidence for the factors responsible for poor control of diabetes, we could not find this as primary objectives in many well-conducted studies. However, our experience with literature review showed that this area requires more attention from diabetes researchers as well as nursing educators.

We recommended that develop.

a. Study regarding the effect of periodontal infections on diabetic complications and glycemic control.
b. Studies to investigate relationship between peri-odontitis and DM.
c. Studies the correlation between glycemic control in DM patients with severe periodontitis .
d. Comprehensive systematic training programs and manuals for health care givers regarding the interrelationship between periodontal diseases and diabetes mellitus as well as target organ.
e. There is still no clearly defined evidence as to whether treatment of periodontal infection contributes to the management of glycaemic control among both type 1 and type 2 diabetes thus we need for studies regarding these issues.

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