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Periodontal Disease And Type 2 Diabetics Versus Non diabetics In Adhamiyah Sector, Baghdad- Iraq, 2018

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Abstract

Background: periodontal disease is an inflammatory condition of the gums and the structures supporting the tooth (periodontium and alveolar bone), importance of diabetes mellitus type 2 and their effect on the periodontal disease and the need further study about this subject.

Objective: To compare the periodontal status of a group of diabetic patient with non-diabetic group.

Material and method: case control study, 105 type 2 diabetics and 105 non diabetic(mean age: 50.47+_11.67) were examined in primary health center in AL-Adhamiyah sector, from the period 1 March 2018 until 1 July 2018, the periodontal parameters were recorded, the plaque index (PI),gingival index (GI), Periodontal pocket depth (PPD), clinical attachment level (CAL) and missing teeth these parameters were evaluated in a randomized half mouth examination.

Result: Diabetics highly significant in PI(p=0.0001), GI(p=0.0001), CAL(p=0.0001) , PPD(p=0.0001) and missing teeth(p=0.0001).

Conclusion: this study showed that diabetics had more severe and higher periodontal disease, diabetics and their health care givers should be informed of these findings so that diabetic patient can seek early management of periodontal disease.

Keywords: Diabetes mellitus, periodontal disease, plaque index, gingival index, calculus, periodontal pocket probing depth, clinical attachment level.

Introduction

Chronic periodontal disease(PD) is an inflammatory condition of the gums and the structures supporting the tooth (periodontium and alveolar bone), most often causedby anaerobic Gram-negative microorganisms, adhering to the teeth forming the bacterial plaque [1,2].

Periodontal disease, particularly its mild and moderate forms, is extremely common in adult-aged populations all over the world, with prevalence rates of approximately 50%, while its severe form becomes more common in the third and fourth decades of life, with global prevalence rates of around 10% [3].

Severe periodontitis, the most common cause of tooth loss in adults, is frequently compounded by tooth drifting and hypermobility, finally leading to a collapsed biting function Furthermore, periodontal disease and tooth loss are thought to be linked to a number of chronic diseases and ailments that impair overall health[4,5].

Periodontal diseases include two major entities, gingivitis and periodontitis. Gingivitis

is characterized by reversible inflammation of periodontal tissues where as periodontitis also presents destruction of tooth supporting structures, and may lead to tooth loss. Exiting evidence indicates that gingival inflammation (gingivitis) is required for periodontitis, however some gingivitis never transform to periodontitis[3,4] This is because bacterial plaque accumulation is necessary for the onset of both entities but individual susceptibility is required to develop periodontitis [4,5].

Periodontal diseases is a very prevalent condition. In the United States, over half the population aged 18 years ormore have PD in its early stages, increasing to up to75 % after the age of 35 years; its mild to moderateforms are present in 30% to 50%, and the severegeneralized form in 5% to 15% of the general adultpopulation[6].

Diabetes mellitus (DM) is a chronic, non-communicable disease and also one of the major global public health issues. It is defined as a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin. An elevation of blood glucose level(hyperglycemia) is the primary feature of DM and results from a defect in insulin secretion by pancreatic β cells, a decrease in insulin sensitivity, or a combination of both [7].

The most common form of DM is type 2 (DM2), which accounts for 85% of all diabetes patients[8]. Asia in particular has the highest prevalence of diabetes in the world. Countries exhibiting the fastest rate in diabetic population growth include India and China, among many other developing countries[9]. It is generally accepted that diabetes increases the prevalence and severity of periodontitis, and is now considered the sixth "opathy" of diabetes[10,11].

In a large cross sectional study, White *etal.,*2003 showed that The increased levels of periodontal attachment and bone loss seen in diabetic patients may be associated with the alterations in connective tissue metabolism that uncouple the receptive and formative responses. Impaired osseous healing and bone turnover in association with hyperglycemia[12]

The effect of periodontitis on diabetes may be related to the penetration of the host tissues by bacteria or their degradation products, such as lipopolysaccharides from the outer membranes (also called endotoxins or lipoglycans), into the systemic circulation[13]

As already mentioned, longitudinal studies have demonstrated a two-way relationship between diabetes and periodontitis, with more severe periodontal tissue destruction in diabetic patients and poorer glycemic control in diabetic subjects with periodontal disease[14,15].

Aim of this study: To compare the periodontal status of type 2 diabetic group with non- diabetic group in primary health center in Adhamiyah sector .

Subject and methods: This was case- control study , included 105 patients who were diagnosed withtype 2 DM and registered at "diabetic clinic and research institute in Adhamiyah sector in Baghdad and105non diabetic.) All the patients were cooperative and very well responded to the study. Out of these 210 patients, were males and 75 (35.7%) werefemales135(64.3%). The majority of patients belonged to AL-Sulikh primary health care center, however, some were also from AL-Dehalik primary health care center. All the patient in this study were diabetic patient type II which will have DM more than 1 year and above 35 years of age.

Self-designed and well-structured questionnaires were filled out by the researchers as the patientsresponded to these questions. The informed consent was taken from all the patients and they werealso assured about their confidentiality. Also, permission from the head of the sector was also obtained to conduct this study. The study was conducted over a period of three month from (March–July)2018. All thepatients were very cooperative and responded well. The questionnaires contained severalquestions regarding the socio-demographic features (i.e. name, age, sex, and occupation, education status); medical history of diabetes (i.e. duration ofdiabetes, DM or not DM); periodontal status, their general and oral habits such as dental visits, frequency of brushing. For each patient, a complete examination of extra-oral and intra-oral full-mouth clinical parameters and the individual number of teeth present was performed.

The examinations and clinical measurements were done by four examiner, the following periodontal variables were recorded in a randomized half-mouth examination on four sites of each tooth(mesio-buccal, mid buccal, disto-buccal and mid-lingual). Plaque index(PI), gingival index(GI), calculus index(CL), periodontal probing depth(PPD), clinical attachment(CAL)were measured at mesial, distal, buccal and lingual aspects for each tooth.

The presence of plaque or debris (PI) was assessed according to the criteria described by Greene & Vermillion[16].

0 = no

1 = plaque covering less than one third

2 = plaque covering between one and two thirds of buccal surface

3 = plaque covering greater than two third

The gingival index (GI) was assessed according to the criteria described by loe&silness.[17].

0 = normal (healthy gingiva); 1= mild inflammation - slight change in color, slight edema but no bleeding on probing;2 = moderate inflammation - redness, edema and glazing, bleeding on probing;3 = severe inflammation – marked redness and edema, ulceration with tendency tospontaneous bleeding

The presence of supra or sub gingival calculus or both was measured using a dental explorer and assessed according to the criteria described by Kunaal **and** Kharidhi [16].

0: no ;1 = calculus covering less than one third;2 = calculus covering between one third to two third;3 = calculus greater than two third

The periodontal probing depth(PPD) measurement were obtained by using a graduated periodontal prob.

The PPD was measured at 6 sites around each tooth(mesial, middle, and distal area& the facial& lingual surfaces).The greatest single measurement determines the pocket score for the tooth. It was measured from the free gingival margin (GM)to the bottom of the pocket.

The probe was maintained parallel to the long axis of the tooth at the mid- buccal and mid-lingual sites.

At the proximal sites the probe were placed as close to the contact point as possible and slightly angled to determine the apical most extent of the pocket and assessed according to the criteria of PPD was described by Williama [18].

Mild = probing reveals sulcular depth not over 3 mm. (1-2mm attachment loss); Moderate = probing reveals pocket depth greater than 3 mm. but not over 5mm and Sever = probing reveals pocket depth greater than 5mm.

The clinical attachment level (CAL) was assessed at four sites around each tooth (the mesiobuccal, mid-buccal,mid- lingual and disto lingual).

The CAL was determined by measuring the distance from cemento-enemal junction (CEJ) to the pocket using a periodontal probe

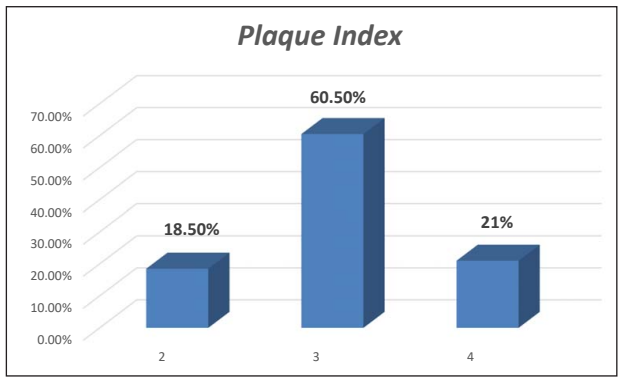
1 = the cej may be coronal to the gingival margin (gum recession);2 = the cej may be at the same level as the gingiva margin);3 = occasionally the gingival margin extend significantly over the cej

Statistical analysis

Data were analyzed with SPSS version 24 software .frequency distribution for selected variable was done first. All data arranged and tabulated in number and percentage. The statistical analysis tested by using P value less than 0.05 was consider significant .

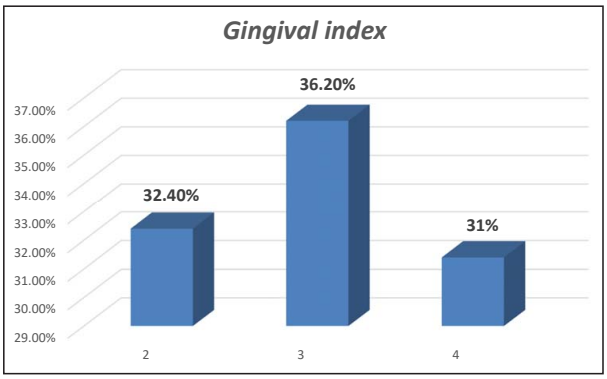
Result

Results in Fig 1 showed the plaque index in grade 2 point 3which is covering between one to two third is more frequent than point 2 and point 4 is 127(60.50%)



Figure(1): PL index in grade 2 point 3 which is covering between one to two third of the buccal surface of the teeth is more frequent than point 2 and point 4 is 127(60.50%)

In Figure (2) the GI index in grade 2 point 3 which is moderate inflammation- redness, edema and glazing, bleeding on probing is more frequent than point 2 and point 4 is 76(36.20%).



Figure(2): GI index in grade 2 point 3 which is moderate inflammation- redness, edema and glazing, bleeding on probing is more frequent than point 2 and point 4 is 76(36.20%)

Results in figure (3) calculus index in grade 1 point 2 which is calculus covering less than one third of the teeth is more frequent than point 3 and point 4 is 105 (50.00%).

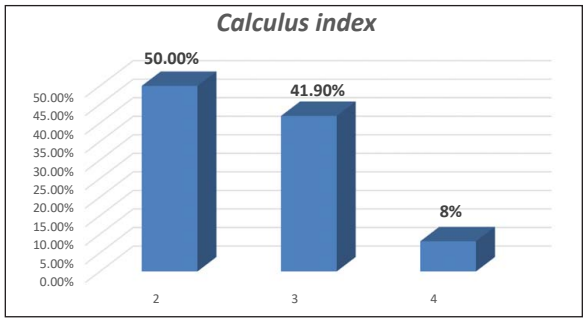


Fig 3: calculus index in grade 1 point 2 which is calculus covering less than one third of the teeth is more frequent than point 3 and point 4 is 105(50.00%)

In table 1 baseline characteristics of the 210 subjects included in the study are presented, the mean age of the participant was 50.47+/-11.67 years with age range from minimum 35-maximum 79 years old. There were 135(64.3%)female and 75(35.7%)male participants.113 participants(53.8%)worker and 97(46.2%)not worker.190 patient(90.5%)were illiterate and 20(9.5%) not illiterate.

There were 105(50%) diabetic patient whereas 105(50%) non diabetic patient. The mean duration of diabetes mellitus 7.4+/-5.5 years with arrange of minimum 1-maximum 23 years.

Table (1): Frequency distribution of the sample (n 210)

Variable		Frequency	%
Gender	Male	75	35.7
	Female	135	64.3
Occupation	Working	113	53.8
	Not working	97	46.2
Level of education	Illiterate	190	90.5
	Not illiterate	20	9.5
Diabetes mellitus	Yes	105	50
	No	105	50
Plaque index	2	39	18.5
	3	127	60.5
	4	44	21
Gingival index	2	68	32.4
	3	76	36.2
	4	66	31.4
Calculus index	2	105	50
	3	88	41.9
	4	17	8.1
Periodontal pocket depth	Mild	168	80
	Moderate	39	18
	Severe	3	6
Clinical attachment level	1	55	26.2
	2	51	24.3
	3	104	49.5
Missing teeth	Yes	184	87.6
	No	26	12.4
Dental clinic visit for care	Yes	21	10
	No	189	90
Teeth brush	Yes	143	68.1
	No	67	31.9
Teeth brush per day	No brushing	67	31.9
	Once	70	33.3
	Twice	62	29.5
	Thrice	11	5.3
Age	(Mean 50.47± 11.67) (minimum 35 – maximum79)		
Duration of DM (years)	(Mean 7.4± 5.5) (minimum 1 – maximum23)		

Most of participants were female, most frequent age (35-79),105 diabetic, 105 non-diabetic and duration of DM (years) (minimum 1-maximum 23 years)

Results in table -2 showed the main association factors which have statistical significant with DM in 210 participate plaque index, gingival index, calculus index, periodontal pocket depth, clinical attachment level and missing teeth .

Table(2): Relationship between DM and indices (No.= 210)

Variable No.		Diabetic		Non diabetic		P value
		%	No.	%		
Plaque index	2	7	17.9	32	82.1	<0.0001
	3	59	46.5	68	53.5	**
	4	39	88.6	5	11.4	
Gingival index	2	10	14.7	58	85.3	<0.0001
	3	43	56.6	33	43.4	**
	4	52	78.8	14	21.2	
Calculus index	2	38	36.2	67	63.8	<0.0001
	3	53	60.2	35	39.8	**
	4	14	82.4	3	17.6	
Periodontal pocket depth	Mild	67	39.9	101	60.1	<0.0001
	Moderate	36	92.3	3	7.7	**
	Severe	2	66.7	1	33.3	
Clinical attachment level	1	44	80	11	20	<0.0001
	2	32	62.7	19	37.3	**
	3	29	27.9	75	72.1	
Missing teeth	Yes	102	55.4	82	44.6	<0.0001
	No	3	11.5	23	88.5	**

The main association factors which have statistical highly significant with DM in 210 participate plaque index, gingival index, calculus index, periodontal pocket depth, clinical attachment level and missing teeth.

Discussion

In current study, there was a higher frequency of periodontitis in the measures of indices used, and shows the marked difference in the controlled and uncontrolled group of diabetic patients. This finding concurs with that of previous study done by Albert and Ward [19].

One study found no difference between diabetic non diabetic Ogunbodede, et. Al in Nigeria in 2005. [20]. However, this study used community periodontal index of treatment needs (CPITN) to asses periodontal health status. It is therefore difficult to compare our results with this study for we used different outcome measures to asses periodontal disease.

Another study reported only a slight association between periodontitis and diabetic [21].The slight difference was said to be because periodontitis in older subjects may approach similar levels of extent and severity regards less of whether they have diabetes. This agreement can be supported by the fact that there is usually a decline in periodontitis after the age of 50-60 years [22]. This is because at this age most of the teeth affected by periodontal destruction have already been extracted.

Current study consisted of adults aged 35 years or older. It is in this age group that both chronic periodontitis and type 2 diabetes start to manifest Tsai, et. Al in US in 2002[23].Therefore, it unlikely that the more sever periodontitis in our study group was due to other manifestation of systemic diseases other than type 2 diabetes.

Results in figure 1 showed that the average percentages of sits with plague covering between one and two thirds of buccal surface of the teeth, figure 2 showed the average percentage of sits withgingivitis moderate inflammation- redness, edema and glazing, bleeding on probing figure 3 showed that the average percentage of sits with calculuscovering less than one third of the teeth, This means that our study groups had poor plaque control, The poor plague control contributed to a high prevalence of gingivitis and this lead to accumulation more of calculus. Therefore, plague, the primary etiologic factor of periodontal disease.

In this study the PPD,CAL, and GI indices were significantly higher (p=0.0001) in diabetics compared to control, these parameters are the main determinant measures of periodontal diseases, it implies that diabetics in this study suffered from more advanced periodontal diseases than control. This is consistent with the findings of other studies by Kapellas *etal.,* in Australian in 2008, person *etal.,* in 2003, Metu *etal.*,in 2009 [24,25,26].

Also in this study plaque and calculus indices were significantly higher (p=0.0001) in DM compared to control group, it is suggested that the probable reason for accumulation of more plaque in uncontrolled diabetic patients could be poor self-efficacy, resulting in less effective cleaning and the increase of level of glucose in gingival crevicular fluid (GCF) and saliva per se could be another possibility leading to higher accumulation of plaque and calculus by Evanthia *etal.,* 2006; Novak *etal.,* in America in 2008 and Mei *etal.*,2020[27,28,29].

Missing teeth was significant higher (p=0.0001) in DM compared to control group, similar to a comparative SAUDI study by Almas, et. Al in 2001. [30]. And another study by Ofoego *etal.,* in 2013 [31]. Since advanced periodontal diseases ultimately leads to teeth loss. Lesser number of teeth in diabetics than controlled is expected to find.

Conclusion

Improper oral hygiene has a strong negative impact on periodontal health, which is evident by increased scores on indices scale of gingival, periodontal, plaque and calculus which leads to teeth loss.

Ethical clearance: Permission from primary health center in Adhamiyah sector was attained

before starting the study. All the participants gave verbal consent with confidentiality of participants' identification

Conflict of interest: Nil

Source of funding: Nil

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