

# TISSUE RESPONSE OF TYPE 2 DIABETICS TOWARDS NON-SURGICAL PERIODONTAL THERAPY: A RETROSPECTIVE, COMPARATIVE STUDY WITH NON-DIABETICS - A PRELIMINARY INVESTIGATION

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*Tissue Response of Type 2 Diabetics towards Non-Surgical Periodontal Therapy: A Retrospective, Comparative Study with non-diabetics - a preliminary investigation. Annal Dent Univ Malaya 2013; 20(2): 24-28*

Original Article

## ABSTRACT

The purpose of this study was to assess the tissue response of Type 2 diabetic subjects towards non surgical periodontal therapy as compared with matched, non-diabetic subjects. This was a retrospective, comparative study using periodontal case notes of 40 subjects attending undergraduates' periodontal clinics (20 diabetics, 20 non-diabetics), who were selected based on the inclusion and exclusion criteria. Response towards non surgical periodontal therapy was assessed through three clinical periodontal parameters, namely plaque score, gingivitis score and number of periodontal pocket  $\geq 5$ mm at the baseline and after initial non surgical periodontal therapy. Data obtained was then analyzed by SPSS Version 12. Both diabetic and non-diabetic subjects showed significant improvements (p-value = 0.021; 0.000; 0.001 and 0.010; 0.014; 0.001) in all three parameters after the therapy. However, when comparison was made between the two groups, there was no significant difference (p-value=0.913; 0.892 and 0.903) in any of the parameters. Periodontal conditions improved clinically in both diabetic and non-diabetic subjects after non-surgical periodontal therapy. Therefore, both groups responded similarly towards the therapy and thus it can be postulated that well-controlled diabetic status does not have a significant effect on the outcome of periodontal therapy.

Keywords: Type 2 Diabetes, periodontal disease, non surgical periodontal therapy

## INTRODUCTION

Diabetes mellitus is one of the most common non-communicable diseases globally. It is now a major public health concern with the increasing prevalence globally (1). Diabetes mellitus has been listed as the 8<sup>th</sup> cause of death in the 10 principal causes of death in Malaysia in 2008. Statistics showed 1.7% of medically certified death in Malaysia in 2008 was due to diabetes mellitus (2).

There are two main classes of diabetes, insulin-dependent Type 1 diabetes and non-insulin dependent

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Type 2 diabetes (3). Type 1 diabetes mellitus is a chronic childhood disease characterized by absolute insulin deficiency with destruction of the pancreatic beta cells being the most common cause (4). Type 2 diabetes mellitus is characterized by decreased response of target tissue to the normal levels of circulating insulin due to the insulin resistance (4).

Periodontal disease is one of the most common dental conditions. Presently, periodontal disease is a group of inflammatory diseases that affect the supporting tissues of the teeth (5,6). Gingivitis is gingival inflammation associated with plaque and calculus accumulation (7). It is characterized by the presence of clinical signs of inflammation that are confined to the gingival and shows no attachment loss of the associated tooth (8). Untreated long standing gingivitis can progress to the more advanced form of periodontal disease known as periodontitis (9). Periodontitis is an inflammatory condition of the supporting structures of teeth resulting from plaque biofilm attached to tooth surface and resulting in progressive destruction of periodontal tissues (5, 7).

Relationship between diabetes mellitus and periodontal disease has been extensively studied. A number of oral diseases and disorders have been associated with diabetes mellitus. Periodontal disease has been identified as the sixth complication of diabetes mellitus and those with diabetes mellitus are said to have twice the risk of periodontal infection (10). Many studies have showed diabetes mellitus as the risk factor for periodontal disease and levels of glycemic control appears to be an important determinant in the relationship between diabetes mellitus and periodontal disease.

The aim of this retrospective study was to assess the response of Type-2 diabetic subjects towards non-surgical periodontal therapy.

## MATERIALS AND METHODS

### *Subject Selection*

Case notes of 2463 were obtained from undergraduates of Faculty of Dentistry, University of Malaya. Twenty subjects' case notes that were treated in the periodontal clinic were selected in each group (control group and diabetic group) which fulfilled the inclusion and exclusion criteria using purposive sampling.

### *Inclusion Criteria*

#### (a) Cases

Subjects with Type 2 diabetes mellitus whose diagnosis had been established (WHO diagnostic criteria) and were on regular follow-up in the Diabetes Clinic, University Malaya Medical Center for a minimum of 2 years and have been diagnosed with periodontal condition (chronic periodontitis) were selected.

#### (b) Control

Subjects who are non-diabetic were included in this study. Subjects with their age ranged  $\pm 5$  years compared with their diabetic counterparts who were then matched according to their diagnosed periodontal condition were selected.

For both cases and controls, only patients' folders which had the complete medical history on their diabetic status and had a history of being well controlled diabetics were chosen for this study. All subjects included should have at least 12 teeth present. According to the case reports, each chosen subjects had undergone through examination, received and completed initial non-surgical periodontal therapy and had been reviewed by undergraduates of the Faculty of Dentistry. All the subjects included had their case notes duly checked and signed by the specialist on duty during the session.

### *Exclusion Criteria*

Subjects with a history of poorly controlled diabetics were excluded. Those pregnant, smokers, immune-compromised, on steroid therapy or radiation therapy and on other systemic modulating factors were also excluded. Subjects who did not complete the initial non-surgical periodontal therapy or those who received periodontal treatment elsewhere within past 3 months or received periodontal therapy during the interval between examination and review after the initial non-surgical periodontal therapy were also excluded. Those subjects with incomplete case notes or with case notes that was not duly checked by specialist on duty were also excluded.

### *Periodontal Parameters*

In this study, periodontal parameters taken into consideration included plaque score, gingivitis score and the number of periodontal pocket  $\geq 5$ mm. These parameters were measured at 6 sites *per* tooth (mesiobuccal, mid buccal, distobuccal, distolingual, mid lingual, and mesiolingual). Both plaque and gingivitis score was assessed by using Visible Plaque Index and Bleeding on Probing Index (11) respectively and were then tabulated into percentage.

### *Statistical Analysis*

Data entry and analysis was done using Statistical Program for Social Science (SPSS) Version 12.0. In order to evaluate the response towards non-surgical periodontal therapy in test and control group respectively, paired-samples T test was applied for plaque score parameter while Wilcoxon Signed Ranks test was used for gingivitis score as well as number of periodontal pocket  $\geq 5$ mm. In order to determine if there was any difference in the response towards non-surgical periodontal therapy between test and control group, Independent T test was employed for plaque score while Mann-Whitney Test for the other two parameters.

## RESULTS

Out of the three parameters examined among test subjects, only plaque score demonstrated a normal distribution while gingivitis score and number of periodontal pocket  $\geq 5$ mm both displayed positively skewed distribution. As such, plaque score readings were analyzed by using paired-samples T-test. A decrease of 15.71 value of plaque score was observed after the therapy (p-value  $< 0.05$ ) in case subjects.

Wilcoxon Signed Ranks test was carried out to determine and compare median values for both gingivitis score and number of periodontal pocket  $\geq 5$ mm. The non-parametric test showed a decrease of 9.91 for gingivitis score and 5.50 for number of periodontal pocket in median values and both p-values were significant with values of 0.000 and 0.001 respectively, as shown in Table 1.

Control subjects displayed normal distribution for both plaque score and number of periodontal pocket while the gingivitis score was positively skewed. A decrease of 16.65 value of plaque score was observed after the therapy and p-value (0.010) attained from paired-samples T-test was statistically significant. The same parametric test was employed for number of periodontal pocket and the findings included a decline (5.55 mm) and a significant p-value (0.001).

Wilcoxon Signed Ranks test, which was utilized in gingivitis score, resulted in a pre therapy reading of 41.86 and post therapy reading of 19.19. The non-parametric test also established a significant p-value of 0.014 (Table 1).

**Table 1:** Clinical parameters among cases and control subjects before and after non-surgical periodontal therapy

Clinical Parameter	Case				p-value	Control				p-value
	Mean (SD)		Median (IQR)			Mean (SD)		Median (IQR)		
	Pre	Post	Pre	Post		Pre	Post	Pre	Post	
Plaque score	46.50 (22.03)	30.79 (20.88)	-	-	0.021a	52.00 (21.35)	35.35 (24.53)	-	-	0.010a
Gingivitis score	-	-	27.17 (44.40)	17.26 (16.76)	0.000*	-	-	41.86 (24.62)	19.19 (30.97)	0.014*
Number of pocket $\geq 5$ mm	-	-	9.00 (8.00)	3.50 (6.00)	0.001*	11.75 (8.57)	6.20 (9.53)	-	-	0.001a

<sup>a</sup> represents p-value determined by paired-samples T-test

\* represents p-value determined by Wilcoxon Signed Ranks test

p-value <0.05 was set to be statistically significant

**Table 2:** Clinical parameters between cases and control subjects

Clinical Parameter	Case (n=20)		Control (n=20)		p-value
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	
Plaque score	15.71 (28.02)	-	16.65 (25.92)	-	0.913a
Gingivitis score	-	14.85 (22.20)	-	20.58 (43.76)	0.892*
Number of pocket $\geq 5$ mm	-	5.00 (10.25)	-	5.00 (7.00)	0.903*

<sup>a</sup> represents p-value determined by Independent T test

\* represents p-value determined by Mann-Whitney test

p-value <0.05 was set to be statistically significant

As both test and control subjects displayed normal distribution for plaque score, this parameter was analyzed by using Independent-T test. The parametric test exploited the mean values for both groups of subjects and obtained a statistically insignificant p-value of 0.913.

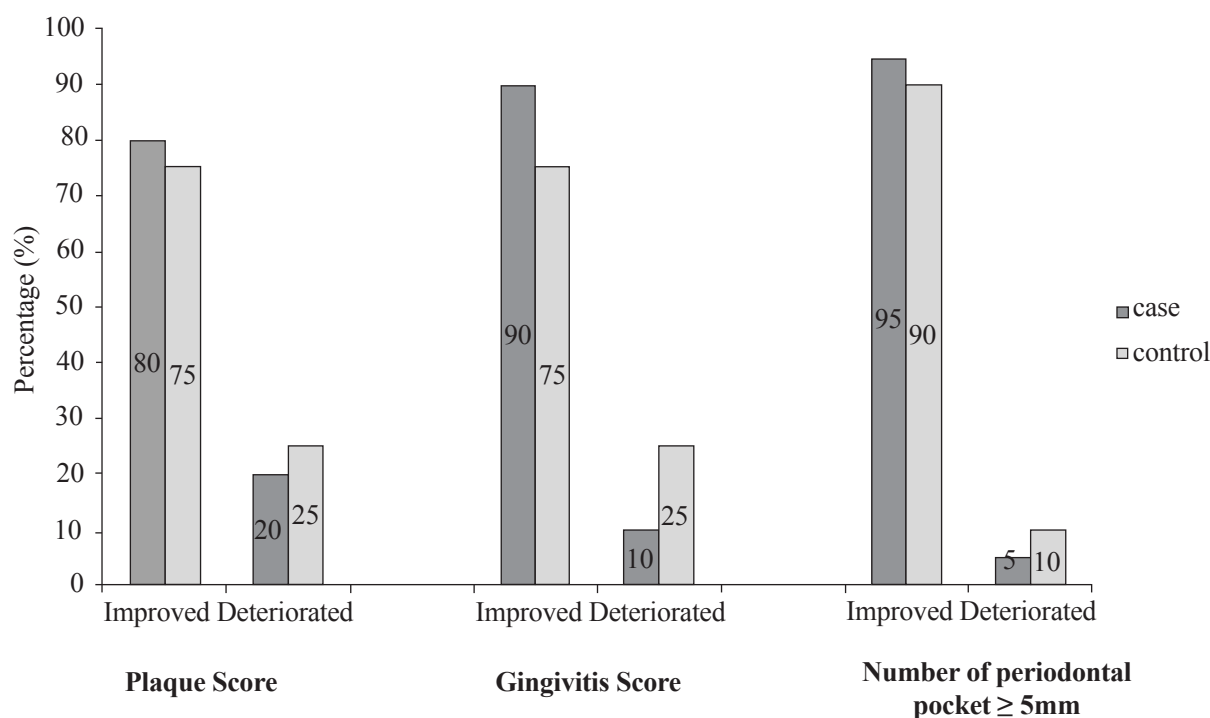
A difference of 5.73 was observed from the median values between cases and control subjects after the data was evaluated using Mann-Whitney test. This reported difference, however, did not suggest any significance as the non-parametric test concluded a value of p-value >0.05. The same value of 5.00 was obtained for both test and control groups in the term of number of periodontal pocket  $\geq 5$ mm after the data from both groups were explored using Mann-Whitney test. P-value (0.903) acquired from the test did not propose any significance like both the other two parameters (Table 2).

It is apparent that a large number of subjects displayed positive response towards the therapy given (Figure 1). No less than 75% improved after the therapy in all three parameters from both groups (Figure 1).

## DISCUSSION

A previous study was carried out to assess the severity of periodontal disease in subjects with type 2 diabetes mellitus when compared to matched, healthy subjects using the information from the selected patients' case notes. Although no conclusive results were obtained from this retrospective study, there were clinical differences in the severity of the disease in both the groups which indicated that the periodontal status of non diabetic subjects was

### Response towards Respective Clinical Parameter



**Figure 1:** Response of test and control subjects towards non surgical periodontal therapy

marginally but not statistically better (unpublished work). This study, also using case notes, compared the tissue response of non surgical periodontal treatment in subjects with type 2 diabetes mellitus and healthy subjects. It has to be emphasized again that the results of these studies were not conclusive as the diabetic status of the subjects selected could not be determined as the fasting blood glucose levels and HbA1C levels before and/or after non-surgical periodontal therapy of the subjects in the test group were not obtained from the patients' case notes which is the limitation of this study.

Both groups showed similar response in short term periodontal healing after the therapy and the presence of diabetes does not appear to have a major affect on the success of periodontal therapy. However, the results of this retrospective study and as concluded from another study, indicated that there was no significant difference between response of diabetic and non diabetic subjects towards non surgical periodontal therapy (12).

It has been suggested that the diabetic status must not be a deterrent that restrict diabetic patients from certain procedures and research carried out so far were focused more on well-controlled diabetic patients. Thus the same cannot be said for uncontrolled diabetic patients. Joint effort between oral health and medical practitioners should be emphasized in treating diabetics, especially poorly controlled diabetics so as the patients may experience full

benefits of the therapy they received and respond well to it.

Oral health professionals should also be able to recognize the signs and symptoms of diabetes in their patients, especially for type 2 diabetes mellitus, as the disease can remain undiagnosed for years because hyperglycemia appears gradually and often without symptoms (13). Oral health professionals may be the first line of health care providers to alert the patients of their condition as the disease itself may have oral manifestations.

### CONCLUSION

Periodontal conditions improved clinically in both diabetic and non-diabetic subjects after non-surgical periodontal therapy. Therefore, both groups responded similarly towards the therapy and thus it can be postulated that well-controlled diabetic status does not have a significant effect on the outcome of periodontal therapy. However, limitation of this study was that, fasting blood glucose levels and HbA1C levels could not be determined before and/or after non-surgical periodontal therapy. Therefore, presently a clinical trial is being carried out to compare the response of diabetic subjects and healthy subjects to non surgical periodontal treatment. This clinical trial involves the participation of medical colleagues who are monitoring

the blood glucose levels (HbA1C) of the subjects before and after non surgical periodontal treatment and we hope to get more conclusive results of the periodontal tissue status and the status of glucose levels before and after non surgical periodontal treatment in the diabetic and non diabetic subjects.

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