ORIGINAL RESEARCH PAPER

Periodontics

KEY WORDS: Diabetes mellitus type II, fasting blood sugar, Non-surgical Periodontal treatment.

THE EFFECT OF NON-SURGICAL PHASE THERAPY ON FASTING SUGAR LEVEL IN TYPE II DIABETIC PATIENTS WITH GENERALIZED CHRONIC PERIODONTITIS

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ABSTRACT

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia.(Harrison's).Clinically and genetically heterogeneous group of metabolic disorders manifested by abnormally high levels of glucose in the blood. (Periodontology 2000 vol.44,2007). Acute complications of Diabetes Mellitus are Hypoglycemia, Diabetic ketoacidosis (DKA) and its Chronic Complications are Microvascular (Retinopathy, Neuropathy, Nephropathy), Macrovascular (Cardiovascular disease, Cerebrovascular disease) and Other (Impaired wound healing, Periodontal disease).Periodontitis, now recognized as the 6th complication of diabetes mellitus acts as a risk factor for diabetic decompensation (J Clin Periodontol 2007). The association between diabetes and periodontitis is widely accepted and is bi-directional in interaction, and the mechanism of this two way relationship is the large secretion of inflammatory mediators, among which cytokines play an important role in this shared susceptibility between the two diseases, which have shown to influence glucose and lipid metabolism and a positive relationship between poor glycaemic control in diabetics and increased periodontitis has been proven.

Treatment of periodontal disease takes on added importance in the setting of diabetes for its possible effect on improving glycaemic control. Clinical treatment outcomes for non-surgical periodontal management include reduction in probing depths, gain in clinical attachment and reduction in bleeding on probing. With this background this clinical study was sought to compare the changes in fasting blood sugar of a group of patients with type II diabetes mellitus having generalized chronic periodontitis following scaling and root planing to a control group with type II diabetes mellitus having generalized chronic periodontitis not receiving periodontal therapy..

INTRODUCTION

Diabetes mellitus is a complex disease of multiple conditions and syndromes which have glucose intolerance in common.[1] It is the most common non-communicable disease worldwide and the fourth to fifth leading cause of death in developed countries. [2] Diabetes mellitus is associated with a wide range of complications, such as retinopathy, nephropathy, micro- and macro-vascular disease, altered wound healing and periodontitis.[3] Periodontitis has been proposed as a sixth complication of diabetes mellitus.[4]In fact, there is a bi-directional relationship between diabetes mellitus and periodontitis[5] and the mechanism of this two way relationship is the large secretion of inflammatory mediators, among which cytokines play an important role in this shared susceptibility between the two diseases, which have shown to influence glucose and lipid metabolism[6] and a positive relationship between poor glycaemic control in diabetics and increased periodontitis has been proven.[7] Thus, on one hand, poorly controlled diabetes mellitus increases the risk of developing severe periodontitis and impairs treatment outcome and on the other, chronic inflammatory periodontal disease considerably complicates diabetic control.

Diabetes may also result in increased periodontal susceptibility via impaired polymorphonuclear neutrophil (PMN) apoptosis, where delayed apoptosis of these neutrophils could lead to increased tissue damage by the release of destructive matrix metalloproteinases (MMP) and reactive oxygen species (ROS) by the polymorphonuclear leukocytes.[8] It is proposed that chronic gram-negative infection of periodontal origin induce insulin resistance, hence contributing to hyperglycaemia and complicating the metabolic control of diabetes.[9]

AIMS & OBJECTIVES

- To assess the changes in Fasting blood glucose in the Control Group (Group A) and the Treatment Group (Group B)- having generalized moderate to severe chronic periodontitis.
- To compare the effect of non-surgical periodontal treatment (scaling, root planing and reinforced oral hygiene instructions) on periodontal parameters (Plaque, Bleeding on probing, Probing pocket depth and Relative attachment level) in the Control Group (Group A) and Treatment Group (Group B) with generalized moderate to severe chronic periodontitis.

MATERIALS & METHODS

40 Subjects with type II diabetes mellitus having generalized moderate to severe chronic periodontitis comprising of both the sexes, visiting outpatient Department of Periodontology, Govt. Dental College and Hospital Srinagar, were considered for the present clinical study after meeting inclusion and exclusion criteria. Subjects were randomly assigned into two groups:- 20 Subjects in Control Group(Group A) and 20 Subjects in Treatment Group(Group B).

Inclusion criteria

1. Subjects age between 40-70 years.
2. Subjects diagnosed with generalized moderate to severe chronic periodontitis (minimum of 30% teeth with pocket > 5mm).[10]
3. Subjects diagnosed with type II diabetes mellitus (HbA1c 6%-8%)(moderate control).[11]
4. Subjects who were willing to take part in the study and who could visit hospital at regular intervals.
5. Subjects not received periodontal treatment for the past 6 months.[12]
6. No history of systemic antibiotic administration within the last 3 months.[12]
7. No change in the medication or diet during the study period.
8. No major diabetic complications.
9. Duration of diabetes minimum 8-9 years.
10. Subjects were on sulphonylureas group of oral hypoglycaemic drugs only.

Exclusion criteria

1. Presence of any systemic disease that would influence the course of periodontal disease or HbA1c levels in blood.
2. Habit of smoking.
3. Pregnancy and lactation.
4. Subjects having peri-apical lesions/ gingival abscess/ periodontal abscess.

Only the subjects who gave written consent and fulfilled all the qualifying criteria were taken up for the study.

The Treatment group (Group B) received oral hygiene instructions and full mouth scaling using ultrasonics (magnetostrictive ultrasonic scaler) followed by root planing (using Gracey curettes) which was performed under local anaesthesia, if needed. The Control group (Group A) received only oral hygiene instructions and no periodontal treatment during the study period. After completion of the study, these subjects were given a non-surgical (scaling and root planing) periodontal treatment and supportive periodontal treatment was provided, if needed.

All the subjects were examined for clinical parameters and the collected data was tabulated which included the following recordings at baseline and 3rd month:-

- Plaque Index (PI) (Silness and Loe, 1964)
- Papillary Bleeding index (PBI) (Muhleman. H.R, and Son,1977)
- Probing Pocket Depth (PPD)
- Relative Attachment Level (RAL)

Following periodontal parameters were recorded in both groups (Group A and Group B) at 1 month:-

- Plaque index (Sillness and Loe).
- Papillary bleeding index (Muhlemann H.R and Son).

For **Glucose level assessment** at baseline and 3rd month, venous blood sample was taken from each subject (both groups) and analysed for fasting plasma glucose (FPG).

RESULTS AND DISCUSSION

The obtained results were subjected for statistical analysis and significance was evaluated.

From these results, the following conclusions were drawn:
Statistically highly significant reduction in plaque Index, papillary bleeding index, probing pocket depth and relative attachment level was found in Group A (diabetic subjects with chronic generalized moderate to severe periodontitis in whom scaling and root planing was performed) at 3rd month as compared to baseline. In case of Group B (diabetic subjects with chronic generalized moderate to severe periodontitis in whom no periodontal treatment was done), although there was some reduction in all these periodontal parameters(Plaque index, papillary bleeding index, probing pocket depth, relative attachment level) but that was not statistically significant.(Table 1,2 & 3)

There was significant decrease in levels of fasting blood sugar in subjects in Group A at 3rd month after scaling and root planing when compared to subjects in Group B, in whom statistically insignificant reduction was observed. (Table 4, 5 & 6)

The present study concludes that non-surgical periodontal therapy can effectively decrease fasting blood sugar and HbA1c levels in diabetic patients on medication. Preventive periodontal regimens for diabetic patients should be sufficiently intense and sustained so as to eliminate periodontal inflammation and should be closely coordinated with the patient's overall clinical diabetic management.

As periodontitis is a complex multifactorial disease and similarly diabetes mellitus is a complex metabolic syndrome, diabetes has long been identified as a complicating factor in the periodontal therapy. Results of this study showed that non-surgical periodontal treatment is associated with improved glycaemic control in type II diabetic patients. Considering the study population with moderate pocket depths, the effect on the metabolic control is a consequence of a decrease in gingivitis. This treatment could be undertaken along with the standard measures for the diabetic patient care. Prevention and control of periodontal disease must be considered an integral part of diabetes control.

The future scope of this study includes the following:

1. The sample size can be increased enough to analyse patients with moderate and severe periodontitis separately,
2. The plasma marker of systemic inflammation can be considered and correlated,
3. The long-term effect of periodontal therapy for at least 6 months can be evaluated, and also,
4. The dosage of the drug can be evaluated.

Table 1: Changes in clinical periodontal parameters from baseline to 3 months in Group A

Periodontal Parameter	Baseline		3rd Month		P-value@
	Mean	SD	Mean	SD	
PI	2.17	0.36	1.49	0.32	0.103#
PBI	2.83	0.42	2.66	0.45	0.376#
PPD	7.15	0.59	7.02	0.73	0.414#
RAL	10.34	0.66	10.07	0.72	0.283#

@: Comparison of baseline and 3rd month data; #statistically non-significant difference;
PI: plaque index; PBI: papillary bleeding index; PPD: probing pocket depth; RAL: relative attachment level

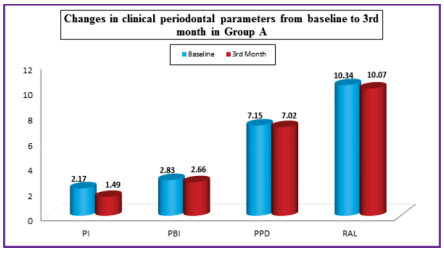


Table 2: Changes in clinical periodontal parameters from baseline to 3rd month in Group B

Periodontal Parameters	Baseline		3rd Month		P-value@
	Mean	SD	Mean	SD	
PI	2.11	0.42	0.57	0.39	<0.001*
PBI	2.91	0.42	1.62	0.41	<0.001*
PPD	7.12	0.95	4.81	1.1	<0.001*
RAL	10.56	1.76	8.56	1.73	<0.001*

@: Comparison of baseline and 3rd month data; *statistically significant difference
PI: plaque index; PBI: papillary bleeding index; PPD: probing pocket depth; RAL: relative attachment level

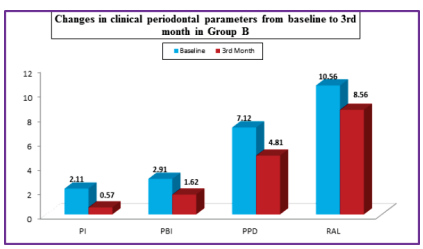


Table 3: Comparison of changes in clinical periodontal parameters between two groups from baseline to 3rd month

Periodontal Parameter	Group A			Group B			P-value$
	Baseline	3rd Month	Δ	Baseline	3rd Month	Δ	
PI	2.17±0.36	1.49±0.32	-0.68	2.11±0.42	0.57±0.39	-1.54	<0.001*
PBI	2.83±0.42	2.66±0.45	-0.17	2.91±0.42	1.62±0.41	-1.29	<0.001*
PPD	7.15±0.59	7.02±0.73	-0.13	7.12±0.95	4.81±1.10	-2.31	<0.001*
RAL	10.34±0.66	10.07±0.72	-0.27	10.56±1.76	8.56±1.73	-2.0	<0.001*

Δ: Changes in pre and post-treatment; *: Statistically significant difference
$: Comparison of changes in periodontal data between Group A and Group B

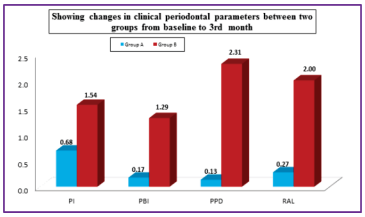


Table 4: Changes in metabolic parameters from baseline to 3rd month in Group A

Metabolic Parameter	Baseline		3rd Month		P-value@
	Mean	SD	Mean	SD	
FBS	119.05	13.94	118.25	13.15	0.166#
PPG	172.40	30.88	171.85	30.98	0.198#
HbA1c	7.47	0.44	7.43	0.38	0.201#

@: Comparison of baseline and 3rd month data; #statistically non-significant difference;
FBS: fasting blood sugar; PPG: post prandial glucose; HbA1c: glycosylated haemoglobin

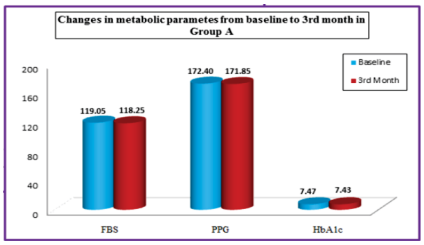


Table 5: Changes in metabolic parameters from baseline to 3rd month in Group B

Metabolic Parameters	Baseline		3rd Month		P-value@
	Mean	SD	Mean	SD	
FBS	121.40	16.31	114.95	14.94	<0.001*
PPG	173.30	30.81	151.45	20.00	<0.001*
HbA1c	7.54	0.38	6.61	0.46	<0.001*

@: Comparison of baseline and 3rd month data; *statistically significant difference;
FBS: fasting blood sugar; PPG: post prandial glucose; HbA1c: glycosylated haemoglobin

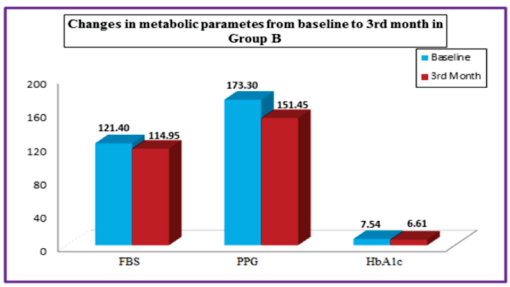
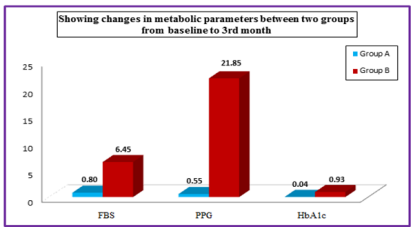


Table 6: Comparison of Changes in metabolic parameters between two groups from baseline to 3rd month

Metabolic Parameters	Group A			Group B			P-value$
	Baseline	3rd Month	Δ	Baseline	3rd Month	Δ	
FBS	119.05±13.94	118.25±13.15	-0.8	121.4±16.31	114.95±14.94	-6.45	<0.001*
PPG	172.4±30.88	171.85±30.98	-0.55	173.3±30.81	151.45±20.0	-21.85	<0.001*
HbA1c	7.47±0.44	7.43±0.39	-0.04	7.54±0.38	6.61±0.46	-0.93	<0.001*

Δ: Changes in pre and post-treatment; *: Statistically significant difference
$: Comparison of changes in periodontal data between Group A and Group B



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