

**Comparative Evaluation of HBA1C and Platelet Markers in Type II Diabetic and Non-Diabetic Patients with Chronic Periodontitis Following Non-Surgical Periodontal Therapy- An Interventional Study**

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**Conflicts Of Interest:** Nil

**Abstract**

**Background and Objectives:** It has been reported in the literature that scaling and root planning (SRP) may help to improve glycemic control in patients with chronic periodontitis and type 2 diabetes mellitus this in turn may have favorable outcome on various independent variables. **Materials and Methods:** This comparative, clinical study was performed between type II diabetics and non diabetics with chronic periodontitis. The study period was 6 months. Conventional periodontal scaling and root planing were performed, and the response to this treatment was compared

between the groups at 3 and 6 months measuring plaque index

**Results:** An improvement in all clinical variables was observed, with no statistically significant differences between the groups, with the exception of probing depth and clinical attachment level ( $P < 0.001^*$ ). **Conclusion:** Both groups of patients showed a clinical improvement after basic non-surgical periodontal treatment. In addition to that, diabetic and non diabetic patients showed improved glycemic control and a reduced mean platelet volume and platelet distribution width at 3 and 6 months after periodontal treatment, although the levels

in group B never reached the same levels as those of the subjects in group A.

**Keywords:** HbA1c, MPV, PDW, periodontal disease, SRP, periodontal pocket

### Introduction

Diabetes mellitus is one of the most frequent metabolic disorders with an estimated prevalence of 7 % in industrialized countries, of which nearly half the cases are undiagnosed.

**Type II DM** is a part of metabolic syndrome which comprises dyslipidemia, hypertension, impaired fibrinolysis, and increased procoagulation factors. It is reported that cardiovascular mortality risk is correlated with blood glucose concentration in cases with type II DM. Hyperglycemia is thought to have a harmful effect on the blood vessels.<sup>4</sup>

Periodontitis being one of the leading complications of type II DM, may be a risk factor for diabetic complications.<sup>9</sup> A common pathogenesis exist, where in patients with periodontitis have increased serum levels of inflammatory cytokines, while diabetic patients have hyper inflammatory immune cells that can aggravate the increased production of inflammatory cytokines. This exacerbation can increase insulin resistance and make it more difficult for patients to control their diabetes.<sup>10</sup> Intervention trials have suggested an improvement in glycemic levels in type II DM subjects following non-surgical periodontal therapy (NSPT).<sup>11, 12</sup> However no studies have compared the levels of HbA1c with platelet markers in type II DM & non DM subjects with chronic periodontitis following non surgical periodontal therapy.

### Materials And Methods

**Source of Data:** Patients reporting to the Department of Periodontics, Faculty of Dental Sciences M.S. Ramaiah University of Applied Sciences, and Bangalore with chronic periodontitis were recruited. Present study is an

interventional, comparative, clinical study performed on two populations of individuals with chronic generalized periodontitis. Ethical clearance was obtained for the study.

**Sample Size:** According to the study by Raman et al 2014 , A sample size of 15 achieves 91% power to detect a mean of paired differences of 0.9 with a known standard deviation of differences of 1.0 and with a significant level (alpha) of 0.05000 using a two-sided paired Z- test.

**Study Population:** A total of 40 subjects were included in the study based on the inclusion and exclusion criteria. Subjects who met the necessary criteria for inclusion in the study were asked to sign an informed consent form. **Study Design**

The study group underwent an initial examination consisting of detailed medical history, complete clinical periodontal examination and blood investigations to estimate levels of glycated hemoglobin and platelet indices such as mean platelet volume and platelet distribution width as necessary for the study. **Clinical Parameters for Comparison:** The following clinical parameters were recorded at baseline, 3 and 6 months intervals using UNC-15 probe and customized acrylic occlusal stents grooved to provide reproducible insertion axis. The parameters assessed were plaque index (Sillness and Loe, 1964), gingival index (Loe and Sillness, 1963) probing pocket depth (PPD) clinical attachment level (CAL).

### Analysis of the Blood Parameters

All the subjects were referred to M.S. Ramaiah Medical Teaching Hospital for blood parameter assessment at baseline after initial examination, at 3 and 6 months following intervention at baseline. 5 ml of venous blood sample was obtained collected in hologram tubes with dipotassium EDTA and biochemistry tubes, tested

within 1 hour of collection to minimize variations due to sample aging. Samples were maintained at room temperature. **Statistical Analysis**

The study data was analyzed using SPSS Software Version 22, IBM., Corp. □ The frequency distribution for gender was expressed in terms of number & percentage. Mean & SD were derived for all the continuous variables. Student Unpaired t test was used to compare the mean values of age & other study parameters at baseline, 3 & 6 months follow-up period.

### Results

There was no significant difference between the two group at baseline with respect to plaque index and gingival index (P value= 0.77, 0.79). Where as with respect to probing pocket depth and clinical attachment levels the values were superior for the test group (P <0.001\*). The blood parameters such as glycated hemoglobin, mean platelet value and platelet distribution width varied between the two groups. The values being superior for the test group compared to the control group and this difference was statistically significant (P value <0.001\*).

The reduction in platelet distribution width for non diabetic group was  $11.24 \pm 0.99$  at 3 months and this difference was statistically significant (P value <0.001\*).

The reduction in PDW levels at 6 months follow up was  $11.19 \pm 0.94$  which had statistical significance (P value <0.001\*) when compared to baseline however when 3 and 6 months follow up results compared, the results did not have statistical significance (P value 0.14).

Intergroup comparison between test and control group showed statistically significant difference with decrease in the measurement being superior for the diabetic group that had a P value of <0.001\*.

### Discussion

In the present study clinical and blood parameters were assessed at baseline, 3 and 6 months. No significant changes were observed with respect to age, gender and clinical parameters such as plaque index and gingival index however clinical parameters such as periodontal pocket and clinical attachment loss was higher for subjects with diabetes and also blood parameters such as HbA1c, mean platelet volume and platelet distribution width demonstrated to have elevated in periodontitis subjects with diabetes mellitus.

The reduction in glycated hemoglobin in diabetic group was followed by an improvement in the MPV the value reduced to  $10.48 \pm 0.26$  fl at 6 months from  $11.03 \pm 0.28$  fl at baseline (P value <0.001) thereby reducing the risk of cardiovascular events in diabetic subjects with chronic periodontitis. This is in accordance with a study by Sarikaya et al.<sup>18</sup> which suggested higher MPV in diabetic patients was independently related to myocardial perfusion defects and may be an indicator of myocardial ischaemia.

In the present study, results showed a positive metabolic response to periodontal treatment, with lowering of HbA1c values at every visit in diabetic subjects. The values decreased from  $7.69\% \pm 0.37\%$  at baseline to  $7.13\% \pm 0.40\%$  at 6 months and this difference was statistically significant (P value <0.001). The change in HbA1c level being 0.5%. This finding is in accordance with various studies.

A systematic review by Fabrizio et al.<sup>19</sup> after the study selection process, five randomized clinical trials were included. Results of the meta-analysis indicated that SRP was effective in the reduction of HbA1c (MD = 0.65; 95% CI 0.43 to 0.88; P <0.05).

The present study also revealed elevated levels of glycated hemoglobin in non diabetic subjects with

periodontitis. The mean HbA1c level of group A at baseline was  $6.02 \pm 0.18$  which was in the prediabetes range according to American Diabetes Association. Six months after SRP, the mean HbA1c level of group A was  $5.68\% \pm 0.16\%$  indicated, that periodontal therapy improved their glycemic status. This is in agreement with studies by Zhang et al.<sup>20</sup> reported that for HbA1c values of 5.5% to <6.0% and 6.0% to <6.5%, the risks for developing DM were 21% and 44%, respectively. Jayachandran et al.<sup>21</sup> who demonstrated the HbA1c levels of individuals without diabetes and with periodontitis were significantly reduced 3 months after non-surgical periodontal therapy, although they never **reached the** same levels as those of the individuals without diabetes or periodontitis.

Larger, multi-centred studies are needed to substantiate our findings and confirm that they are generalizable to other populations of Patients With Type 2 Diabetes.

### Conclusion

Non-Surgical periodontal therapy leads to a reduction in HbA1c and platelet markers such as mean platelet volume and platelet distribution width especially in patients with an elevated degree of DM severity and periodontal disease. However it is not yet possible to precisely establish the clinical relevance of these variations.

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