

## EFFECT OF DIABETES MELLITUS ON PERIODONTAL DISEASE IN THE ADULT POPULATION OF MORADABAD

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### Abstract

**Aims & objective:** Periodontal diseases and diabetes are two common diseases with high prevalence. Many clinicians have accepted the relationship between these two diseases. Some investigators have reported that periodontal treatment may enhance the metabolic control of diabetes. The effects of non-surgical periodontal treatment on metabolic control in people with type 2 diabetes mellitus (DM2) were examined. The aim of this study is to determine the association between glycemic control and periodontitis among 30-45 year aged patients with DM type 2.

**Methods:** 40 subjects aged 30-45 years with type 2 diabetes mellitus (DM2), only on oral medication were recruited for the study. Fasting blood sugar level (FBS), probing pocket depth, gingival index, plaque index and the relevant drug history was recorded. The data was analysed to compare the means of PPD, GI, PI between different FBS levels, Gender and Duration of Drug.

**Result:** 5.07 mm was the mean probing pocket depth of patients, recruited in the study. With the increase in FBS values there was a significant rise in PPD, PI scores and GI scores ( $p < 0.001$ ). Diabetic males had a higher PPD, PI and GI score as compared to females. With the increase in duration of drug, there was an increase in PPD which was found to be statistically non-significant.

**Conclusion:** Patients having poor glycemic level had more severe periodontitis as compared to patients having fair glycemic level.

**Keywords:** Diabetes Mellitus Type 2 (DM2), Periodontitis, HbA1c,

### Introduction

Type 2 diabetes mellitus (DM2), the most common type of diabetes, is characterized by hyperglycaemia, hyperlipidaemia and associated complications.<sup>1</sup> 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  $\beta$  cells, a decrease in insulin sensitivity, or a combination of both. DM currently is the twelfth leading cause of death in the world. One of the leading complications of diabetes, periodontitis, is an infection of the periodontal support tissues.<sup>2</sup> There is an interacting, complex relationship between diabetes and periodontitis. Many studies have shown a greater incidence and a greater severity of periodontitis in diabetic patients.<sup>3-6</sup> Meanwhile, a number of studies have suggested that periodontitis may actually be a risk factor for diabetic complications as well.<sup>7-12</sup> The prevalence of DM has risen dramatically in recent years, resulting in a rapid increase of diabetic patients. 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.<sup>13</sup>

Periodontal disease is chronic inflammatory disease of the tissues that support and attach the teeth to the jaws.<sup>14</sup> They are caused by gram-negative bacterial infections and are,

for the most part, asymptomatic, although much of the actual destructive tissue changes observed clinically are result of the inflammatory host response. Periodontal disease (PD) is the second main cause of oral cavity disorders affecting the population due to its high prevalence.<sup>15</sup> It is more frequent in adults in contrast to cavities which are more common and much more frequent in children.

The risk of developing periodontitis may be greater in patients with diabetes who have poor glycemic control than that in patients with well-controlled diabetes.

In a review article by Measley,<sup>16</sup> he cited a number of established mechanisms by which diabetes can influence the periodontium which include the following: alteration in the host immune-inflammatory response, altered wound healing, accumulation of advanced glycation end products (AGE's), and elevated pro-inflammatory cytokines. Without mechanical debridement, the plaque biofilm matures and causes gingivitis in a few days. Gingivitis represents chronic but reversible inflammation and can be usually treated by proper plaque control and accumulation of plaque acts as a local irritant in the oral cavity.

The objective of the present study is to determine the association between glycemic control and periodontitis among 30-45 year aged patients with DM type 2.

### Methods

Convenient sample of 40 patients aged 30-45 years were selected from a Diabetic Centre in Moradabad. Patient who came to Diabetic Centre for their routine check-up and

investigation were screened for type II Diabetes Mellitus and Periodontitis.

A total of 40 patients who fulfilled the eligibility criteria and signed the informed consent were taken in the study. This study was reviewed and approved by the Institutional Ethical Review Committee, Moradabad.

The inclusion criteria include; Blood sugar controlled only with oral hypoglycaemic agents and no systemic antibiotic administration or periodontal treatment within the last six months. The exclusion criteria includes; Patients with systemic diseases other than Diabetes Mellitus type II, tobacco and alcohol users and patients who were suffering from oral disease that need emergency treatment like endo-perio lesion, periodontal abscess.

The oral examination was conducted in dental clinical wing of the diabetic centre. Oral examination included assessing periodontal Pocket Depth, Gingival status and Plaque deposition of each individual patient. Periodontal pocket depth was assessed by measuring Probing pocket depth (PPD) with CPI probe at six points for each tooth and the arithmetic mean value of all the teeth was considered. Gingival status was assessed by Gingival Index, Loe & Silness (1963). Dental plaque was assessed by Plaque Index, Silness & Loe (1967).

Glycemic status was assessed by the fasting blood sugar level. Participating subjects were interviewed for the demographic data, duration and the frequency of a drug and were cross verified with the hospital records.

Statistical analysis was carried out using SPSS ver. 16.0 (SPSS, Inc., Chicago, IL, USA) to find the association between PPD, GI and PI with FBS, Gender and Duration of Drug. Pearson correlation between PPD, GI, PI and Duration of Drug with FBS which was found to be statistically significant at  $p \leq 0.05$  (95% confidence interval).

## Results

The present study was carried out with an objective to find the association between the FBS and periodontitis. 40 patients (20 males and 20 female) with mean age of 37.6 years formed the study sample. The Probing Pocket Depth ranged from 3.6 mm to 7.08 mm with a mean of 5.23 mm while Gingival Index score ranged from 1.64 to 2.84 with the mean of 2.28 and Plaque Index score ranged from 0.88 to 2.80 with the mean of 1.64.

Table 1 shows that patient with more FBS value ( $\geq 200$ ) had greater mean Probing Pocket Depth, Gingival Index Score, Plaque Index Score as compared to the patients having FBS value ( $< 200$ ) and this was found to be statistically significant ( $p=0.0001$ ). When males and females are compared for PPD, GI and PI, males were found to have higher PPD as compared to females, while there was a slight rise in GI scores and PI scores in males as compared to female patients. Though there was rise in PPD, GI and PI in males as compared to female this rise was statistically non-significant ( $p=0.4771, 0.6704, 0.8165$

respectively). Out of 40 subject, 15 patients those who were on medication for more than 5 year showed higher mean PPD, GI and PI and this rise was found to be statistically significant ( $p=0.0242, 0.0542, 0.0724$  respectively).

	Probing Pocket Depth	Gingival Index Score	Plaque Index Score
<b>GLYCEMIC LEVEL</b>			
FBS $\geq 200$ mg/dl	5.23	2.77	2.37
FBS $< 200$ mg/dl	4.09	1.98	1.06
p Value	0.0001*	0.0001*	0.0001*
<b>GENDER</b>			
Male	5.47	2.34	1.62
Female	5.19	2.22	1.54
p Value	0.4771	0.6704	0.8165
<b>DURATION</b>			
$\geq 5$ Years	5.72	2.41	2.41
$< 5$ Years	4.96	2.19	2.16
p Value	0.0242	0.0542	0.0724

Table 1: Association between different selected potential factors and periodontitis

## Discussion

Very often, course of periodontal disease is modified by the systemic disorders of patients. These systemic disorders exert the effect in a generalized manner and therefore also affect the occurrence and management of the periodontal conditions. One of such systemic conditions playing an important role in the etiology of periodontal disease is diabetes mellitus.

The finding that Diabetes Mellitus type II subjects have an increased prevalence and severity of periodontitis in our study is in accordance with other studies.<sup>17</sup>

An abundance of recent evidence has consolidated a bidirectional correlation between diabetes and periodontitis. While diabetes is an independent risk factor for periodontitis,<sup>18</sup> periodontitis as a chronic inflammation has a negative impact on the metabolic control of diabetes.<sup>19</sup> Diabetes Mellitus and periodontitis are common multigenetic and multifactorial chronic diseases with a higher incidence at increased age. Both of the morbidities negatively affect periodontal health and systemic health, thus affecting the quality of life.<sup>20</sup>

As the value of FBS increases there is increase in the mean PPD value. This is because hyperglycemia impairs overall cell function, as insulin is required for glucose to enter cells to provide a source of energy. The plaque index values were less in patients having healthy periodontium, but increased gradually with the progress of the periodontal disease except for localized periodontitis. Plaque acts as a local irritant in oral cavity. Regarding the influence of diabetes on periodontium, there are two schools of thought.

One school of thought has reported increased severity of periodontal disease in diabetics not related to increased local irritants. According to them angiopathy, abnormal collagen metabolism, abnormal polymorphonuclear cell (PMN) function, and altered sulcular microbial flora are found in close association with the severity of periodontitis

in diabetic patients. These factors reduce the defensive capacity of tissues and may disturb the tissue response to local irritants.<sup>21</sup> Another school of thought recognizes no relationship between diabetes and periodontal disease and maintains that, when two conditions exist together, it is a coincidence rather than a specific cause and effect relationship. According to them, the distribution and severity of local irritants affect the severity of periodontal disease in diabetics. In the present study effect of blood glucose level is directly related to the plaque which is similar to the results shown by Janet H *et al.*<sup>22</sup> Previous pathological study showed diabetic patients had a larger content of lipid-rich plaque compared with nondiabetic patients.<sup>23</sup> The result of the study (Ricardo Faria-Almeida, Ana Navarro, and Antonio Bascones ,2006) showed a statistically significant relationship between plaque index and HbA1C (p=0.0001) which was similar to our study.

Although the sex interaction in the present study did not reach statistical significance, the observation that periodontal disease was apparently more strongly associated with incident type 2 diabetes among women may be worthy of note, given recent findings that inflammation was a stronger predictor of type 2 diabetes in women than in men.<sup>24</sup> Lowe GD<sup>25</sup> found that periodontal disease increases in prevalence and severity with age of the patient which was similar to the result of our study.

Kiran *et al.*<sup>26</sup> had concluded that the duration of diabetes was a significant factor for the severity of periodontal disease. Alpagot T *et al.* stated that the diabetic status was significantly and strongly related to both prevalence and severity of periodontal disease.<sup>27</sup> The severity of periodontal disease was more prevalent in diabetics who had the disease for > 5 years.

## Conclusion

Diabetic patients are commonly encountered in the dental office. Proper patient management requires close interaction between the dentist and physician. Dentists and other oral health care providers should understand the diagnostic and therapeutic methodologies used in diabetes care. They must be comfortable with the parameters of glycemia that are used to establish a diagnosis and an assessment of patients' ongoing glycemic control. Dentists must educate patients and their physicians about the interrelationships between periodontal health and glycemic control, with an emphasis on the inflammatory nature of periodontal diseases and the potential systemic effects of periodontal infection. Working with diabetic patients can be challenging and rewarding when open lines of communication are established and thorough patient education is attained.

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