

# Prevalence of Periodontitis among the People with Diabetes Mellitus

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## ABSTRACT

**Introduction:** Diabetes mellitus is a metabolic disorder characterized by a chronic high level of blood sugar with disturbances in carbohydrate, fat, and protein metabolism resulting from defects in insulin secretion, action or both. Periodontitis is a chronic infectious disease which leads to the destruction of the periodontal ligament fibers and alveolar bone until tooth loss. Among the several factors that may manifest periodontitis like aging, genetic factors, poor oral hygiene, obesity and virulence of the attacking micro-organisms, type 2 diabetes mellitus has received the greatest attention. **Aims:** The aim of the study was to determine the association type 2 diabetes mellitus with periodontal condition among population in mid-western region of Nepal. **Methods:** We screened 200 subjects of age group from 30 to 50 years and divided into two groups: Group I – diabetic person and Group II were non diabetic. Oral examination was done to get the Community Periodontal Index of Treatment Need score and correlation between Diabetes mellitus and periodontal disease was determined. **Results:** Our result showed strong correlation between diabetes mellitus and periodontitis. When the evaluation was done for prevalence of periodontal disease according to diabetes mellitus, the prevalence of periodontal disease was significantly higher in diabetic person compared to non-diabetic individuals (88% vs 74.4%,  $P=0.03$ ). [Odds Ratio = 11.826 and 95% confidence interval: 5.415-21.828] **Conclusion:** Provided Diabetes mellitus related morbidity and mortality is burgeoning in our society and it is imperative to identify right indicators of periodontal disease for specific population.

**Keywords:** Diabetes mellitus, Gingivitis, Periodontitis

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## INTRODUCTION

Diabetes is one of the most common non-communicable diseases globally. Based on the current trends, >360 million individuals it has been estimated that will have diabetes by the year 2030.<sup>1</sup> Besides being a risk factor for cardiovascular disease, certain cancers, type 2 diabetes mellitus has also been associated with oral diseases, including periodontitis.<sup>2</sup> Periodontal disease has been reported as the sixth complication of diabetes, along with neuropathy, nephropathy, retinopathy, and micro- and macrovascular diseases.<sup>3</sup> Destruction of the peri- tooth structure that supports the teeth is referred as periodontal disease. The chronic destruction of these structures such as the gingiva, the periodontal ligament, the cementum, and the alveolar bone can lead to the partial or complete loss of teeth.<sup>4</sup> According to the WHO Global Oral Data

Bank more than two-thirds of the world's population suffers from one of the chronic forms of periodontal disease.<sup>5</sup> Among many predisposing factor of periodontitis such as age, hygiene, gender, obesity, genetics, smoking, socio-economic status diabetes has also significant impact.<sup>6</sup> In fact the burgeoning prevalence of periodontitis despite improvement in public awareness about oral hygiene and accessibility to dental care providers also indicates that the changing lifestyle and obesity is significantly associated with periodontitis. Age is one important factor for the periodontal disease and its severity increases with age.<sup>7,8</sup> Diabetes contributes to an overall systemic inflammatory state through its effect on metabolic and immune parameters, thereby increasing susceptibility to periodontal disease.<sup>9</sup> Recent studies show that incidence of diabetes is increasing even in the developing countries like Nepal.<sup>10</sup>

## METHODS

This study was conducted in patients attending Dental OPD at Nepalgunj Medical College, from December 2018 to July 2019. The study aimed to determine the correlation between diabetes mellitus and periodontitis measured by the Community Periodontal Index of Treatment Need CPITN index score 3 and 4. It was planned to establish if chronic periodontitis is associated with DM individuals attending dental outpatient department (OPD) of Nepalgunj Medical College, Nepalgunj Total 200 subjects of age group between 30 – 50 years of either sex were taken and divided into 2 groups.

- Group I – Diabetic – 100 subjects – study group
- Group II – Non- diabetic – 100 subjects – control group

### Inclusion Criteria

Subjects who gave the consent to participate in this study, patients diagnosed with type 2 diabetes (only for study group) were included for the study,

### Exclusion Criteria

Subjects who were not in the age group 30–50 years and those individuals who were under medication of any kind of severe illness which might modify the state of periodontitis, smokers, tobacco chewers, pregnancy were excluded from the study. Subjects were asked to test fasting blood sugar level.

Oral examination was done with a sterile periodontal probe and dental mirrors. The mouth was divided into six parts (sextants). The score was identified by examination of specified index teeth: upper right first molar, upper right central incisor, upper left first molar, lower right first molar, lower left central incisor, lower left first molar and the highest score was recorded for each sextant. Community Periodontal Index of Treatment Needs (CPITN) (WHO / FDI in 1982) & scored as: 0= No disease; 1= Bleeding on probing; 2= Calculus with plaque seen or felt by probing; 3= Pathological pocket 4 – 5 mm; 4 =Pathological pocket 6 mm or more; x = When only 1 tooth or no tooth are present. In our study, subjects with CPITN 1 and 2 scores were identified as having gingivitis and the subjects with CPITN 3 and 4 scores were identified as having periodontitis. Data were analyzed with statistical software IBM SPSS Statistics 16.

## RESULTS

| Distribution of subject according to gender | Male                 | Female              |
|---|----------------------|---------------------|
| Case (Group I)                              | 72<br>(72 %)         | 28<br>(28 %)        |
| Control (Group II)                          | 70<br>(70%)          | 30<br>(30%)         |
| <b>Total (out of 200)</b>                   | <b>142<br/>(71%)</b> | <b>58<br/>(29%)</b> |

*Table I: Distribution of subject according to gender.*

The age range of population studied was 30 to 55 years with mean age  $38.63 \pm 4.58$  years. Among the 200 people examined, in Group I there were 72 males and 28 females and in Group II 70 males and 30 females. The overall male to female ratio was 2.44:1.

| CPITN        | GROUP I      | GROUP II    |
|--------------|--------------|-------------|
| 1            | 0%           | 8%          |
| 2            | 8%           | 78%         |
| 3            | 66%          | 12 %        |
| 4            | 26%          | 2%          |
| <b>TOTAL</b> | <b>100 %</b> | <b>100%</b> |

*Table II: Prevalence of CPITN.*

The prevalence of CPITN 4 was found to be 26% in Group I & 2% in Group II [Table II]. This prevalence rates were found to be significantly different between case and control group ( $X^2 = 23.92$ ,  $p < 0.01$ ). odds ratio 17.21(CI: 3.96-74.84) [Table II] The prevalence of CPITN 3 was found to be 66% in Group I and 12% in Group II [Table II] and was significantly different between case and control group ( $X^2 = 61.28$ ,  $p < 0.01$ ). odds ratio 14.23 (CI: 6.85-29.58) The prevalence of CPITN 2 was found to be 8% in Group I and 78% in Group II [Table II] and was significantly different between case and control group ( $X^2 = 99.59$ ,  $p < 0.01$ ). odds ratio was found to be  $< 1$  implying that the odds of gingival bleeding in Group II was actually higher as compared to Group I {0.025 (CI: 0.01-0.05)}.

## DISCUSSION

The relationship between diabetes mellitus and periodontal disease appears to be strong.<sup>11</sup> Diabetic person with poor metabolic control have a higher prevalence of periodontal destruction in severe form.<sup>12</sup> The main aim of this study was to describe the periodontal health status determined by CPI score and relate this to the glycemic profile among type 2 diabetics.<sup>13</sup> The present study was done in group of patient in age group, 30- 55 years as shown in table I. This age group was considered because other systemic diseases are much more common with the older age group and the dental indices would be affected by aging in older individuals. A positive association between type 2 diabetes and chronic periodontitis has been found previously, with diabetes mellitus associated with severe forms of the disease.<sup>14</sup> In the present study the frequency and percentage for the severe gingivitis (CPITN score 2) was highest in Group II (78%) whereas in the Group I CPITN score 3 was highest (66%) as shown in the table II. A study in Pakistan (2015) among those aged 20–60 years found a similar prevalence of periodontitis of 34.5%, another in Bangladesh (1990) found a prevalence of 42%, while a study among urban residents of Brazil (2004) showed a prevalence of 79% of clinical attachment loss.<sup>15,16,17</sup> Studies done in developed countries such as the United States and Canada showed a prevalence of 47% and 67.8%, while a study in France among those aged

35–64 years showed a higher prevalence of 82.23%.<sup>18,19,20</sup> The prevalence of CPITN 4 was found to be highest (26%) in Group I & only 2% in Group II. This prevalence rates were found to be significantly different between case and control group ( $X^2 = 23.92$ ,  $p < 0.01$ ) with the odds ratio 17.21(CI: 3.96-74.84) as shown in table II.

The main mechanisms by which diabetes and periodontitis are related are via alterations in host responses and collagen metabolism. Due to prolonged exposure of tissue to hyperglycemia which may result in production of advanced glycation end products (AGEs). This leads to an increase in collagen cross-linking and the generation of free radicals.<sup>4</sup> The modified collagen fibers accumulate in the tissues, resulting in thickening of the basement membrane. This impairs oxygen diffusion, waste elimination, leukocyte migration and the diffusion of immune factors and may thereby contribute to the pathogenesis of periodontitis.<sup>5</sup> Significantly higher cytokine levels have been found in the gingival crevicular fluid of diabetics when compared with non-diabetics, with both groups demonstrating periodontitis.<sup>4,5,6</sup> Hyperglycemic conditions result in decreased cellular proliferation and growth of periodontal ligament (PDL) fibroblasts and collagen synthesis. Patients with diabetes have an increase in gingival crevicular fluid collagenase activity when compared with non-diabetics.<sup>8</sup> This greater collagenase activity would suggest an increased degree of collagen breakdown in the tissues of diabetics.

## CONCLUSION

Thus, our study shows that persons with Diabetes Mellitus has higher percentage of CPITN score 3 and 4 and so are at high risk for periodontal diseases compared to persons with normal. Relevant blood sugar level can serve as excellent indicators of periodontitis if used based on scientific validation.

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