

## DIABETIC PATIENTS AND PERIODONTITIS: A STUDY

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### ABSTRACT

*Due to a disturbed metabolism a patient suffering from diabetes mellitus is particularly prone to periodontal disease, stomatitis, and caries. The aim of this study was to assess the effects of un-controlled diabetes on the health of periodontal tissues.*

*In this cross sectional study 100 patients were selected by convenient purposive sampling. Variables like age, gender, and occupation were recorded along with presence and absence of diabetes mellitus. Oral examination was done by a qualified dentist. Grades of Plaque, gum recession and Mobility index were recorded. Descriptive statistics, deposition of plaque, gum recession and mobility index were compared in diabetics and non-diabetics. It was found that all diabetics and majority of non-diabetics (87%) had plaque whereas 13% of the non-diabetics did not show plaque. Majority of non-diabetics (65.8) did not show mobility index whereas majority of diabetics (85.5) had mobility index. Gum recession was seen to be almost equal in diabetics and non-diabetics.*

*It was concluded from this study that a relationship does exist between un-controlled diabetes and periodontal tissues.*

**Key Words:** *Un-controlled diabetes, periodontal health, dental treatment for diabetic patients.*

### INTRODUCTION

Diabetes mellitus (DM) is an endocrine disorder with metabolic implications related to carbohydrate, protein, and lipids. Hyperglycemia is the main feature of this disease which is the result of decreased secretion of insulin or defect in utilization of insulin in the body.<sup>1</sup>

Diseases of tissues surrounding and supporting the teeth are known as periodontal diseases. Commonly occurring inflammation of the gingiva is quite reversible but in some instances may provoke chronic inflammation which may have far reaching oral health and general health implications. Periodontium may become severely inflamed resulting in damage to the connective tissue as well as alveolar bone which is known as periodontitis. In extreme cases severe periodontitis may cause painful mastication, extreme discomfort,

loosening of teeth which may end up in tooth loss.<sup>2</sup>

Gingival infection and inflammation caused by microbes residing in the subgingival biofilm which incite immune responses which tend to trigger innate inflammation. Gingival epithelium produces chemokines and cytokines as a result of the bacterial assault which chemotactically attracts neutrophils. If the pathologic processes goes unabated inflammation may extend into deeper tissues and may start destruction of the connective tissues supporting the teeth and alveolar bone.<sup>3</sup>

Type 2 diabetes and periodontitis are highly common conditions and dental professional are aware about the association between these two conditions for many years. Type 2 Diabetes have been recognized to be an independent risk factor for chronic periodontitis, the risk increased to 3 folds in diabetics as compared to non-diabetics.<sup>4</sup> It is said that cytokines which are secreted as a result of bacterial gingivitis may enhance insulin resistance which may cause or exacerbate diabetes. Both periodontitis and diabetes when concurrently present may reciprocate the ill effects of each other.<sup>5</sup>

A plethora of evidence is available in the current literature which supports the notion that uncontrolled diabetes exacerbates periodontitis and vice versa. It has been shown that a better glycemic control improves periodontitis and vice versa. There is a higher risk of diabetes related complications in severer periodontitis.<sup>6</sup>

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Periodontal manifestation of diabetes mellitus may start with gingivitis and may end up in full blown periodontitis.<sup>7,8</sup> Heightened Diabetes can lead to severe periodontitis and severe periodontitis may exacerbate coexisting diabetes or may make diabetic control difficult.<sup>9</sup> Diabetics tend to have higher incidence of periodontitis in comparison with non-diabetics. Recent research have shown that glycated hemoglobin levels may be ameliorated if diabetics undergo regular periodontal treatment which may also delay the systemic complications of diabetes.<sup>10</sup>

The latest research suggests better glycemic control may be achieved through periodontal (non-surgical) treatment.<sup>11,12</sup> Requirements of insulin are decreased and metabolic balance is improved through management of periodontal disease.<sup>13,14</sup> Nonsurgical periodontal treatment reduced systemic inflammatory markers and improved glycemic control and lowered blood sugar.<sup>14</sup> Diabetics should be made aware of importance of visit to dentist and a regular periodontal checkup and maintenance of good oral hygiene.<sup>15</sup> It is imperative that patients of diabetes mellitus should know about their disease and its complications that might occur if their diabetes is not controlled. They are to be convinced to visit dentists for periodic dental checkups. Regular estimation of blood glucose level is also mandatory because it helps to keep a balance between proper diet, regular exercise and emotional wellbeing. Blood glucose level is to be checked at regular intervals and dose of hypoglycemic agents is to be titrated with the help of a physician. Therefore regular visits to the treating physician are also essential.<sup>16</sup>

Tooth loss may occur when bone surrounding teeth is destroyed due to an enhanced and deranged inflammatory immune response which usually follows formation of microbial biofilm which is the result of periodontitis.<sup>17</sup>

Many epidemiological studies demonstrated high degree of association between type 2 diabetes and periodontitis which later appeared to be a bidirectional relationship. Further research proved that if periodontitis is treated blood glucose levels may become better and untreated periodontitis may worsen glycemic control.<sup>18</sup>

There is need for further research to elucidate the chemical basis of the relationship between type 2 diabetes and periodontitis.<sup>13</sup> The aim of this study was to assess the effects of un-controlled diabetes on the health of periodontal tissues.

## METHODOLOGY

One hundred patients were selected through non probability, convenient and purposive sampling from the patients visiting a dental clinic in a public hospital. A semi-structured questionnaire was used to collect data. Oral examination was done by a qualified dentist.

Demographic variables like age, gender, and occupation were recorded along with presence and absence of diabetes mellitus which was confirmed by estimating Hb 1 Ac. Clinical variables like Grades of Plaque and gum recession were observed along with Mobility index. Data were entered and analyzed in Epi info 3.1. Descriptive statistics like frequency and percentage were calculated for demographic and clinical variables. Mobility of the teeth was compared in diabetics and non-diabetics. Deposition of plaque, gum recession and mobility index were compared in diabetics and non-diabetics.

## RESULTS

One hundred patients formed the study groups. Details of the results can be seen in Table 1 and Fig 1.

TABLE 1: CATEGORIES OF AGE, GENDER AND OCCUPATION

Variable	Categories	Percentage
Age in years	24-50	34% n=100
	51-75	66% n=100
Gender	Male	55% n=100
	Female	45% n=100
Occupation	Employed	54% n=100
	Housewives	22% n=100
	Businessmen	24% n=100

TABLE 2: GRADES OF PLAQUE

Grades of Plaque	Number	Percentage
Grade 0	5 n=100	5%
Grade 1	4 n=100	4%
Grade 2	11 n=100	11%
Grade 3	80 n=100	80%

TABLE 3: MOBILITY INDEX

Mobility index	Number	Percentage
0 (No mobility)	34 n=100	34%
1 (Slight)	36 n=100	36%
2 (Moderate)	27 n=100	27%
3 (Severe)	35 n=100	3%

TABLE 4: GUM RECESSION

Grade	Gum recession	Gum recession %
Grade 0	4 n=100	4%
Grade 1	74 n=100	74%
Grade 2	22 n=100	22%
3 (Severe)	35 n=100	3%

TABLE 5: DENTAL PLAQUE AND DIABETES

Diabetes	Plaque absent	Plaque present	Total
Present	0 (0%)	62 (100%)	62 (100 %)
Absent	5 (13 %)	33 (87 %)	38 (100 %)

TABLE 6: GUM RECESSION AND DIABETES

Diabetes	Gum recession 1	Gum recession 2	Gum recession 3	Total
Present	1(1.6%)	55(88.7%)	6(9.7%)	62(100%)
Absent	2(5.3%)	19(50.0%)	17(44.7%)	38(100%)

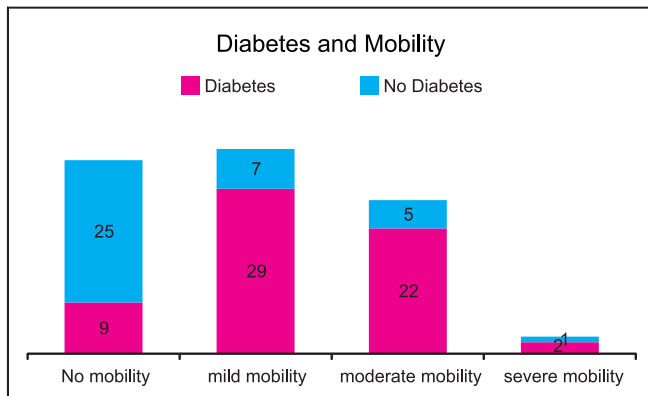


Fig 1: Diabetese and mobility

DISCUSSION

Diabetes mellitus has been regarded as a scourge to the mankind and International diabetes federation has shown that the projected number of people affected by this systemic metabolic disease will reach to the proportion of 552 million by year 2030.<sup>19</sup> In a study done in Pakistani Punjab prevalence of diabetes was found to be high i.e. 12.14% (males) and 9.83% (females) and was comparable to prevalence of diabetes in other 3 provinces of Pakistan.<sup>20</sup> Diabetes has been incriminated to be risk factor for gingivitis and periodontal inflammation.<sup>5</sup> Concurrence of Diabetes mellitus and periodontal disease has been found to be quite common.<sup>18</sup> Glycemic control may be one of the most important factors in the two way relationship between periodontitis and type 2 diabetes. Poor glycemic control in diabetics have been proved to be a reason of increased inflammation and rapid destruction of gingival tissue.<sup>10</sup> Alveolar bone and attachment loss has also been shown to be increased many folds in periodontal disease associated with type 2 diabetes with uncontrolled hyperglycemia.<sup>21</sup> The insidious process of structural destruction provoked by uncontrolled hyperglycemia leads to tissue damage that is visible in periodontitis associated with type 2 diabetes.<sup>22</sup> Uncontrolled type 2 diabetes causes altered immune and inflammatory response in the host which may lead to decreased neutrophil adherence and phagocytic activity along with increased formation of chemical mediators and cytokines.<sup>1</sup> In an interesting case control study done by Loe in Arizona on Pima Indians of Gila

River Indian community periodontal disease was three times in diabetics in comparison with non-diabetics. Type 2 diabetics were 15 times more totally toothless in comparison with non-diabetics.<sup>23,24</sup>

Rajhans et al carried out a clinical study with the objective to find out the relationship between diabetes mellitus and periodontal disease. The study showed that 86.8% of diabetics had periodontal disease. Up to 34 years of age no mobility was seen among diabetics and 43.7% of the total patients showed mobility. Glycemic status of diabetes was significantly correlated with tooth mobility and plaque index (P value <0.01). The mean plaque index scores was 1.22±0.55. In this study adult tooth loss was found in 58.4% of the diabetics of which in 10.7% tooth loss was complete. A statistically significant correlation was seen between duration of diabetes mellitus and the number of the number of missing teeth (P value <0.01).<sup>25</sup>

Mohamed et al did a study on Sudanese adult T2DM patients to look for association between type 2 diabetes and periodontal health. It was seen that diabetics were found to have chronic periodontal disease along with higher tooth loss as well as more evident dental plaque.<sup>26</sup> The relationship between periodontitis and diabetes is complex and bidirectional. It can be explained in terms of glycemic control and severity of Periodontitis.<sup>27</sup> Poorly controlled diabetes leads to severe forms of periodontitis and severe periodontitis causes poorly controlled diabetes.<sup>28,29</sup> Conventional periodontal therapy (non-surgical) may help in a better glycemic control and subsequent reduction in HbA1C. And similarly an improved glycemic control may help improving severe Periodontitis.<sup>30,31</sup>

Therefore diabetics need to visit diabetic physicians and dentists and dental hygienists regularly.<sup>32-34</sup> Decreased levels of C-reactive protein (CRP), tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and interleukin-6 (IL-6) have been achieved by periodontal treatment which show periodontal diseases may have systemic effects beyond the oral cavity.<sup>35</sup> Dentists are considered to be most important for providing oral health education. The dentists aware of possibility of concurrence of type 2 diabetes and periodontitis may help in identifying dental patients with undiagnosed diabetes.<sup>36</sup>

In a study done in Lithuania by Vysniauskaite and Vehkalahti<sup>37</sup> it was revealed that oral self-care was related to the guidance provided by dental professionals to the patients and it resulted in a better state of dental health (OR 1.9; 95% CI 1.1-3.2; p = 0.03).<sup>37</sup> In another study done in England it was seen that majority of patients did not visit dentists regarding oral health and advice related to their diabetes.<sup>38</sup>

Evidence has accumulated proving the coexistence of severe form of gingivitis as well as periodontitis in patients of type 2 diabetes.<sup>23</sup> Both of these conditions (gingivitis as well as periodontitis) may worsen the glycemic control in diabetic patients.<sup>21</sup> It is imperative that the health professionals understand this two way relationship as well as the impact of the two diseases on one another.<sup>39</sup> It shows that a close collaboration

is needed between internists for diabetic control and dental professionals for non-surgical periodontal treatment to decrease dental complications of diabetes and also exacerbation of diabetes.<sup>40</sup>

## CONCLUSION

It was concluded from this study that a relationship does exist between un-controlled diabetes and periodontal tissues. Therefore for a diabetic patient a planned and carefully carried dental health programme in addition to continuous medical supervision is required.

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## CONTRIBUTIONS BY AUTHORS

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|---------------------------------|---|
| <b>1 Geti Fatima:</b>           | Collected the data after writing synopsis, did oral examination.              |
| <b>2 Muhammad Jalil Akhtar:</b> | Helped in designing the study and shaping the objectives                      |
| <b>3 Nuzhat Naveed:</b>         | Overall guidance in write up, references and interpretation                   |
| <b>4 Mahmood Ahmad:</b>         | Guidance in interpretation  |
| <b>5 Marium Tariq:</b>          | Data analysis graphs and tables   |
| <b>6 Abdul Rahman Khawaja:</b>  | Co-ordination in research and writing introduction discussion and conclusion. |