

## Original Research

### Prognosis of dental implants in diabetic patients

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#### ABSTRACT:

**Background:** Dental implant survival is initially dependent on successful osseointegration following placement. Any alteration of this biological process by excessive surgical trauma, infection, or metabolic upset may adversely affect treatment outcomes. Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin that it produces. The number of people with diabetes increased from 153 million (95% uncertainty interval = 127, 182) in 1980 to 347 million. **Aim of the study:** To study Prognosis of dental implants in diabetic patients. **Materials and methods:** The present study was conducted in the Department of Periodontics of the Dental institution. For the study, we selected participants with poorly-controlled type 2 diabetes mellitus that received dental implants as part of a randomized comparative study of implant surfaces. A total of 30 patients were included in the study population. Participants were prescribed antibiotics for one week post-surgically, analgesics given as required and chlorhexidine-digluconate 0.12% oral rinse (Peridex®) for 7–14 days. After a minimum of 16 weeks of healing, the participants received implant-supported fixed dental prostheses. Participants were seen 13 to 16 months after implant placement to evaluate implant complications and HbA1c levels, and were then recalled for a long-term follow up which occurred between 21 and 34 months post-surgery to assess implant survival and success by a single examiner. **Results:** The number of implants evaluated was 60. Table 1 shows the implant survival rate over a follow up period of 2 years. We observed that diabetic patients have high probability of implant failure. The number of failed implants increased with elevated HbA1c %. The results were found to be statistically significant. **Conclusion:** Within the limitations of the present study, it can be concluded that poorly controlled diabetes mellitus can lead to poor dental implant health and implant failure within a short period of time.

**Keywords:** Diabetes mellitus, implant, dental implant, HbA1c

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#### INTRODUCTION

Dental implant survival is initially dependent on successful osseointegration following placement. Any alteration of this biological process by excessive surgical trauma, infection, or metabolic upset may adversely affect treatment outcomes.<sup>1</sup> Subsequently, as an implant is restored and placed into function, bone remodeling becomes a critical aspect of implant survival in responding to the functional demands placed on the implant restoration and supporting bone. The critical dependence on bone metabolism for implant

survival may be heightened in patients with diabetes.<sup>2</sup> Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin that it produces. The number of people with diabetes increased from 153 million (95% uncertainty interval = 127, 182) in 1980 to 347 million (95% uncertainty interval = 314, 382) in 2008.<sup>3</sup> Diabetes mellitus is a chronic disorder of carbohydrate metabolism characterized by hyperglycemia, reflecting distortion in physiological equilibrium in utilization of glucose by tissue, liberation

of glucose by liver and production-liberation of pancreatic anterior pituitary and adrenocortical hormone. The debilitating characteristic of diabetes mellitus was known as early as in second century AD, when Areteous named it as diabetes means “a siphon” as he perceived that the condition was characterized by melting down of flesh and limb into urine.<sup>4-6</sup> Various modern research and discoveries have shown that diabetes mellitus, more or less, affects every tissues of body directly or indirectly through late complications.<sup>4</sup> Concerning the effect on oral tissues, Loe et al recognized<sup>5</sup> the periodontal disease as sixth major complication of diabetes. Number of studies has proved the adverse effect of chronic hyperglycemia on oral mucosa and with some controversies on alveolar bone. Hence, the present study was conducted to assess the prognosis of dental implants in diabetic patients.

**MATERIALS AND METHODS**

The present study was conducted in the Department of Periodontics of the Dental institution. The ethical clearance for the study was approved from the ethical committee of the hospital. For the study, we selected participants with poorly-controlled type 2 diabetes mellitus that received dental implants as part of a randomized comparative study of implant surfaces. A total of 30 patients were included in the study population.

*Inclusion criteria:*

- Over 18 years of age
- With a diagnosis of type 2 diabetes of over one year duration
- Baseline glycated hemoglobin levels between 8.0% and 12.0% at the time of enrollment.

*Exclusion criteria*

- Individuals having a history of treatment for microvascular or macrovascular complications of diabetes Chronic and routine use of antibiotics

- Diabetic neuropathy or nephropathy of sufficient severity that may require treatment or surgical intervention.

Participants were prescribed antibiotics for one week post-surgically, analgesics given as required and chlorhexidine-digluconate 0.12% oral rinse for 7–14 days. After a minimum of 16 weeks of healing, the participants received implant-supported fixed dental prostheses. Participants were seen 13 to 16 months after implant placement to evaluate implant complications and HbA1c levels, and were then recalled for a long-term follow up which occurred between 21 and 34 months post-surgery to assess implant survival and success by a single examiner.

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student’s t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistically significant.

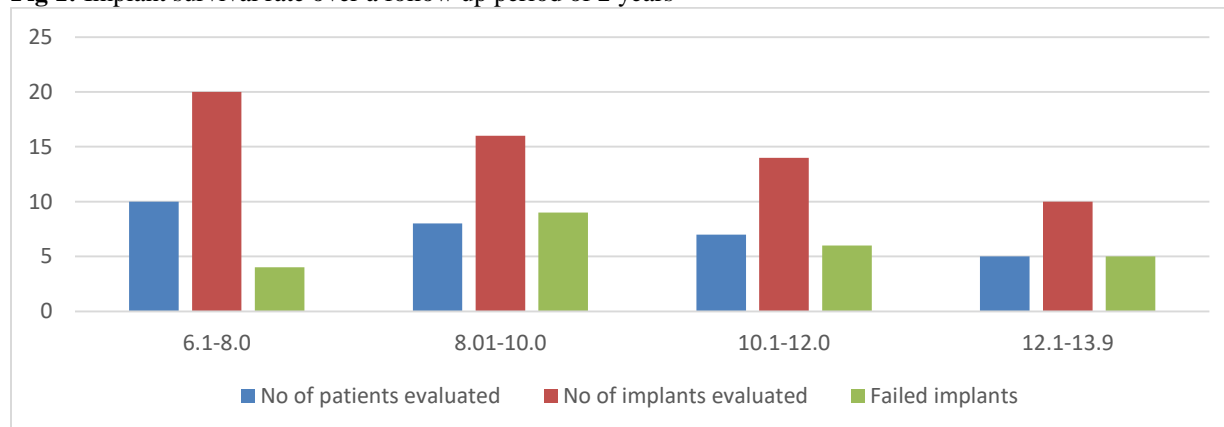
**RESULTS**

In the present study, a total of 30 patients were evaluated. The number of implants evaluated was 60. Table 1 shows the implant survival rate over a follow up period of 2 years. We observed that diabetic patients have high probability of implant failure. The number of failed implants increased with elevated HbA1c %. The results were found to be statistically significant.

**Table 1:** Implant survival rate over a follow up period of 2 years

HbA1c level (%)	No of patients evaluated	No of implants evaluated	Failed implants
6.1-8.0	10	20	4
8.01-10.0	8	16	9
10.1-12.0	7	14	6
12.1-13.9	5	10	5
<b>TOTAL</b>	30	60	24

**Fig 1:** Implant survival rate over a follow up period of 2 years



## DISCUSSION

In the present study, we observed that the implant failure is highly common in diabetic patients. We studied 60 implants in 30 patients. It was observed that the number of failed implants increased with elevated HbA1c %. The results were found to be statistically significant. The results were compared with previous studies from the literature. Raikar S et al.<sup>7</sup> assessed various factors affecting the survival rate of dental implants. 5200 patients with dental implants which were placed during June 2008–April 2015 were studied. Out of 5200 patients, 2800 were males and 2400 females. Maximum implants failures (55) were seen in age group above 60 years of age. Age group <40 years showed 20 failed implants. Age group 41–60 years showed 45 failed implants. The difference was nonsignificant. Maximum implant failure was seen in implants with length >11.5 mm (40/700) followed by implants with <10 mm (20/1650) and 10–11.5 mm (60/2850). The difference was significant. Maximum implants failure (30/1000) was seen in implants with diameter <3.75 mm followed by implants with diameter >4.5 mm (16/1600) and implants with diameter 3.75–4.5 mm (50/2600). Mandibular posterior showed 3.3% implants failure, maxillary posterior revealed 2.2%, maxillary anterior showed 2.1%, and mandibular anterior showed 1% failure rate; this difference was significant. Type I bone showed 0.3% implant failure, Type II showed 1.95%, Type III showed 3%, and Type IV revealed 0.8% failure rate; this difference was significant. They concluded that age, length of implant, diameter of implant, bone quality, and region of implant are factors determining the survival rate of implants. They found that implant above 11.5 mm length, and with diameter <3.75 mm, placed in the mandibular posterior region, in Type III bone showed maximum failures.

Inbarajan A et al.<sup>8</sup> evaluated the efficacy of implant supported tooth replacement in diabetic patients. The study involved placement of implants in five diabetic patients (three females and two males) of age ranging from 35–65 years with acceptable metabolic control of plasma glucose. All patients included in the study were indicated for single tooth maxillary central incisor replacement, with the adjacent teeth intact. The survival of the restored implants was assessed for a period of three months by measurement of crestal bone heights, bleeding on probing and micro flora predominance. Results indicated that there was a significant reduction in bleeding on probing and colonization at the end of three months and the bone loss was not statistically significant. They concluded that patients with diabetes are appropriate candidates for implants and justifies the continued evaluation of the impact of diabetes on implant success and complications. Oates TW et al.<sup>9</sup> examined the evidence guiding the use of implant

therapy relative to glycemic control for patients with diabetes. Reported implant failures rates for diabetic patients ranged from 0–14.3%. The identification and reporting of glycemic control was insufficient or lacking in 13 of the 16 studies with 11 of these enrolling only patients deemed as having acceptable glycemic control, limiting interpretation of findings relative to glycemic control. Three of the 16 studies having interpretable information on glycemic control failed to demonstrate a significant relationship between glycemic control and implant failure, with failure rates ranging from 0–2.9%. They concluded that clinical evidence is lacking for the association of glycemic control with implant failure while support is emerging for implant therapy in diabetes patients with appropriate accommodations for delays in implant integration based on glycemic control. The role for implants to improve oral function in diabetes management and the effects of hyperglycemia on implant integration remains to be determined.

## CONCLUSION

Within the limitations of the present study, it can be concluded that poorly controlled diabetes mellitus can lead to poor dental implant health and implant failure within a short period of time.

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