Success Rates of Dental Implants in Patients with Diabetes

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ABSTRACT

Aim: The aim of this study is to evaluate the success rates of dental implants in patients with diabetes, considering factors such as implant survival.

Material and methods:A total of 50 patients (23 men and 27 women), aged 30 to 70 years, participated in the study, during which 75 dental implants were placed. Comprehensive medical histories were obtained, and laboratory investigations, including HbA1c assessments, were conducted. The findings revealed a correlation between HbA1c levels and the incidence of complications relative to the number of implants. Data analysis was performed using SPSS software.

Results: Among the biologic complications observed, peri-implantitis had the highest occurrence, affecting 40% of patients and 44.44% of implants. Peri-implant mucositis was noted in 26.67% of patients and 20% of implants. Mucosal recession was reported in 16.67% of patients and 13.33% of implants. Similarly, crestal bone loss affected 16.67% of patients and 22.22% of implants.

Conclusion: Implant failure rates varied across HbA1c levels, indicating that factors beyond glycemic control may influence outcomes. The high prevalence of biologic complications highlights the need for regular monitoring and preventive care to enhance implant success.

Keywords: Diabetes, implants, mucositis

1. INTRODUCTION

Dental implants have revolutionized modern dentistry by providing a reliable and long-lasting solution for replacing missing teeth. Unlike conventional fixed partial dentures, implants offer numerous advantages, including a high success rate reduced risk of caries and endodontic complications in adjacent teeth, and enhanced bone preservation in edentulous sites. These benefits make dental implants an integral treatment option for both complete and partial edentulism, improving overall oral health and function.[1,2,3]

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The history of implant dentistry dates back to ancient civilizations, with early evidence of Mayan populations using shell fragments as implants. Over the centuries, significant advancements have refined implant materials and techniques, leading to the modern concept of osseointegration. This breakthrough established the foundation for contemporary implantology, where biocompatible materials like titanium ensure direct, rigid attachment to the bone without intermediate tissue interference, enhancing stability and longevity.[4,5]

Successful implant placement requires a thorough understanding of anatomical landmarks, patient-specific factors, and precise surgical techniques. Preoperative planning, including radiographic assessment and evaluation of bone density, plays a crucial role in determining the ideal implant position. Additionally, advancements in imaging, such as cone beam computed tomography (CBCT), enable precise surgical planning to minimize complications and ensure optimal functional and aesthetic outcomes. As dental implantology continues to evolve, it remains a cornerstone of restorative dentistry, offering patients a predictable and highly effective treatment for tooth loss.[7,8]

The aim of this study is to evaluate the success rates of dental implants in patients with diabetes, considering factors such as implant survival.

2. MATERIALS AND METHODS

A total of 50 patients (23 men and 27 women), aged 30 to 70 years, participated in the study, during which 75 dental implants were placed. Comprehensive medical histories were obtained, and laboratory investigations were conducted. Blood glucose levels were monitored and recorded for all. Each patient's condition was managed and regulated by their designated family physician, with efforts made to achieve the plasma glucose levels recommended by the American Diabetes Association (fasting plasma glucose of 140 mg/dL and 2-hour postprandial glucose of 200 mg/dL).The findings revealed a correlation between HbA1c levels and the incidence of complications relative to the number of implants. Data analysis was performed using SPSS software.

3. RESULTS

Table 1: HbA1c stratification levels and implants survival

HbA1c stratification (%)	Number of patients	Number of implants	Implant failure	% Implant failure
8.0-8.9	9	14	5	35.71%
9.0-9.9	21	29	1	3.45%
10.0-10.9	6	10	0	0.0%
11.0-11.9	4	8	1	12.50%
12.0-12.9	7	9	1	11.11%
13.0-14.0	3	5	2	40%
Total	50	75	10	13.33%

Among patients with HbA1c levels of 8.0–8.9%, the implant failure rate was the highest at 35.71%. However, in the 9.0–9.9% range, the failure rate significantly decreased to 3.45%. No implant failures were recorded in the 10.0–10.9% category. The failure rate increased to 12.50% for the 11.0–11.9% group, while it was 11.11% in patients with HbA1c levels of 12.0–12.9%. The highest failure rate, 40%, was observed in the 13.0–14.0% group. Overall, the total implant failure rate across all groups was 13.33%.

Table 2: Biologic complications

Biologic complications	Patients(n=30)	Number of implants(n=45)
Peri- implantitis	12(40%)	20 (44.44%)
Peri- implant mucositis	8 (26.67%)	9 (20%)
Mucosal recession	5(16.67%)	6 (13.33%)
Crestal bone loss	5 (16.67%)	10 (22.22%)

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Among the biologic complications observed, peri-implantitis had the highest occurrence, affecting 40% of patients and 44.44% of implants. Peri-implant mucositis was noted in 26.67% of patients and 20% of implants. Mucosal recession was reported in 16.67% of patients and 13.33% of implants. Similarly, crestal bone loss affected 16.67% of patients and 22.22% of implants.

4. DISCUSSION

Dental implants have become a widely accepted solution for tooth replacement, offering high success rates and long-term stability. However, in patients with diabetes, concerns arise regarding delayed healing, impaired osseointegration, and increased risk of infection, which may affect implant success.[9] While well-controlled diabetes appears to have minimal impact on implant survival, poorly controlled diabetes has been associated with higher complication rates. Understanding the success rates of dental implants in diabetic patients is crucial for optimizing treatment planning and ensuring favorable long-term outcomes.

In our study among patients with HbA1c levels of 8.0–8.9%, the implant failure rate was the highest at 35.71%. However, in the 9.0–9.9% range, the failure rate significantly decreased to 3.45%. No implant failures were recorded in the 10.0–10.9% category. The failure rate increased to 12.50% for the 11.0–11.9% group, while it was 11.11% in patients with HbA1c levels of 12.0–12.9%. The highest failure rate, 40%, was observed in the 13.0–14.0% group. Overall, the total implant failure rate across all groups was 13.33%. These findings suggest that implant failure rates do not follow a linear trend with increasing HbA1c levels, highlighting the need for further investigation into additional factors influencing implant survival in patients with varying glycemic control.

Among the biologic complications observed, peri-implantitis had the highest occurrence, affecting 40% of patients and 44.44% of implants. Peri-implant mucositis was noted in 26.67% of patients and 20% of implants. Mucosal recession was reported in 16.67% of patients and 13.33% of implants. Similarly, crestal bone loss affected 16.67% of patients and 22.22% of implants. These findings highlight the varying prevalence of biologic complications associated with dental implants, emphasizing the need for regular monitoring and preventive measures.

James Y et al.[10] in their study found that diabetes, when well-managed (HbA1c < 8%), does not significantly compromise implant survival rates, with survival percentages ranging from 96.1% to 97.3% at one year and 87.3% to 96.1% at five years, comparable to non-diabetic populations.

Marchand F et al.[11], in their study on the success of dental implant treatment in diabetic patients, emphasized that the careful selection of suitable candidates, management of co-morbidities such as poor oral hygiene, smoking, and periodontitis, stabilization of glycemic control (with HbA1c around 7%), and implementation of preventive measures against infection significantly increased implant success rates to a satisfactory range of 85–95%. They concluded that implant surgery was not an urgent procedure, and diabetic patients with the highest chances of success should have been collaboratively selected and prepared by both dental and diabetes specialists.

De Baat C.[12]reviewed the literature on the success of dental implants in elderly patients. The findings from two studies indicated that implant treatment was both safe and predictable for older and younger patients alike. Three studies reported no significant increase in implant failure rates among individuals with compromised medical conditions, while four studies demonstrated high success rates in elderly groups. Within the limitations of the review, it was concluded that advanced age did not appear to be a major prognostic factor affecting the success of dental implant treatment.

A limitation of our study was the relatively small sample size, which may have affected the generalizability of the findings. A larger cohort would provide more accurate data and allow for a more comprehensive analysis of implant success rates and biologic complications in diabetic patients.

5. CONCLUSION

Implant failure rates varied across HbA1c levels, indicating that factors beyond glycemic control may influence outcomes. The high prevalence of biologic complications highlights the need for regular monitoring and preventive care to enhance implant success.

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