

Original Research

Analysis of effect of diabetes on outcome of dental implant therapy

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ABSTRACT:

Background: Diabetes mellitus (DM) has several complications. Delayed wound healing, microvascular disease and an impaired response to infections are complications that can have a direct bearing on dental implant therapy. **Material and method:** A total of 56 patients were enrolled in this study who had received a dental implant as replacement of missing tooth in the mouth atleast 4 years prior to the commencement of the study. Of these 28 patients were diabetics whereas the other 28 were healthy subjects (control group). The demographic details of the patients were collected. Cases of implant failure were recorded and their correlation with both the groups was analysed. **Results:** Out of 56 patients enrolled in this study, 3 cases of implant failures were seen. An overall failure rate of implants irrespective of the diabetic or control group was found to be 5.35%. Out of 29 males 2 cases of implant failure were seen and only 1 failure case was seen amongst 27 females. Only 1 failure case of implant was seen amongst 19 patients who were below 35 years of age. 2 cases of implant failure were seen amongst 37 patients who were more than 35 years of age. This study found 2 cases of implant failure amongst the diabetic group with a failure percentage of 7.14 percent. The control group observed a failure percentage of 3.70% with one case of implant failure out of 28 patients. **Conclusion:** A definitive correlation between diabetes mellitus and implant failure could not be justified and successful dental implant osseointegration can be accomplished in subjects with diabetes with good metabolic control in a similar manner as in subjects without diabetes.

Key words: Dental implants, Implant survival, Diabetes mellitus, Glycemic control

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INTRODUCTION

Today, dental implants are one of the restorative methods to replace missing teeth. Improvements in implant design, surface characteristics, and surgical protocols made implants a secure and highly predictable procedure with a mean survival rate of 94.6 % and a mean success rate of 89.7 % after more than 10 years¹. Diabetes mellitus is a chronic metabolic disorder that is reaching epidemic proportions, recently projected as affecting over 350 million individuals worldwide. The number of affected individuals underlines the urgent need to understand the effects of diabetes and improve the care for patients with diabetes².

Diabetes mellitus is a chronic metabolic disorder that leads to hyperglycemia, which raises multiple complications

caused by micro- and macroangiopathy. Diabetic patients have increased frequency of periodontitis and tooth loss³, delayed wound healing⁴, and impaired response to infection⁵. Consistent with this concern, animal studies have repeatedly shown poor bone-implant healing with delays in osseointegration directly related to inadequate glycemic control⁶⁻⁷. Similarly, a previous clinical report correlated delays in implant integration with increased HbA1c levels⁸.

It is these individuals with poor glycemic control that may have enhanced vulnerability to implant-related biologic complications consistent with their increased vulnerability to periodontal disease⁹. Hence, this study was conducted to analyse and assess the effect of diabetes on outcome of dental implant therapy.

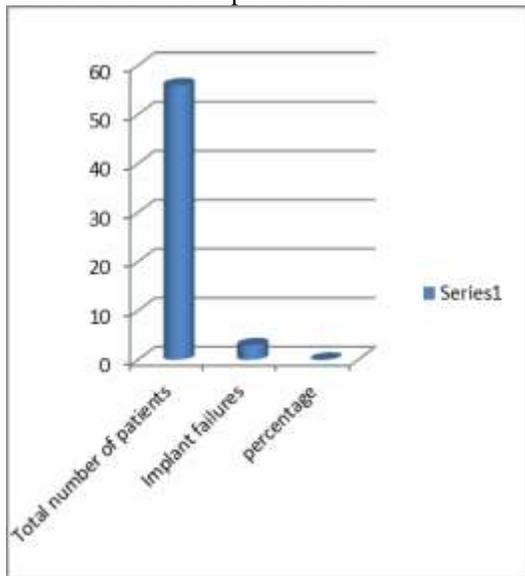
MATERIAL AND METHODS

This study was conducted to analyse and assess the effect of diabetes on outcome of dental implant therapy. A total of 56 patients were enrolled in this study who had received a dental implant as replacement of missing tooth in the mouth atleast 4 years prior to the commencement of the study. Of these 28 patients were diabetics whereas the other 28 were healthy subjects (control group).The demographic details of the patients were collected. All pre-operative clinical and radiographic details of the patients were also collected to compare and evaluate with current status. Cases of implant failure were recorded and their correlation with both the groups was analysed. All the assimilated data was recorded in Microsoft excel sheets. The data was statistically analysed by using SPSS software. Chi-square test was used for statistical analysis

RESULTS

This study was conducted to analyse and assess the effect of diabetes on outcome of dental implant therapy. It was observed in this study that out of 56 patients enrolled in this study, 3 cases of implant failures were seen. An overall failure rate of implants irrespective of the diabetic or control group was found to be 5.35% (Graph 1).

Graph 1: Total cases of implant failure.



It was seen in this study that 29 out of the 56 patients were males and the rest 27 were females. Out of 29 males 2 cases of implant failure were seen and only 1 failure case was seen amongst 27 females. Only 1 failure case of implant was seen amongst 19 patients who were below 35 years of age. 2 cases of implant failure were seen amongst 37 patients who were more than 35 years of age (table1).

Table 1: Demographic correlation with implant failure

Variable	Patients				
	Total cases	Percentage	Failed cases	Percentage	
Gender	male	29	51.78%	2	6.8%
	female	27	48.21	1	3.7%
Age :	<35 years	19	33.92%	1	5.2%
	≥35 years	37	66.07%	2	5.4%

This study found 2 cases of implant failure amongst the diabetic group with a failure percentage of 7.14 percent. The control group observed a failure percentage of 3.70% with one case of implant failure out of 28 patients (table 2).

Table 2: Implant failures in diabetic and control group

Prognosis	Diabetic group		Control group		p- value
	Number	%	Number	%	
Success	26	92.86	27	96.30	0.47
Failure	2	7.14	1	3.70	
Total	28	100	28	100	

DISCUSSION

Diabetes mellitus, a condition characterized by increased plasma glucose levels (or hyperglycemia), is a group of metabolic disorders that result either from abnormal insulin secretion, insulin action or both. Currently, approximately 285 million people around the world are affected, and these figures are expected to increase two-fold by 2030¹⁰.

Implant survival is initially dependent on successful osseointegration following placement. Any alteration of this biological process may adversely affect treatment outcome. 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 leads us to evaluation of certain risk factors. One of the controversial discussed diseases is diabetes mellitus. Diabetes mellitus is a chronic metabolic disorder that leads to hyperglycemia, which raises multiple complications caused by micro- and macroangiopathy. Diabetic patients have increased frequency of periodontitis and tooth loss, delayed wound healing¹¹.

This study was conducted to analyse and assess the effect of diabetes on outcome of dental implant therapy. It was observed in this study that out of 56 patients enrolled in this study, 3 cases of implant failures were seen. An overall failure rate of implants irrespective of the diabetic or control group was found to be 5.35% (Graph 1). Hendrik Naujokat et al carried out a systematic review on dental implants and diabetes mellitus. They observed that dental implant surgery has developed to a widely used procedure for dental rehabilitation and is a secure and predictable procedure. Local and systemic risk factors can result in

higher failure rates. Diabetes mellitus is a chronic disease that goes in with hyperglycemia and causes multifarious side effects. Diabetes as a relative contraindication for implant surgery is controversially discussed. Because the number of patients suffering from diabetes increases, there are more diabetic patients demanding implant procedures. They aimed to answer the PICO question “Do diabetic patients with dental implants have a higher complication rate in comparison to healthy controls?” by a systematic literature search based on the PRISMA statement. We identified 22 clinical studies and 20 publications of aggregated literature, which were quite heterogeneous concerning methods and results. We conclude that patients with poorly controlled diabetes suffer from impaired osseointegration, elevated risk of peri-implantitis, and higher level of implant failure. The influence of duration of the disease is not fully clear. The supportive administration of antibiotics and chlorhexidine seems to improve implant success. When diabetes is under well control, implant procedures are safe and predictable with a complication rate similar to that of healthy patients¹². It was seen in this study that 29 out of the 56 patients were males and the rest 27 were females. Out of 29 males 2 cases of implant failure were seen and only 1 failure case was seen amongst 27 females. Only 1 failure case of implant was seen amongst 19 patients who were below 35 years of age. 2 cases of implant failure were seen amongst 37 patients who were more than 35 years of age. Thomas W. Oates et al conducted a review study to critically appraise the clinical evidence guiding our application of dental implant therapy relative to glycemic control for patients with diabetes. Their initial searches of the literature identified 129 publications relevant to both dental implants and diabetes. These were reduced to 17 clinical studies for inclusion. Reported implant failure rates in these 17 reports ranged from 0 to 14.3% for patients with diabetes. Unfortunately, the majority of these reports lacked sufficient information relative to glycemic control to allow the application of the findings toward clinical care. However, clinical evidence is emerging from several investigations that diabetes and glycemic control are important considerations that may require modifications to therapeutic protocols, but may not be contraindications to implant therapy in diabetes patients. Also, a potentially important role for implant therapy to support oral function in diabetes dietary management remains to be determined¹³.

This study found 2 cases of implant failure amongst the diabetic group with a failure percentage of 7.14 percent. The control group observed a failure percentage of 3.70% with one case of implant failure out of 28 patients. B.R. Chrcanovic et al carried out a review on diabetes and dental implants. The aim of this systematic review and meta-analysis was to investigate whether there are any effects of diabetes mellitus on implant failure rates, postoperative infections, and marginal bone loss. An electronic search without time or language restrictions was undertaken in

March 2014. The present review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Eligibility criteria included clinical human studies. The search strategy resulted in 14 publications. The I^2 statistic was used to express the percentage of total variation across studies due to heterogeneity. The inverse variance method was used for the random effects model when heterogeneity was detected or for the fixed effects model when heterogeneity was not detected. The estimates of an intervention for dichotomous outcomes were expressed in risk ratio and in mean difference in millimeters for continuous outcomes, both with a 95% confidence interval. There was a statistically significant difference ($p = .001$; mean difference = 0.20, 95% confidence interval = 0.08, 0.31) between diabetic and non-diabetic patients concerning marginal bone loss, favoring non-diabetic patients. A meta-analysis was not possible for postoperative infections. The difference between the patients (diabetic vs. non-diabetic) did not significantly affect implant failure rates ($p = .65$), with a risk ratio of 1.07 (95% confidence interval = 0.80, 1.44). Studies are lacking that include both patient types, with larger sample sizes, and that report the outcome data separately for each group. The results of the present meta-analysis should be interpreted with caution because of the presence of uncontrolled confounding factors in the included studies¹⁴.

CONCLUSION

From the above study the author concluded that a definitive correlation between diabetes mellitus and implant failure could not be justified and successful dental implant osseointegration can be accomplished in subjects with diabetes with good metabolic control in a similar manner as in subjects without diabetes.

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