

ORIGINAL RESEARCH

Assessment of effect of smoking and diabetes on prognosis of dental implant

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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. **Material and method:** This study was undertaken to assess the effect of smoking and diabetes on prognosis of dental implants. A total of 60 patients were enrolled in this study. The patients were categorised into four groups: Group 1: 15 patients who were non-diabetics but were chronic smokers, Group 2: 15 patients who were diabetics but were non smokers, Group 3: 15 patients who were diabetics and were also chronic smokers, Group 4: 15 patients who were non-diabetics and non smokers. All the demographic details of the patients were recorded. The patients were evaluated every month for a duration of 6 months after implant loading to check for signs of bone loss and implant failure. Preoperative and follow up radiographs were collected and compared. **Results:** In the current study 29 patients were below 35 years of age whereas 31 patients were above 35 years of age. Out of 60 patients 34 were males and the rest 26 were females. Out of 15 cases of implants in group 1, there was failure in 4 cases. Number of cases of implant failures in group 2, 3 and 4 were 3, 6 and 1 respectively. In the current study the statistical analysis showed that difference in the success rate of implants was statistically significant between groups 1 and 3, group 1 and 4, group 2 and 3, group 3 and 4 with P-values of 0.00, 0.01, 0.02, 0.00 respectively. However the results were not significant between the groups 1 and 2, groups 2 and 4 with P-values of 0.86, and 0.58 respectively. **Conclusion:** Both smoking and diabetes influence the prognosis of dental implants and the presence of anyone of the above has detrimental effects on the success of implants.

Keywords: Bone, dental implants, Osseointegration, smoking, diabetes.

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INTRODUCTION

Dental osseointegrated implants are generally considered as effective and predictable restorations for the replacement of missing teeth. However, although highly desirable outcomes and the long-term survival of dental implant treatments are well documented in numerous studies, implant failures still occur for various reasons¹⁻².

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 infection.

Various studies report a failure rate of implants in smokers compared to nonsmokers, ranging from 6.5% to 20%⁵. The negative impact of tobacco smoking in implant outcome may be related to multiple factors and their mechanism may be mediated through both local and systemic biologic routes⁶.

Since life expectancy is expected to increase with the advent of better therapies and targeted medicine, an increasing number of patients who smoke or

previously smoked, or who present with diabetes or osteoporosis may require dental implant treatment⁷. Hence, this study was undertaken to assess the effect of smoking and diabetes on prognosis of dental implants.

MATERIAL AND METHOD

This study was undertaken to assess the effect of smoking and diabetes on prognosis of dental implants. A total of 60 patients were enrolled in this study. The patients were categorised into four groups:

Group 1: 15 patients who were non-diabetics but were chronic smokers

Group 2: 15 patients who were diabetics but were non smokers

Group 3: 15 patients who were diabetics and were also chronic smokers

Group 4: 15 patients who were non-diabetics and non smokers

All the demographic details of the patients were recorded. Patients with deranged vitamin D level and calcium levels were excluded from the study. The purpose of the study was explained to the patients and a written consent was obtained. Once the implants were placed a strict oral hygiene protocol was instructed to the patients. The patients were evaluated every month for a duration of 6 months after implant loading to check for signs of bone loss and implant

failure. Preoperative and follow up radiographs were collected and compared.

Entire data was recorded in the Microsoft excel sheets. SPSS software was used for statistical analysis. Chi square test and student T test were used to compare the variables. P-value of less than 0.05 was considered significant.

RESULTS

This study was undertaken to assess the effect of smoking and diabetes on prognosis of dental implant. In the current study 29 patients were below 35 years of age whereas 31 patients were above 35 years of age. Out of 60 patients 34 were males and the rest 26 were females. Group wise age and gender distribution of patients was given in table 1.

It was observed in the current study that out of 15 cases of implants in group 1, there was failure in 4 cases. Similarly the number of cases of implant failures in group 2, 3 and 4 were 3, 6 and 1 respectively (table 2).

In the current study the statistical analysis showed that difference in the success rate of implants was statistically significant between groups 1 and 3, group 1 and 4, group 2 and 3, group 3 and 4 with P-values of 0.00, 0.01, 0.02, 0.00 respectively. However the results were not significant between the groups 1 and 2, groups 2 and 4 with P-values of 0.86, and 0.58 respectively (table 3).

Table 1: Demographic details

| Parameter | Group 1 | Group 2 | Group 3 | Group 4 | Total |
|------------------|---------|---------|---------|---------|-------|
| Age group | | | | | |
| • <35 years | 8 | 9 | 7 | 5 | 29 |
| • ≥35 years | 7 | 6 | 8 | 10 | 31 |
| Gender | | | | | |
| • Male | 10 | 8 | 9 | 7 | 34 |
| • Female | 5 | 7 | 6 | 8 | 26 |

Table 2: Number of implant cases with success and failures.

| Variable | Group 1 | Group 2 | Group 3 | Group 4 |
|--------------------|---------|---------|---------|---------|
| Total cases | 15 | 15 | 15 | 15 |
| Success | 11 | 12 | 9 | 14 |
| Failure | 4 | 3 | 6 | 1 |

Table 3: Statistical analysis between different groups

| Comparison | P-value |
|---------------------------|---------|
| Group 1 vs Group 2 | 0.86 |
| Group 1 vs Group 3 | 0.00 |
| Group 1 vs Group 4 | 0.01 |
| Group 2 vs Group 3 | 0.02 |
| Group 2 vs Group 4 | 0.58 |
| Group 3 vs Group 4 | 0.00 |

DISCUSSION

A variety of conditions, including implant design (length, shape or surface texture), patient-related medical risk factors (systemic diseases or habits, such as smoking), and surgery-related factors (surgeon's experience or surgical design) have been considered to influence the outcome for implant restoration⁸⁻⁹. With the dramatic advancements in materials science and surgical techniques, increasing attention is focused on patient-related conditions as risk factors for dental implant failure¹⁰.

The ability to anticipate outcomes is an essential part of risk management in an implant practice. Recognizing conditions that place the patient at a higher risk of failure will allow the surgeon to make informed decisions and refine the treatment plan to optimize the outcomes¹¹. Smoking increases the risk of periodontal disease, oral precancerous and cancerous lesions, root caries, and peri-implantitis. It also causes taste derangement, staining of teeth and restorations, as well as delayed wound healing after extractions, periodontal procedures, and orthognathic surgeries. Smoking upregulates the expression of pro-inflammatory cytokines such as interleukin-1, which contributes to increased tissue damage and alveolar bone resorption¹².

This study was undertaken to assess the effect of smoking and diabetes on prognosis of dental implant. In the current study 29 patients were below 35 years of age whereas 31 patients were above 35 years of age. Out of 60 patients 34 were males and the rest 26 were females. Group wise age and gender distribution of patients was given in table 1. Dror Twito et al analyzed the influence of smoking habits and other possibly relevant factors on dental implant survival. The study population included all patients who underwent dental implants between the years 1999 and 2008 at a large military dental clinic and were examined in the periodic medical examination center. Correlation between implant characteristics and patients' smoking habits, as mentioned in the questionnaire answered by patients in the periodic examination, was performed. Besides standard statistical methods, multiple linear regression models were constructed for estimation of the relative influence of some factors on implant survival rate. The long-term results of the implant treatment were good. The study refers to 7,680 implants. 7,359 (95.8%) survived and 321 (4.2%) did not survive. Concerning smoking habits, in a uni-variable analysis, factors found to have an association with implant survival were the smoking status of the patients (smoking/no smoking), the amount of smoking, passive smoking, and the time elapsed in ex-smokers from the time they ceased smoking to the time of implantation. In a multi-variable analysis, factors found to have an association with implant survival were smoking status (smoking/no smoking) and amounts of smoking as expressed in pack years¹³.

It was observed in the current study that out of 15 cases of implants in group 1, there was failure in 4 cases. Similarly the number of cases of implant failures in group 2, 3 and 4 were 3,6 and 1 respectively (table 2). Hui Chen et al evaluated the association between smoking, radiotherapy, diabetes and osteoporosis and the risk of dental implant failure. A comprehensive research on MEDLINE and EMBASE, up to January 2013, was conducted to identify potential studies. References of relevant studies were also searched. Screening, data extraction and quality assessment were conducted independently and in duplicate. A random-effects meta-analysis was used to pool estimates of relative risks (RRs) with 95% confidence intervals (CIs). A total of 51 studies were identified in this meta-analysis, with more than 40,000 dental implants placed under risk-threatening conditions. The pooled RRs showed a direct association between smoking (n=33; RR=1.92; 95% CI, 1.67–2.21) and radiotherapy (n=16; RR=2.28; 95% CI, 1.49–3.51) and the risk of dental implant failure, whereas no inverse impact of diabetes (n=5; RR=0.90; 95% CI, 0.62–1.32) on the risk of dental implant failure was found. The influence of osteoporosis on the risk of dental implant failure was direct but not significant (n=4; RR=1.09; 95% CI, 0.79–1.52). The subgroup analysis indicated no influence of study design, geographical location, length of follow-up, sample size, or mean age of recruited patients. Smoking and radiotherapy were associated with an increased risk of dental implant failure. The relationship between diabetes and osteoporosis and the risk of implant failure warrant further study¹⁴.

In the current study the statistical analysis showed that difference in the success rate of implants was statistically significant between groups 1 and 3, group 1 and 4, group 2 and 3, group 3 and 4 with P-values of 0.00, 0.01, 0.02, 0.00 respectively. However the results were not significant between the groups 1 and 2, groups 2 and 4 with P-values of 0.86, and 0.58 respectively (table 3). Hendrik Naujokat et al carried out a systematic review 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 patients¹⁵.

CONCLUSION

From the above study the author concluded that both smoking and diabetes influence the prognosis of dental implants and the presence of anyone of the above has detrimental effects on the success of implants. Further studies are recommended.

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