



Intricate Assessment and Evaluation of Effect of Bruxism on Long-term Survival and Failure of Dental Implants: A Comparative Study

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ABSTRACT

Introduction: Dental implants are one of the common lines of treatment used for the treatment of missing tooth. Various risk factors are responsible for the failure of the dental implants and occurrence of postoperative complications. Bruxism is one such factor responsible for the failure of the dental implants. The actual relation between bruxism and dental implants is a subject of long-term controversy. Hence, we carried out this retrospective analysis to assess the complications occurring in dental implants in patients with and without bruxism.

Materials and methods: The present study included 1100 patients which were treated for rehabilitation by dental implant procedure at 21 dental offices of Ghaziabad (India) from 2004 to 2014. Analyzing the clinical records of the patients along with assessing the photographs of the patients was done for confirming the diagnosis of bruxism. Clinical re-evaluation of the patients, who came back for follow-up, was done to confirm the diagnosis of bruxism. Systemic questionnaires as used by previous workers were used to evaluate the patients about the self-conscience of the condition. Estimation of the mechanical complications was done only in those cases which occurred on the surfaces of the restoration of the dental implants. All the results were analyzed by Statistical Package for Social Sciences (SPSS) software. Student's t-test and Pearson's chi-square test were used to evaluate the level of significance.

Results: In both bruxer and non-bruxers, maximum number of dental implants was placed in anterior maxillary region. Significant difference was obtained while comparing the two groups for dimensions of the dental implants used. On comparing the total implant failed cases between bruxers and non-bruxers group, statistically significant result was obtained. Statistically significant difference was obtained while comparing

the two study groups based on the health parameters, namely hypertension, diabetes, and smoking habit.

Conclusion: Success of dental implant is significantly affected by bruxism. Special attention is required in such patients while doing treatment planning.

Clinical significance: For the long-term clinical success and survival of dental implants in patients, special emphasis should be given on the patient's deleterious oral habits, such as bruxism as in long run, they influence the stability of dental implants.

Keywords: Bruxism, Failure, Implant.

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INTRODUCTION

One of the promising lines of treatment for the restoration of missing tooth is by endosseous dental implants.^{1,2} With continuous improvements in the long-term effectiveness, the future prospective and scope of these dental implants in the field of rehabilitation has improved and expanded to a wider extent, thereby having a positive effect on the quality of life of patients. Even though research in the field of dental implants have reached a much higher level, one of the common problem being faced by both the clinician and the patient is the failure of dental implants. Recent past has witnessed many studies relating to this dilemma. In a recent reported survey, less than 70% of the patients, in which dental implants were placed, were free from any kind of postoperative complication.³ Various risk factors associated with dental implants are widely responsible for occurrence of these complications. One such factor discussed in the literature, i.e., responsible for the failure of the dental implants is bruxism. The actual relation

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between bruxism and dental implants is a subject of long-term controversy.^{4,5} Keeping all these facts in mind, the authors has genuinely attempted to assess the basic ideology and complications occurring in dental implants in patients with and without bruxism.

MATERIALS AND METHODS

The present study was comprised of concrete analysis of records of 1100 patients those were treated for rehabilitation by dental implant procedure from 2004 to 2014 at 21 dental offices of Ghaziabad (India). Out of 1100 patients, 610 were females and 490 were males. Firstly, the contact list of registered dental surgeons in Ghaziabad was obtained from the office of Indian Dental Association (IDA); Ghaziabad Branch. Ethical clearance was also obtained from the same office. There were 167 registered at this office of IDA. Out of this, 77 were not actively practicing, rest left behind was 90. One in every four was figured out through systemic random sampling. Two out of the total selected dental surgeons not responded to our questionnaire therefore concluding list of 21 dental offices were finalized for the study. After explaining them the comprehensive research protocol and plan, written informed consent of the selected 21 dental surgeons were obtained to confirm their participation. Diagnosis of bruxism was made by analyzing the clinical records of the patients along with assessing the photographs of the patients. Clinical re-evaluation of the alive patients was done to confirm the diagnosis of bruxism. Telephone communication was done with the patients whose contact details were available and follow-up and re-examination was done. Patients who reported back for follow-up were re-examined and written consent was also obtained from them after informing them about the study procedure. Questionnaires as used by previous authors were used to evaluate the patients about the self-conscience of the condition.⁶ Following questions were used for the assessment of the patients:

- Does grinding of your teeth occur during the sleep?
- Does anyone else tell you that your teeth grind during sleep?
- Does your jaws thrust or braced after awakening in the morning or in the night?
- Does your teeth clench during the awakening time?
- Does your tooth grind during the awakening time?

All the patients were directed to submit their answers in “yes” or “no.” Clinical re-evolution of the condition was done to search for clinical signs and symptoms related to bruxism. International classification of Sleep Disorders was used to look for criteria described for the diagnosis of bruxism.⁷ In reference to the recent consensus given by Lobbezoo et al,⁸ clenching or grinding of the teeth and even thrusting of mandible during the awoken period of

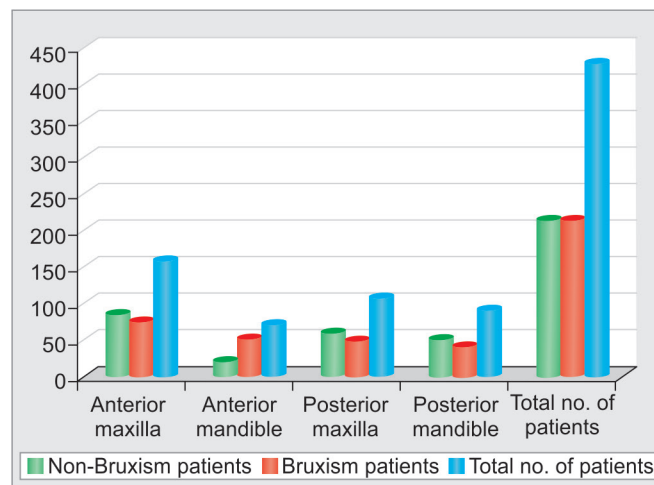
time was also categorized under the category of bruxism. Same clinician was used for evaluating all the patients of bruxism. Patients who did not reported for the follow-up, their clinical history and photograph were used for evaluation of the habit. Evaluation of the mechanical complications was done only in those cases which occurred on the surfaces of the restoration of the dental implants. Assessment of the following parameters was done:

- Surface roughness
- Length and diameter of the implant
- Site and location of the implant
- Sex of the patient
- Age of the patient at the time of implant surgery
- Follow-up time
- Mechanical complications, if any, of the dental implants
- Type and number prosthetic units
- Hard stabilization splints in bruxism patients for night use.

Lekholm and Zarb⁹ classification was used for the assessment of the quality of bone at the time of implant surgery. All the results were analyzed by Statistical Package for Social Sciences (SPSS) software. Student’s t-test and Pearson’s chi-square test were used to evaluate the level of significance.

RESULTS

Graph 1 highlights the distribution of dental implants in patients with and without bruxism. In bruxers, most of the dental implants were placed in anterior maxillary region



Graph 1: Distribution of dental implants in patients with and without bruxism

Table 1: Mean diameter and length of implants used in bruxers and non-bruxers

Dimensions of implants	Patients with bruxism	Patients without bruxism	p-value
Diameter	3.82	3.80	0.005*
Length	12.64	13.52	0.004*

*Significant

Table 2: Comparative evaluation of survival and failure of dental implants in patients with and without bruxism based on the database of the patients

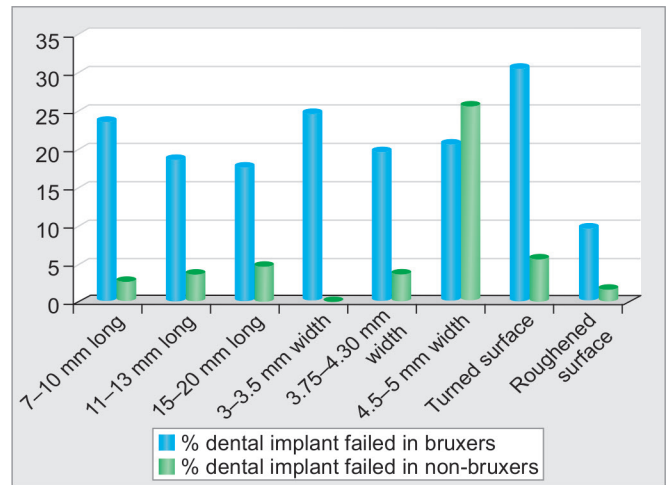
Dental implants	Patients with bruxism	Patients without bruxism	p-value
No. of failed dental implants	36	808	–
Patients in which minimum of one implant failed	12	99	0.004*
Odds ratio	2.45	0.003*	

*Significant

while in non-bruxers, most of the dental implants were also placed in the anterior maxillary region followed by posterior region of maxilla. Table 1 shows the p value for mean diameter and length of implants used in bruxers and non-bruxers. On comparing the two groups for dimensions of the dental implants used, significant correlation was obtained (p-value <0.05). On comparing the total implant failed cases between bruxers and non-bruxers group, statistically significant result was obtained, as shown in Table 2 (p-value <0.05). Graph 2 shows failure of dental implants in between the two study groups based on the dimensions of the dental implants. Graphs 3 and 4 highlight the survival and failure of dental implants in patients with and without bruxism based on the health conditions. On comparing in between the patients with and without bruxism, statistically significant difference was obtained based on the health parameters, namely hypertension, diabetes, and smoking habit, as shown in Table 3.

DISCUSSION

Common oral parafunctional habits include bruxism, lip biting, thumb sucking, and abnormal posturing of the jaw. These are categorized as parafunctional as they have no functional activity. Instead, they cause various complications, such as occlusal grinding, oral musculature



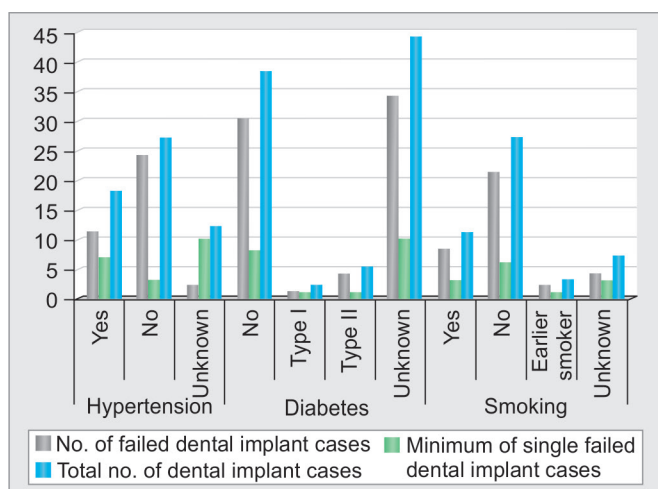
Graph 2: Comparative evaluation of failure of dental implants in both study groups according to dimensions of dental implants

problem, and dental implant failure.^{10,11} As the prevalent rate of these habits among general population is very high, it is unavoidable to use dental implants in patients with these habits.¹² According to some authors, the reason for failure of dental implants in such patients may be due to abnormal amount of occlusal stress subjected in areas of dental implants due to these parafunctional habits. Hence, in patient receiving rehabilitation therapy by dental implants, bruxism can be highlighted as a possible risk factor.¹³ Therefore, we evaluated the effect of bruxism in patients receiving dental implants.

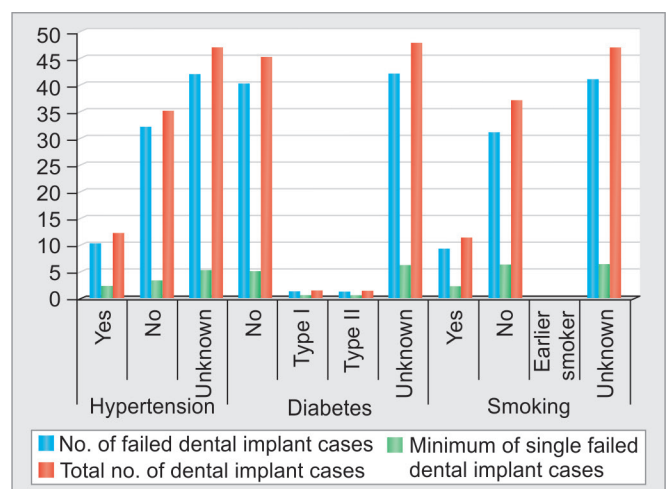
Table 3: Comparative evaluation of survival and failure of dental implants in patients with and without bruxism based on the health conditions

Variable	p-value between bruxers and non-bruxers
Hypertension	0.004*
Diabetes	0.003*
Smoking	0.004*

*Significant



Graph 3: Evaluation of survival and failure of dental implants in patients with bruxism based on the health conditions



Graph 4: Evaluation of survival and failure of dental implants in patients without bruxism based on the health conditions

In the present study, a significant difference was obtained while comparing the dental implants in between the two study groups based on the dimension of dental implants (Graph 1, Table 1). We also observed that in patients with bruxism, a higher rate of failure of dental implants was observed in comparison to the patients without the habit of bruxism (Table 2). Similar findings were reported by Chrcanovic et al⁷ who also observed high failure rate of dental implants in patients with bruxism habit. As hypothesized by Meyer et al,¹⁴ this can be partly due to reduced proprioception of the dental implants when compared with teeth. A feedback is provided to the central nervous system by the natural teeth's periodontal ligament, which stimulates the motor control and sensory perception. A significantly higher failure rate of dental implant was seen in patients with burxism in comparison with longer implants (Graph 2). This can be explained, as hypothesized by el Askary et al,¹⁵ in the way that minimal stress is offered to the bone by the longer dental implants with larger diameter. In the present study, it was observed that statistically significant alterations were noticed while comparing the patients in two study groups based on the health conditions, as shown in Graphs 3 and 4. Our results were in correlation with the results obtained by Manfredini et al¹⁶ and Chrcanovic et al⁷ who reported similar findings in their respective studies. Chrcanovic et al⁷ analyzed the complications of dental implants occurring in patients with and without bruxism. They analyzed bruxism patients within the group of patients who were treated with dental implants and were diagnosed as being affected by bruxism according to the criteria given by International classification of Sleep Disorders. Out of total 2,670 patients included in their study group, 98 patients were identified as affected by bruxism. 2.71 came out to be the odd ratio of the dental implant failure in patients with bruxism. From the results, they concluded that dental implant success rate is compromised in patients having bruxism. Tosun et al¹¹ used polysomnographic analysis to evaluate the clinical relation between patients with sleep bruxism receiving dental implants. They retrospectively analyzed over 350 patients who received a total of 838 dental implants. From the results, they concluded that patients receiving dental implants and affected by sleep bruxism should take proper precautions along with night guard to ensure long-term success of implant treatment. Kinsel et al¹⁷ retrospectively analyzed the potential statistical predictors for porcelain fracture of implant-supported prosthesis. They analyzed patients who earlier received dental implant supported prosthesis and were recalled after 6 months for follow-up. From the results, they concluded that bruxism affected patients receiving dental implant prosthesis are at a significantly higher chance for implant failure. Lobbezoo

et al¹⁸ reviewed the success of dental implants in patients with tooth grinding habits. Although evidences regarding risk factors are postulated based on the clinical experience, patients receiving dental implants, bruxism is usually considered to be a contraindication. Although literature lacks the substantial evidence regarding this, a careful analysis and approach for treatment is required while planning implant therapy for prosthetic rehabilitation in such patients. Van der Zaag et al¹⁹ evaluated the efficacy of occlusal stabilization splints in the treatment of patients affected by sleep bruxism. They analyzed 21 patients who were randomly assigned into two groups. One group with occlusal splint while the other group with palatal splint. From the results, they concluded that patients in which splinting is advocated, caution is required for better results. Mijiritsky et al²⁰ assessed the effect of preoperative use of botulinum toxin type A in bruxism patients receiving immediately loaded dental implants placed in fresh extraction sockets for full mouth rehabilitation. They analyzed a total of 26 patients with bruxism habit and from the results concluded that in bruxism patients, preoperative use of botulinum toxin appears to be a useful technique that requires special attention and can be explored further for better results.

CONCLUSION

From the above results, it can be concluded that dental implant success rate is significantly affected by bruxism. Therefore, special attention and care should be taken while planning out implant treatment in such patients.

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