

# Assessment of Survival Rate of Dental Implants in Patients with Bruxism: A 5-year Retrospective Study

## Abstract

**Background:** Dental implants are associated with failure such as early or late failure. Systemic conditions such as diabetes, hypertension, and bruxism affect the success rate. The present study was conducted to assess complications in dental implants in bruxism patients. **Materials and Methods:** This 5-year retrospective study was conducted on 450 patients (640 dental implants) who received implants during the period and followed up for 5 years from June 2010 to June 2016. Among these patients, 124 had bruxism habit. Dental radiographs or patients' recalled records were evaluated for the presence of complications such as fracture of implant, fracture of ceramic, screw loosening, screw fracture, and decementation of unit. **Results:** In 240 males and 210 females, 380 implants and 260 implants were inserted, respectively. The difference was statistically nonsignificant ( $P = 0.1$ ). A total of 145 screw-type and 130 cemented-type fixations had complications. The difference was statistically nonsignificant ( $P = 0.5$ ). Complications were seen in single crown (45), partial prostheses (125), and complete prostheses (105). The difference was statistically significant ( $P = 0.012$ ). The common complication was fracture of ceramic (70) in cemented-type fixation and fracture of ceramic (85) in screw-type fixation. The difference was statistically significant ( $P = 0.01$ ). Forty-two single crowns showed decementation, 85 partial prostheses had fracture of ceramic/porcelain, and 50 complete prostheses showed fracture of ceramic/porcelain. The failure rate was 42.9%. Survival rate of dental implants in males with bruxism habit was 90% after 1 year, 87% after 2 years, 85% after 3 years, 75% after 4 years, and 72% after 5 years. Survival rate of dental implants in females with bruxism habit was 92% after 1 year, 90% after 2 years, 85% after 3 years, 75% after 4 years, and 70% after 5 years. The difference among genders was statistically nonsignificant ( $P = 0.21$ ). **Conclusion:** Bruxism is a parafunctional habit which affects the survival rate of dental implants. There is requirement to follow certain specific protocols in bruxism patients to prevent the developing complications.

**Keywords:** *Bruxism, decementation, dental implant*

## Introduction

Dental implants are the treatment of choice for missing teeth. It is considered to be the preferred option for those who want to have long-term artificial prosthesis. The successful implant therapy is determined by its ability to fulfill functions such as biting, chewing, cutting, and occlusion. If it is placed in the anterior region of either of the jaws, it should be capable of cutting and, when inserted in the posterior region, it should have chewing capacity.<sup>[1]</sup>

Studies have shown survival rate of implants ranging from 90% to 95% up to 10 years. The complications in properly inserted implants are not uncommon. The ability of dental implants to unite effectively

with the bone is called osseointegration. This determines the survival rate of dental implants. More efficiently, it has union with bone; higher will be the success rate. Complications are divided into early failures and late failures. Early failures are due to failure in osseointegration, while late failures are due to occlusal overload. In both conditions, there is decreased life of dental implants and thus leads to patient and operator unsatisfaction.<sup>[2,3]</sup>

Bruxism is a condition characterized by grinding and clenching of teeth at night. This is a most commonly occurring parafunctional habit. This is the cause of excessive occlusal load on dental implants due to movement disorder of masticatory apparatus. Excessive overload due to bruxism causes implant and marginal bone

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**Rajkiran Chitumalla,  
Halini Kumari KV<sup>1</sup>,  
Abhilash  
Mohapatra<sup>2</sup>,  
Anuj Singh Parihar<sup>3</sup>,  
Anand KS<sup>4</sup>,  
Padmavathi  
Katragadda<sup>5</sup>**

*Prosthodontics Division, Qaseem Private Colleges, Buraidah, Kingdom of Saudi Arabia,  
<sup>1</sup>Department of Prosthodontics, Sree Sai Dental College and Research Institute, Srikakulam, Andhra Pradesh, <sup>2</sup>Department of Prosthodontics, Institute of Dental Sciences, Siksha "O" Anusandhan (Deemed to be University), Bhubaneswar, Odisha, <sup>3</sup>Department of Periodontics, RKDF Dental College and Research Centre, Bhopal, Madhya Pradesh, <sup>4</sup>Department of Prosthodontics, Kannur Dental College, Anjarekandy, Kannur, Kerala, <sup>5</sup>Department of Periodontics, Mallareddy Institute of Dental Sciences, Hyderabad, Telangana, India*

## Address for correspondence:

*Dr. Rajkiran Chitumalla,  
Prosthodontics Division,  
Qaseem Private Colleges,  
Buraidah - 51411,  
Kingdom of Saudi Arabia.  
E-mail: anilkk44@gmail.com*

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loss. This parafunctional habit is considered to be the main failure cause of dental implants and failure rate is decided by the frequency and intensity of forces applied to the dental implants. The direction of forces also determines the survival rate. There is considerable effect on the implant-supported prostheses.<sup>[4]</sup>

There are two thoughts among researchers regarding the effect of bruxism on dental implants. One thought is that the habit itself is sufficient to cause late-term failures, while the second thought of school is that bruxism is a broad term and there are different motor activities and different etiologies behind it. Engel *et al.* in their study on occlusal wear on bone loss and periosteal value of dental implants did not find any bone loss around dental implants.<sup>[5]</sup> The present study was conducted to assess complications in dental implants in bruxism patients.

**Materials and Methods**

The present retrospective study was conducted in the department of prosthodontics. The study included 450 patients of both genders. A total of 640 dental implants were inserted in these patients. Ethical clearance was obtained before starting the study.

General information such as name, age, gender, site of implant, and bruxism habits was retrieved from the case history pro forma of all patients who received dental implants during the treatment period and followed up for 5 years from June 2010 to June 2016. Among these patients, 124 had bruxism habit. Patients’ age ranged between 20 and 50 years and who had implant-supported prostheses were included in the study. Patients with complaints of tooth grinding or tapping sound at night, confirmation of masseter muscle hypertrophy on voluntary contraction during clinical examination, with hypersensitivity of teeth to cold air, clicking sound in temporomandibular joint movements, and presence of masticatory muscle fatigue or stiffness in the morning were considered positively to be labeled as bruxism patients.

Patients with a history of drug allergy, history of hypertension, or any other systemic diseases were excluded from the study. Dental radiographs or patients’ recalled records were evaluated for the presence of complications such as fracture of implant, fracture of ceramic, screw loosening, screw fracture, and decementation of unit. Results thus obtained were subjected to statistical analysis using Chi-square test.  $P < 0.05$  was considered statistically significant.

**Results**

In this study, there were 240 males and 210 females [Table 1]. The difference was statistically nonsignificant ( $P = 0.5$ ). The number of dental implants in males was 380 and in females was 260. The difference was statistically nonsignificant ( $P = 0.1$ ). Table 2 shows that complications were seen in 145 screw-type and

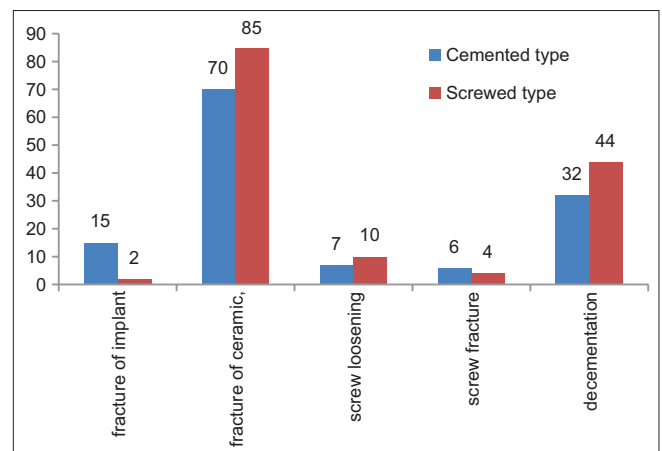
130 cemented-type fixations, while it was absent in 260 screw-type and 242 cemented-type fixations. The difference was statistically nonsignificant ( $P = 0.5$ ). Prostheses who had complications were single crown (45), partial prostheses (125), and complete prostheses (105), while those that had no complications were single crown (112), partial prostheses (210), and complete prostheses (180). The difference was statistically significant ( $P = 0.012$ ). Graph 1 shows that in cemented type of fixation, common complications were fracture of implant (15), fracture of ceramic (70), screw loosening (7), screw fracture (6), and decementation (32), whereas the common complications in screw-type fixation were fracture of implant (2), fracture of ceramic (85), screw loosening (10), screw fracture (4), and decementation (44). The difference was statistically significant ( $P = 0.01$ ). Graph 2 shows that the most common complication seen in single crown was decementation (42), in partial prostheses was fracture of ceramic/porcelain (85), and in complete prostheses was fracture of ceramic/porcelain (50). Survival rate of dental implants with bruxism habit in males was 90% after 1 year,

**Table 1: Distribution of patients and implants**

Gender	Males	Females	P
n	240	210	0.5
Implant number	380	260	0.1

**Table 2: Complications in patients**

Parameters	Present	Absent	P
Number of implants	120	520	0.001
Number of units	135	512	0.00
Fixation			
Screwed	145	260	0.5
Cemented	130	242	
Prostheses			
Single crown	45	112	0.012
Partial prostheses	125	210	
Complete prostheses	105	180	



**Graph 1: Type of complications depending on type of fixation**

87% after 2 years, 85% after 3 years, 75% after 4 years, and 72% after 5 years [Graph 3]. Survival rate of dental implants in females with bruxism habit was 92% after 1 year, 90% after 2 years, 85% after 3 years, 75% after 4 years, and 70% after 5 years [Graph 4, Kaplan–Meier survivability curve]. The difference among genders was statistically nonsignificant ( $P = 0.21$ ).

### Discussion

Dental implants being preferred and optimal modality for missing teeth are not devoid of complications. The successful dental implant treatment shows normal functioning and esthetics. Bruxism is a commonly occurring motor disorder characterized by night grinding or clenching of teeth. Depending on the severity of the disorder, there can be variable clinical features. Patients often experience pain in temporomandibular disorder area and facial muscles, leading to difficult mouth opening. Occlusal facets are commonly seen in mandibular molars and sensitivity to cold and hot becomes the prominent feature.<sup>[6]</sup>

In a 5-year follow-up study by Fischer *et al.*<sup>[7]</sup> on early and delayed loading of implants supporting full-arch prosthesis, 142 dental implants were inserted in edentulous maxillae of 24 patients and 4 implant failures were observed. The role of bruxism as a contributing factor for implant failure was uncertain. Herzberg<sup>[8]</sup> in 2006 conducted a study on implant marginal bone loss in maxillary sinus graft cases done on seventy patients with 212 dental implants and found that 15 patients had the habit of bruxism who were prescribed night guards and author did not find a positive correlation between bruxism and dental implant failure.

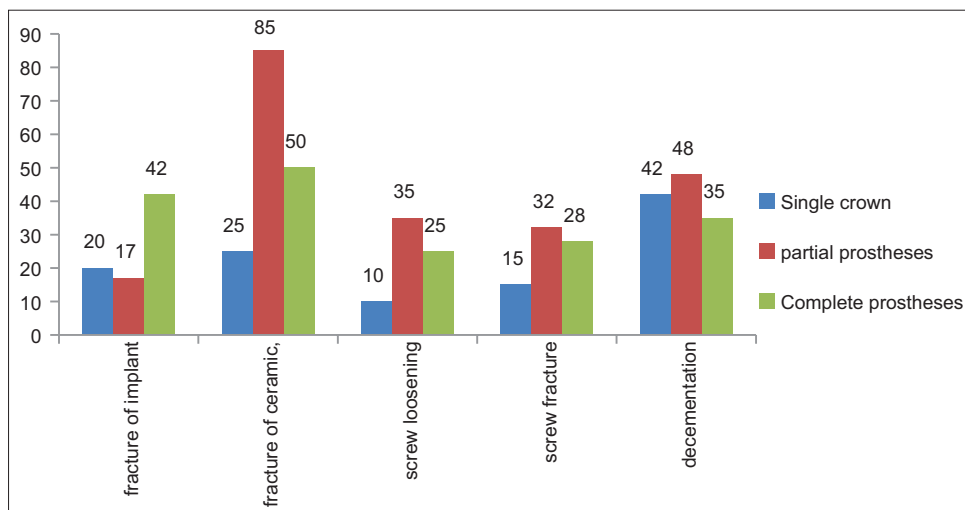
In our study, there were 240 males and 210 females. The number of dental implants in males was 380 and in females was 260. Ibañez<sup>[9]</sup> in 2015 conducted a study on 11 males

and 30 females, whereas Siebers *et al.*<sup>[10]</sup> included 34 males and 42 females with cemented and screw types of fixations. Both types are commonly used. Cement-type fixation is the one where fixed partial denture is luted on abutment which in turn is attached to the implant. It is preferably performed in porcelain-fused-to-metal prostheses in single or multiple crowns. It has the advantages of enhanced esthetics and occlusal harmony. With cement type, the fitting of prostheses becomes perfect. In cemented-type fixations, 130 patients showed complications.

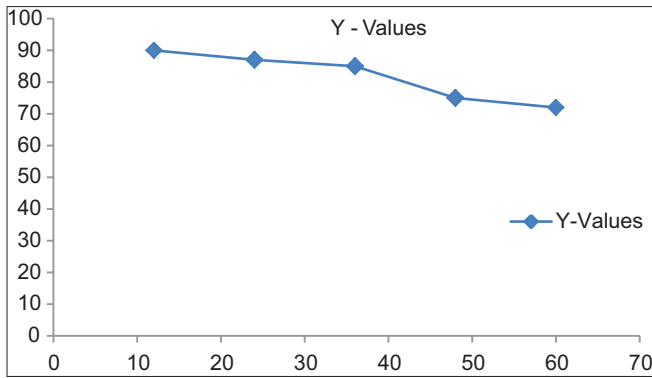
In screw-type prostheses, there is direct metal-to-metal connection and hence error cannot be bear. It has been considered the choice of fixation nowadays. A study by Lewis and Klineberg<sup>[11]</sup> has found 95.8% success rate of screw-type fixation in dental implants. In our study, maximum (145) complications occurred in screw-type fixation. Suneel *et al.*<sup>[12]</sup> in their study of prosthetic complications associated with implant-borne prosthesis in sleep disorder observed complications in 19 cemented- and 12 screw-type fixations.

A study by Punjabi *et al.*<sup>[13]</sup> evaluated the relation of sleep-disordered breathing and mortality and found that there is a positive correlation between the two. Zupnik *et al.*<sup>[14]</sup> conducted a study on 121 clencher and 220 nonclencher having 341 dental implants and found no correlation between bruxism and dental implant failure. Nedir<sup>[15]</sup> in 2004 conducted a study on 236 patients with 528 dental implants and bruxism habit was observed in 13.6% of patients, with two cases of dental implant failures. van der Zaag *et al.*<sup>[16]</sup> conducted a study on 21 sleep bruxism patients. The authors found that occlusal splints become mandatory in patients with bruxism.

We found that the common complications were fracture of implant, fracture of ceramic/porcelain, screw loosening, screw fracture, and decementation. It has been observed that overload caused by bruxism may result in failure of implant-supported prostheses. A study by Suneel



Graph 2: Type of complications depending on type of prostheses



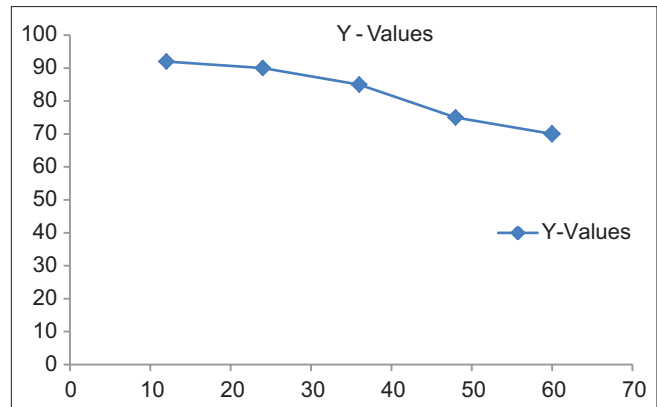
Graph 3: Survival rate of dental implant in males with bruxism habit

*et al.*<sup>[12]</sup> found 12 cases of fracture of porcelain in bruxism patients (8 – cemented, 4 – screw). In six cases, loosening of screw was observed, 6 cases showed decementation, 4 cases showed fracture of screw, and 3 cases had fracture of implant. In our study, the most common complication was fracture of porcelain (155) followed by decementation (76), loosening of screw and fracture of screw (17) each, and screw fracture (10). Glauser *et al.*<sup>[17]</sup> found 41% of dental implant failure in fixture level in bruxism patients and 12% in nonbruxism patients. In the present study, 42.9% of failure was observed.

Torcato *et al.*<sup>[18]</sup> evaluated the effects of bruxism on dental implants and suggested that there should be specific guidelines regarding dental implant insertion in patients with bruxism. Manfredini *et al.* did a review of studies and found no specific relation between dental implant rehabilitation and bruxism. Tosun<sup>[19]</sup> conducted a retrospective study on 368 patients and found implant and abutment fractures, damage to the occlusal surface, and loosening of gold screws.

Manfredini *et al.*<sup>[3]</sup> in their review of bruxism as a risk factor for dental implants evaluated 21 articles to assess biological complications such as mobility of implant, marginal bone loss, and mechanical complications such as prefabricated structures and laboratory-fabricated superstructures. The authors found that four studies revealed a positive correlation in mechanical complications among bruxism patients.

Mendonça *et al.*<sup>[20]</sup> in their case study suggested that parafunctional habits such as bruxism are associated with dental implant failures. Misch<sup>[21]</sup> in his study on the effect of bruxism on treatment planning for dental implants suggested that use of metallic bridge, Grade V titanium components, and by using different shape, diameter, length, and thread of screws, the overload over dental implants may be reduced effectively. Thymi *et al.* from a prospective cohort study evaluated the peri-implant complication with bruxism habit after receiving implant and observed correlation with bruxism habit with complications.<sup>[22]</sup> De Angelis *et al.* evaluated the implant survival rate with



Graph 4: Survival rate of dental implant in females with bruxism habit

several risk factors including bruxism habit for follow-up of 10–18 years and they observed 91.96% survival rate.<sup>[23]</sup>

## Conclusion

Bruxism is a parafunctional habit found to be related with complications in dental implants. Excessive occlusal overload caused in bruxism patients is the leading cause of failure such as fracture of implant, loosening of screw, fracture of screw, and fracture of porcelain. There is need to inculcate new treatment modality in patients with bruxism. However, large-scale studies are required to evaluate the results.

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## Conflicts of interest

There are no conflicts of interest.

## References

1. Pappaspyridakos P, Mokti M, Chen CJ, Benic GI, Gallucci GO, Chronopoulos V. Implant and prosthodontic survival rates with implant fixed complete dental prostheses in the edentulous mandible after at least 5 years: A systematic review. *Clin Implant Dent Relat Res* 2014;16:705-17.
2. Albrektsson T, Donos N; Working Group 1. Implant survival and complications. The third EAO consensus conference 2012. *Clin Oral Implants Res* 2012;23 Suppl 6:63-5.
3. Manfredini D, Poggio CE, Lobbezoo F. Is bruxism a risk factor for dental implants? A systematic review of the literature. *Clin Implant Dent Relat Res* 2014;16:460-9.
4. Paesani DA, Lobbezoo F, Gelos C, Guarda-Nardini L, Ahlberg J, Manfredini D. Correlation between self-reported and clinically based diagnoses of bruxism in temporomandibular disorders patients. *J Oral Rehabil* 2013;40:803-9.
5. Engel E, Gomez-Roman G, Axmann-Krcmar D. Effect of occlusal wear on bone loss and periosteal value of dental implants. *International Journal of Prosthodontics* 2001;14:444-50.
6. Mangano F, Macchi A, Caprioglio A, Sammons RL, Piattelli A, Mangano C. Survival and complication rates of fixed restorations supported by locking-taper implants: A prospective study with 1 to 10 years of follow-up. *J Prosthodont* 2014;23:434-44.
7. Fischer K, Stenberg T, Hedin M, Sennerby L. Five-year results

- from a randomized, controlled trial on early and delayed loading of implants supporting full-arch prosthesis in the edentulous maxilla. *Clin Oral Implants Res* 2008;19:433-41.
8. Herzberg R, Dolev E, Schwartz-Arad D. Implant marginal bone loss in maxillary sinus grafts. *Int J Oral Maxillofac Implants* 2006;21:103-10.
  9. Ibañez JC, Tahhan MJ, Zamar JA, Menendez AB, Juaneda AM, Zamar NJ, *et al.* Immediate occlusal loading of double acid-etched surface titanium implants in 41 consecutive full-arch cases in the mandible and maxilla: 6- to 74-month results. *J Periodontol* 2005;76:1972-81.
  10. Siebers D, Gehrke P, Schliephake H. Delayed function of dental implants: A 1- to 7-year follow-up study of 222 implants. *Int J Oral Maxillofac Implants* 2010;25:1195-202.
  11. Lewis MB, Klineberg I. Prosthodontic considerations designed to optimize outcomes for single-tooth implants. A review of the literature. *Aust Dent J* 2011;56:181-92.
  12. Suneel VB, Kotian S, Jujare RH, Shetty AK, Nidhi S, Grover S, *et al.* Incidence of prosthetic complications associated with implant-borne prosthesis in a sleep disorder center. *J Contemp Dent Pract* 2017;18:821-5.
  13. Punjabi NM, Caffo BS, Goodwin JL, Gottlieb DJ, Newman AB, O'Connor GT, *et al.* Sleep-disordered breathing and mortality: A prospective cohort study. *PLoS Med* 2009;6:e1000132.
  14. Zupnik J, Kim SW, Ravens D, Karimbux N, Guze K. Factors associated with dental implant survival: A 4-year retrospective analysis. *J Periodontol* 2011;82:1390-5.
  15. Nedir R, Bischof M, Briaux JM, Beyer S, Szmukler-Moncler S, Bernard JP. A 7-year life table analysis from a prospective study on ITI implants with special emphasis on the use of short implants. Results from a private practice. *Clin Oral Implants Res* 2004;15:150-7.
  16. van der Zaag J, Lobbezoo F, Wicks DJ, Visscher CM, Hamburger HL, Naeije M. Controlled assessment of the efficacy of occlusal stabilization splints on sleep bruxism. *J Orofac Pain* 2005;19:151-8.
  17. Glauser R, Rée A, Lundgren A, Gottlow J, Hämmerle CH, Schärer P. Immediate occlusal loading of Brånemark implants applied in various jawbone regions: A prospective, 1-year clinical study. *Clin Implant Dent Relat Res* 2001;3:204-13.
  18. Torcato LB, Zuim PRJ, Brandini DA, Falcón-Antenucci RM. Relation between bruxism and dental implants. *RGO, Rev. Gaúch. Odontol.* 2014;62:371-6.
  19. Tosun T, Karabuda C, Cuhadaroglu C. Evaluation of sleep bruxism by polysomnographic analysis in patients with dental implants. *Int J Oral Maxillofac Implants* 2003;18:286-92.
  20. Mendonça G, Mendonça DB, Fernandes-Neto AJ, Neves FD. Management of fractured dental implants: A case report. *Implant Dent* 2009;18:10-6.
  21. Misch CE. The effect of bruxism on treatment planning for dental implants. *Dent Today* 2002;21:76-81.
  22. Thymi M, Visscher CM, Yoshida-Kohno E, Crielaard W, Wismeijer D, Lobbezoo F. Associations between sleep bruxism and (peri-) implant complications: A prospective cohort study. *BDJ Open* 2017;3:17003.
  23. De Angelis F, Papi P, Mencio F, Rosella D, Di Carlo S, Pompa G, *et al.* Implant survival and success rates in patients with risk factors: Results from a long-term retrospective study with a 10 to 18 years follow-up. *Eur Rev Med Pharmacol Sci* 2017;21:433-7.