

## ORIGINAL RESEARCH



## Incidence of Prosthetic Complications associated with Implant-borne Prosthesis in a Sleep Disorder Center

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### ABSTRACT

**Background:** Obstructive sleep apnea (OSA) is one of the common prevalent conditions present worldwide. The process of abnormal habits related to clenching and grinding of teeth is referred to as bruxism and is characterized under the heading of parafunctional activity of the masticatory system. Osseointegrated dental implants represent advancements in the field of odontology. Despite its high success rate, failure and complications are often associated with dental implant treatment due to a number of factors. Hence, we aimed for the present study to assess the incidence of prosthetic complications in patients rehabilitated with implant-borne prosthesis in a sleep disorder unit.

**Materials and methods:** The present study included the assessment of all the patients who underwent prosthetic rehabilitation by dental implants. An experienced registered prosthodontist was given duty for examination of all the cases from the record file data. Prosthetic complications in the patients were identified using photographs, radiographs, and all other relevant data of the patients obtained from the record files. All types of complications and other factors were recorded separately and analyzed.

**Results:** While correlating the prosthetic complications in OSA patients grouped based on number of dental implants, nonsignificant results were obtained. Significant correlation was observed while comparing the prosthetic complications

divided based on type of prosthesis. Fracture of the porcelain was observed in four and eight cases respectively, of screwed and cemented dental implant cases.

**Conclusion:** Some amount of significant correlation existed between the incidences of prosthetic complications and OSA.

**Clinical significance:** Proper history of the patients undergoing dental implant procedures should be taken to avoid failure.

**Keywords:** Dental, Implant, Obstructive sleep apnea.

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### INTRODUCTION

One of the highly prevalent conditions affecting a significant number of males and females worldwide is obstructive sleep apnea (OSA). Strong correlation of OSA with epidemic obesity has also been suggested. The preliminary clinical manifestation of this disease is recurrent episodes of obstruction of upper airway track.<sup>1</sup> This further leads to reduction in the ventilation process resulting in recurrent arousals and episodic oxyhemoglobin desaturations during sleep time. Daytime hypersomnolence along with other major clinical adverse effects is commonly found to be associated with this condition.<sup>2</sup> Association of sleep bruxism and high clench index has been reported in patients suffering from OSA.<sup>3</sup>

Bruxism refers to the process of abnormal habit related to clenching and grinding of teeth, and is characterized under the heading of parafunctional activity of the masticatory system.<sup>4</sup> A wide spectrum of factors are hypothesized to be the causative agent for the occurrence of bruxism. Some cases of bruxism might show no major effect on the oral and perioral tissues, while some

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cases can show serious problems including temporomandibular disorder, tooth mobility, headache, toothache, and problems associated with various prosthetic restorations.<sup>5</sup>

Advancements in the field of odontology can be highlighted in terms of osseointegrated dental implants. Despite its high success rate, failure and complications are often associated with dental implant treatment due to a number of factors. Bruxism is also said to have some amount of effect on the success of implant-supported prosthesis.<sup>6</sup> Hence, we aimed for the present study to assess the incidence of prosthetic complications in patients rehabilitated with implant-borne prosthesis in a sleep disorder unit.

## MATERIALS AND METHODS

The present study was conducted in the Department of Oral Implantology, and included assessment of all the patients who underwent prosthetic rehabilitation by dental implants from June 2013 to July 2016. Ethical approval was taken from the institutional ethical committee, and written consent was obtained after explaining in detail the entire research protocol. Strengthening the Reporting of Observational studies in Epidemiology guidelines were used for planning and conducting the present study. In the dental institution, retrospective collection of all the data records was done from the patient's records of the selected patients from the sleep disorder unit of the institution. Inclusion criteria for the present study included:

- Patients diagnosed with OSA
  - Patients rehabilitated with implant-borne prosthesis
  - Patients belonging to the age group of 25 to 50 years
- Exclusion criteria for the present study included:
- Patients with history of any known drug allergy
  - Patients having history of any other systemic illness
  - Patients who have undergone any other major surgical procedure in the past 1 year

For achieving unbiased randomization, an experienced registered prosthodontist was given duty for examination of all the cases from the record file data. The prosthodontist was unaware of the result obtained after the sleep analysis of the included patients. Prosthetic complications in the patients were identified using the photographs, radiographs, and all other relevant data of the patients obtained from the record files. Occurrence of following factors was included under the category of prosthetic complications:

- Abutment tooth fracture
- Fracture of the connector component
- Fracture or loosening of the screw
- Fracture of the abutment
- Ceramic chipping
- Prosthesis and implant fracture

All the type of complications and other factors were recorded separately. Criteria given by the Spanish Respiratory Association were used for the identification of OSA in various participants.<sup>7</sup>

## Statistical Analysis

All the results were analyzed by Statistical Package for the Social Sciences software 16.0. Chi-squared test, one-way analysis of variance, and multivariate regression curve analysis were used for the assessment of the level of significance. The  $p < 0.05$  was considered statistically significant.

## RESULTS

Details of the patients with and without prosthetic complications are highlighted in Table 1 and Graph 1. Nonsignificant results were obtained while correlating the prosthetic complications in OSA patients grouped based on number of dental implants. Based on the type of fixation of dental implants, two types were found: Cemented and screwed. Prosthetic complications were present in 19 and 12 cases of cemented and screw type of dental implants respectively. A significant correlation was observed while comparing the prosthetic complications divided based on the type of prosthesis ( $p < 0.05$ ). Table 2 and Graph 2 show the incidences of various types of complications. Loosening of the screw was observed in four cases, while fracture of the dental implant was observed in three cemented cases of dental implants. Fracture of the porcelain was observed in four and eight cases respectively, of screwed and cemented dental implant cases.

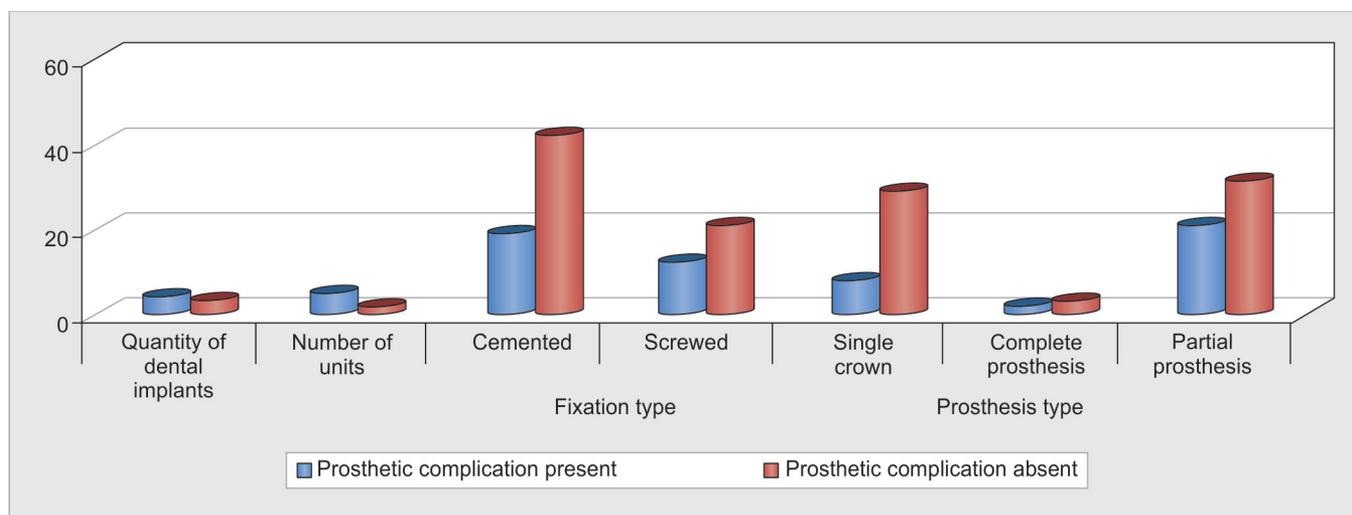
## DISCUSSION

The OSA is one of the common prevalent conditions affecting approximately 6% of the world's middle-aged population with an apnea-hypopnea index (AHI) of

**Table 1:** Details of the patients with or without prosthetic complications

Parameter	Prosthetic complication		p-value
	Present	Absent	
Quantity of dental implants	4	3	0.25
Number of units	5	2	0.02*
<i>Fixation type</i>			
Cemented	19	42	0.36
Screwed	12	21	
<i>Prosthesis type</i>			
SC	8	29	0.03*
Complete prosthesis	2	3	
Partial prosthesis	21	31	

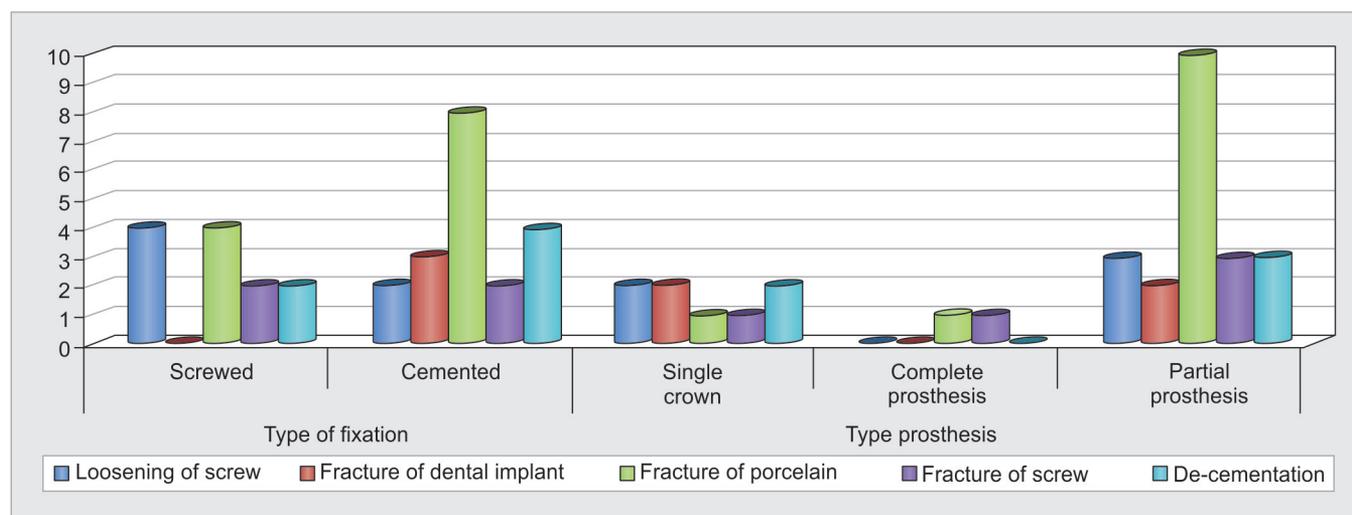
\*Significant



Graph 1: Subtle elements of the patients with or without prosthetic complications

Table 2: Incidence of occurrence of various types of complications

Complication	Type of fixation		Type of prosthesis		
	Screwed	Cemented	Single crown	Complete prosthesis	Partial prosthesis
Loosening of screw	4	2	2	0	3
Fracture of dental implant	0	3	2	0	2
Fracture of porcelain	4	8	1	1	10
Fracture of screw	2	2	1	1	3
Decementation	2	4	2	0	3
Total complications	12	19	8	2	21



Graph 2: Rate of event of different types of complexities

more than 5. The value is even higher in the elderly population and in patients with various metabolic and systemic diseases.<sup>8</sup> Clinical manifestation of OSA includes recurrent airway obstruction that lasts longer than 10 seconds during the time period of sleep. Stereotypical rhythmic movement of masticatory muscles characterizes bruxism, resulting in grindings of teeth. Stress and sleep disorders further exaggerate these manifestations.<sup>9</sup> Results of various studies show that a positive correlation

exists between the bruxism during OSA and tooth grinding.<sup>10</sup> Hence, we aimed for the present study to assess the incidences of prosthetic complications in patients rehabilitated with implant-borne prosthesis in a sleep disorder unit.

In the present study, we observed that approximately 80% of the complications of prosthesis occurred in patients presenting with OSA (Table 1 and Graph 1). The highest AHI was present in the patients having screw fractures

(Table 2 and Graph 2). Our results were in correlation with the results obtained by Anitua et al,<sup>11</sup> who reported nearly similar findings. Anitua et al<sup>11</sup> assessed the prosthetic complications associated with OSA in patients who underwent prosthetic rehabilitation by dental implants. Out of 172 patients included in their retrospective study, implant-supported prosthesis was present in 67 patients. In 22 prosthesis cases, 30 complications were identified by the authors in 16 different patients. In 14 cases, porcelain fracture was present, whereas screw or implant fracture was present in eight cases. They also observed screw loosening and decementation in three and five cases respectively. About 117 months was the mean follow-up time after the prosthesis placement. From the results, they concluded that higher prosthetic complications are associated with OSA. Wittneben et al<sup>12</sup> assessed the complication rates retrospectively associated with implant-supported fixed dental prostheses and single crowns (SCs). They comprehensively examined the complete medico-dental history along with their clinical and radiographic details of the patients included in the present study. They observed that a total of 397 reconstructions were done in 303 participants. A failure rate of 4.5% was observed in the approximately 10-year follow-up time. Ceramic chipping was the most commonly encountered complication followed by occlusal screw loosening and loss of retention. However, they did not observe any occlusal fracture cases in their study. A complication rate of approximately 25% was observed in their study. From the results, they concluded that the most frequently involved complication associated with prosthesis is ceramic chipping.

Mangano et al<sup>13</sup> conducted a retrospective study to assess the failure rate and complication rates of dental implant-associated fixed restorations supported by locking-taper implants. They analyzed a total of 1,494 implants, which were placed in 642 patients over a 10-year time period. They observed that 12 maxillary and 7 mandible implants failed in total. Lack of osseointegration and peri-implantitis were the main reasons found to be responsible for the failure of dental implants. Dental implant survival rate of approximately 99% was observed in their study. No significant correlation was observed between the dental implant failure rate and position, location, or other clinical parameters of dental implants. From the results, they concluded that for the rehabilitation of partial or completely edentulous dental arches, locking-taper implants appear to be a successful procedure.

Chrcanovic et al<sup>14</sup> investigated the correlation between the bruxism and risk associated with failure of dental implants. In their retrospective study, they analyzed over 2,500 patients, who were rehabilitated with over

10,000 dental implants in a single specialty dental clinic. They collected all the data on the dental implant and patients receiving those implants. For approximately 3,500 dental implant cases, complete information was available regarding placement of dental implants. These implants were placed in approximately 1,000 patients. The total number of dental implants that failed was 174, giving a failure rate of 13% for bruxers and 4.6% for nonbruxers. The results were found to be statistically significant. Their statistical model showed a significant correlation between bruxism and risk of failure of dental implants. From the results, they concluded that increased risk of dental implant failure is associated with bruxism. Yadav et al<sup>15</sup> evaluated the complications associated with dental implants in bruxers. They analyzed a total of 1,100 patients, who underwent prosthetic rehabilitation by dental implants. They observed that the maxillary anterior tooth region was the most common site of placement of dental implants. They observed a significant difference while comparing the two study groups. From the results, they concluded that bruxism significantly affects the success of dental implants.

The present study had a few limitations of having small sample size, and no separate consideration was taken for various etiologic factors of OSA in patients undergoing implant-borne prosthesis.

## CONCLUSION

From the above results, the authors concluded that significant correlation existed between the incidences of prosthetic complications and OSA to some extent. However, future studies are recommended.

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