

# Assessment of correlation of periodontitis in teeth adjacent to implant and peri-implantitis

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## ABSTRACT

**Aims:** The present study was conducted to determine correlation between peri-implantitis and periodontitis in adjacent teeth. **Materials and Methods:** The present study was conducted on 58 patients with 84 dental implants. They were divided into two groups, group I (50) was with peri-implantitis and group II (34) was without it. In all patients, probing depth (PD), gingival recession (GR), and clinical attachment loss (CAL) was calculated around implant, adjacent to implant and on contralateral side. Obtained data were statistically analyzed using statistical software IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp with one-way analysis of variance. **Results:** Males were 30 with 52 dental implants and females were 28 with 32 dental implants. CAL was  $5.82 \pm 0.52$  in group I and  $3.62 \pm 0.63$  in group II ( $P = 0.001$ ) around implants. PD was  $4.28 \pm 1.26$  in group I and  $2.20 \pm 0.52$  in group II around adjacent teeth ( $P = 0.002$ ). PD around contralateral teeth was significant ( $P = 0.05$ ) in group I ( $3.18 \pm 1.01$ ) and group II ( $2.71 \pm 0.73$ ). **Conclusion:** Periodontitis has negative effect on implant success. Teeth adjacent to dental implant plays an important role in deciding the success or failure of implant. Maintenance of periodontal health is of paramount importance for successful implant therapy.

**Keywords:** Implant, peri-implantitis, periodontal health

## Introduction

The management of missing teeth is nowadays no longer considered a complicated procedure. In the last few decades, there has been transition in the field of dentistry. With the change in trend from removable partial denture (RPD) to fixed partial denture (FPD) to dental implants, the advancement has led successful treatment. Dental implants have brought revolution, with replacing few teeth to several.<sup>[1]</sup> Dental implants have gained importance in past few years.

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It has become the choice for the patients as well as for the dentist.

The long-term survival rate of dental implants have been well documented in the literature.<sup>[2,3]</sup> The survival rate of 95% in 5 years has been considered successful treatment. However, failure rates are still there. General health of the patient plays an important role which decides outcome of the therapy. Diabetes, hypertension, smoking, etc., are risk factors for peri-implantitis. Oral health status determines the survival of dental implant. It has been observed that in patients with periodontitis, there are more chances of peri-implantitis.<sup>[4]</sup> The present study was conducted to determine correlation between peri-implantitis and periodontitis in adjacent teeth.

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## Materials and Methods

The present retrospective study was conducted on 58 patients of both genders with 84 dental implants in Department of Implantology from March 2011 to September 2017. Written informed consent was obtained from all participating subjects. Ethical clearance was taken from the institutional ethical committee letter no. PDA/Rese: 128/2017-18. Ethical approval was obtained on 16<sup>th</sup> August 2017.

Inclusion criteria was patients with dental implants, evidence of periodontitis with bleeding on probing, >4.5 mm pocket depth, clinical and radiographic presence of bone loss, presence of atleast one teeth adjacent to implant (either mesial or distal), and in opposing and contralateral arch. Patients who received dental implants on posterior ridge in either of the arch in the last 6 years were enrolled in the study. Information of patient home care and smoking habit was recorded. Patients with prior periodontal surgery, history of systemic conditions like diabetes, patients under medications, edentulous opposing, and contralateral arch were excluded from the study.

Depending upon presence or absence of peri-implantitis, patients were divided into two groups. Group I (50) was with peri-implantitis and group II (34) was without peri-implantitis. In all patients, William graduated periodontal probe was used to calculate the probing depth (PD) around the implant as well as around the teeth adjacent to the implant. Teeth adjacent to implant site were evaluated for bone and periodontal condition.

Gingival recession (GR) was calculated by measuring the distance from gingival margin to the Cemento-enamel (CE) junction. The clinical periodontal parameters included PD. In all patients, the mean of parameters was considered which were measured at six sites such as buccal, mesiobuccal, distobuccal, lingual, mesiolingual, and distolingual around the dental implant and teeth adjacent to implant and on the contralateral site using a manual probe.

Clinical attachment loss (CAL) was calculated by adding GR and PD. All measurements were performed around 84 implant sites, 84 adjacent teeth, and 84 contralateral teeth. Intraoral periapical radiographs (IOPARs) were taken to evaluate peri-implantitis. All the evaluation was done by single trained investigator. Results thus obtained were subjected to statistical analysis using statistical software IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp with one-way analysis of variance (ANOVA). *P* value less than 0.05 was considered significant.

## Results

Out of 58 patients, males were 30 and females were 28. In 30 males, 52 dental implant and in 28 females, 32 dental implants were present. The difference was significant ( $P = 0.01$ ) [Table 1]. Table 2 shows PD (mean  $\pm$  S.D) around implant ( $4.24 \pm 1.15$ ), adjacent teeth ( $3.20 \pm 1.08$ ), and contralateral teeth ( $3.04 \pm 0.26$ ).

The difference was significant ( $P = 0.01$ ). GR showed significant difference ( $P = 0.02$ ) around implants ( $0.55 \pm 0.92$ ), adjacent teeth ( $0.83 \pm 1.02$ ), and contralateral teeth ( $0.80 \pm 0.96$ ). CAL was found to be  $4.79 \pm 1.46$ ,  $4.03 \pm 1.32$  and  $3.84 \pm 1.17$  around implant, adjacent teeth, and contralateral teeth, which showed nonsignificant difference ( $P = 0.07$ ). CAL was highly significant ( $P = 0.001$ ) among group I ( $5.82 \pm 0.52$ ) and group II ( $3.62 \pm 0.63$ ) around implants. PD was  $4.28 \pm 1.26$  in group I and  $2.20 \pm 0.52$  in group II around adjacent teeth which showed significant difference ( $P = 0.002$ ). CAL around adjacent teeth to implant also showed significant difference ( $P = 0.001$ ). PD around contralateral teeth was  $3.18 \pm 1.01$  in group I and  $2.71 \pm 0.73$  in group II. The difference was significant ( $P = 0.05$ ) [Tables 3-5].

## Discussion

The successful dental implant therapy may be judged by its ability to free from complications such as peri-implantitis, fracture of

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

Gender	Dental implants	P
Male	30	52
Female	28	32

**Table 2: Assessment of periodontal & peri-implant status in 84 implants**

Parameters (Mean $\pm$ S.D)	Implants	Adjacent teeth	Contralateral teeth
PD	4.24 $\pm$ 1.15	3.20 $\pm$ 1.08	3.04 $\pm$ 0.26
GR	0.55 $\pm$ 0.92	0.83 $\pm$ 1.02	0.80 $\pm$ 0.96
CAL	4.79 $\pm$ 1.46	4.03 $\pm$ 1.32	3.84 $\pm$ 1.17

$P < 0.05$  test used: One way ANOVA

**Table 3: Periodontal status around implants in both groups**

Parameters	Group I (50) (Mean $\pm$ S.D)	Group I (34) (Mean $\pm$ S.D)
PD	5.28 $\pm$ 1.27	3.20 $\pm$ 0.75
GR	0.54 $\pm$ 0.82	0.42 $\pm$ 0.58
CAL	5.82 $\pm$ 0.52	3.62 $\pm$ 0.63

$P < 0.05$  test used: One way ANOVA

**Table 4: Periodontal status around adjacent teeth**

Parameters	Group I	Group II
PD	4.28 $\pm$ 1.26	2.20 $\pm$ 0.52
GR	0.91 $\pm$ 0.80	0.86 $\pm$ 0.75
CAL	5.19 $\pm$ 1.42	2.06 $\pm$ 1.27

**Table 5: Periodontal status in contralateral teeth in both groups**

Parameters	Group I	Group II
PD	3.18 $\pm$ 1.01	2.71 $\pm$ 0.73
GR	0.82 $\pm$ 0.85	0.86 $\pm$ 0.95
CAL	4.00 $\pm$ 0.81	3.57 $\pm$ 0.77

implant, and prosthetic part. The presence of peri-implantitis can be evaluated by taking radiographs in recalled visits and the amount of bone loss and mobility of implant determines the survival rate of implant.<sup>[5]</sup> The present study was conducted to evaluate the effect of periodontitis in dental implants in terms of peri-implantitis.

Zitzmann and Berglundh<sup>[6]</sup> in their study found 28-56% of prevalence of peri-implant diseases among patients and 12-43% around dental implants. They suggested that the chances of peri-implantitis are higher among those who have periodontal diseases as compared to healthy one. Peri-implant mucositis and peri-implantitis are two peri-implant diseases which affects the treatment outcome. Peri-implant mucositis is inflammation of mucosa adjacent to implant and peri-implantitis is inflammation around implant characterized by bone loss.<sup>[7]</sup> Klokkevold *et al.*<sup>[8]</sup> in their systemic review revealed that periodontitis is among various risk factors for peri-implantitis and periodontitis has a negative influence on survival rate of dental implants.

We found that CAL was higher in patients with peri-implantitis than those without it. Thus, it may be suggested that risk of peri-implantitis is more in patient with periodontal diseases than those with healthy periodontium. Similarly, PD and CAL were significantly higher in adjacent teeth group I as compared to group II.

Wang *et al.*<sup>[9]</sup> evaluated the relation between peri-implant conditions and periodontal conditions and found that 58% of patients with 120 dental implants had more peri-implantitis with modified gingival index score >3. They concluded that periodontal health adversely affects the implant health in patient.

We found that although GR and CAL on contralateral side in group I was higher than group II but the difference was statistical nonsignificant ( $P > 0.05$ ). Chrcanovic *et al.*<sup>[10]</sup> in their meta- analysis of dental implants and periodontically compromised and periodontically healthy subjects found that 5.37% implant failures were seen out of 10, 927 dental implants inserted in periodontically compromised patients as compared to 3.84% failure rate in periodontically healthy subjects. They suggested that periodontitis exaggerate the bone loss around dental implant, ultimately leading to implant loss.

Sung *et al.* evaluated the relationship between peri-implantitis and the periodontal health of the adjacent tooth to the implants with and without peri-implantitis and concluded that the presence of peri-implantitis was significantly associated with the periodontal measurements of the remaining teeth.<sup>[11]</sup> Dinzin *et al.* in a systemic review conclude that diagnosis or history of periodontitis was associated with the occurrence of peri-implantitis and determining the potential factors associated with peri-implantitis is fundamental for preventive strategies.<sup>[12]</sup>

Sabanci and Eltas evaluated the microbiological findings obtained from implants and teeth of individuals with dental implants in

function for at least 3 years with respect to presence of smoking and concluded that peri-implant and periodontal microflora composition was similar at long-term implants in smoking and non-smoking individuals.<sup>[13]</sup> Kandasamy *et al.* evaluated various clinical parameters during implant maintenance phase and conclude that etiological factors should be considered in success of implant due to possibility of peri-implantitis.<sup>[14]</sup>

Muhammad Irshad in his review article stated that knowledge of risk factors for developing peri-implantitis is necessary for the clinicians to provide detailed counseling to the high-risk patients and stress the need for good personal and clinical care for the implants.<sup>[15]</sup> Sarmast *et al.* suggested that endodontic evaluation of teeth adjacent to the implant site should be performed for primary prevention of RPI.<sup>[16]</sup>

Mumcu and Taqi Fadhil in a review article suggested that risk factors for peri-implantitis include periodontitis, dental plaque, bad oral hygiene, smoking, alcohol consumption, and diabetes mellitus.<sup>[17]</sup>

From the present study, we observed that periodontal health strongly affects the outcome of dental implant therapy. Teeth adjacent to dental implant also play an important role in deciding the success or failure of implant. Primary preventive care by home oral hygiene, early treatment of periodontal condition, treating systemic condition, and avoiding smoking habit can help in the better prognosis.

Limitation of the study was smaller sample size in particular geographic area. Further long-term study on larger sample size with inclusion of various other factors is needed.

## Conclusion

Periodontal health strongly affects the outcome of dental implant therapy. Teeth adjacent to dental implant also plays an important role in deciding the success or failure of implant. Contralateral teeth have no strong relationship between peri-implantitis and periodontitis.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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