

## Original Article

# Systemic Assessment of Patients Undergoing Dental Implant Surgeries: A Trans- and Post-operative Analysis

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### ABSTRACT

**Background:** Procedure-related and patient-related factors influence the prognosis of dental implants to a major extent. Hence, we aimed to evaluate and analyze various systemic factors in patients receiving dental implants. **Materials and Methods:** Fifty-one patients were included in the study, in which a total of 110 dental implants were placed. Complete examination of the subjects was done before and after placement of dental implants. Implant surgery was planned, and osseointegrated dental implants were placed in the subjects. Postoperative evaluation of the dental implant patients was done after 3 weeks. Anxiety levels were determined using State-Trait Anxiety Inventory (STAI) questionnaire on the surgery day and after 1 week of surgery. The participant describes how they feel at the moment by responding to twenty items as follows: (1) absolutely not, (2) slightly, (3) somewhat, or (4) very much. All the results were recorded and statistical analyzed by SPSS software. **Results:** Out of 51, 29 patients were males while 22 were females, with ratio of 1.32:1. Female patients' mean age was 50.18 years while male patients' mean age was 52.71 years, with statistically nonsignificant difference between them. Functional rehabilitation was the main purpose of choosing dental implants in more than 90% of the subjects. Diameter of 3.75 mm was the shortest implants to be placed in the present study, whereas in terms of length, 8.5 mm was the shortest length of dental implant used in the present study. Tooth area in which maximum implants were placed in our study was 36 tooth region. Maximum implants were placed in Type II bone quality ( $n = 38$ ). Implants installed in the mandible were clamped more efficiently than implants placed in the maxilla ( $P < 0.001$ ). The difference of average STAI-State subscore before and after the surgery was statistically significant ( $P < 0.05$ ; significant). **Conclusion:** Mandibular dental implants show more clamping (torque) than maxillary dental implants.

**KEYWORDS:** Implants, mandible, maxilla, osseointegration

## INTRODUCTION

These days, dental implants are becoming routinely used as a treatment option for rehabilitation of lost teeth. Conventionally, it is only after the completion of bone healing that the dental implants are loaded into the bone. Bone healing time is approximately 3 months and 6 months for the mandible and maxilla, respectively.<sup>[1,2]</sup> Nowadays, one of the modifications of the conventional treatment protocol used for rehabilitation purpose is the immediate loading of implants.<sup>[3-5]</sup> Large amount

of bone-to-implant contact percentage has been observed by histological and histomorphometrical evaluation in the immediate implants recovered from humans.<sup>[6,7]</sup> Success of any implant procedure is determined by procedure-related and patient-dependent measures taken by the clinician and surgeon.<sup>[8]</sup>

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Hence, we conducted this study to analyze the transoperative and postoperative systemic conditions of the patients receiving dental implants.

### MATERIALS AND METHODS

The present study was carried out from March 2008 to April 2012 and consisted of 51 patients reporting in the dental outpatient department for prosthetic rehabilitation by dental implants. A study protocol as given by Goiato *et al.* was adopted for the present study.<sup>[9]</sup> Ethical clearance was taken from the Ethical Committee, and written consent was obtained from all the subjects with prior information about the research protocol. A list of closed-ended questionnaires was framed and was filled by all the subjects. In the questionnaire, participant describes how he/she feels at the moment by responding to twenty items as follows: (1) absolutely not, (2) slightly, (3) somewhat, or (4) very much. All the patients underwent prosthetic rehabilitation by dental implants. Complete medical, clinical, and oral examination was done at initial examination for planning the treatment. Implant surgery was planned and osseointegrated dental implants were placed in the subjects.

Inclusion criteria for subjects in the present study:

- Patients in which dental implants were indicated for treatment of missing teeth
- Patients without any previous history of bone grafts or any other surgical procedure in the same region
- Patients with age between 40 and 55 years.

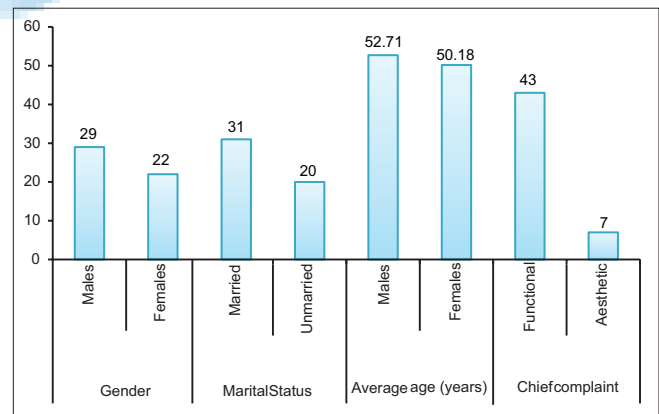
Patients with any history of systemic illness, any known drug allergy, or any other metabolic disorder were excluded from the study. The implant procedure was carried out by a skilled experienced surgeon and the researcher was present during the entire procedure to make note of data regarding the various things, protocols, and moments occurring during the surgery including the guidelines mentioned by the surgeon. Classification of bone quality was done according to Lekholm and Zarb<sup>[10]</sup> and entire transoperative data record was collected by the researcher. After the placement of dental implants, the patient was recalled after 3 weeks for suture removal and for postoperative evaluation by the same researcher. Analysis of the routine activities of oral cavity such as chewing, verbal control, and mouth opening and general activities such as sleep, work, and social life was done to record the postoperative changes. Patients in the present study were periodically recalled after every 2 days of the surgery to note for the occurrence of any kind of symptoms such as nausea, bleeding, swelling, bruising, pain, and tenderness to rule out any immediate postoperative complication. State-Trait Anxiety Inventory (STAI) questionnaire<sup>[11]</sup>

was filled by the patients on the surgery day, i.e., day zero, and after 1 week of surgery during follow-up. All the results were analyzed by SPSS software (SPSS-IBM Co., United States) with descriptive analysis. According to the recent data, for the assessment of preoperative anxiety, the STAI analysis can be considered as a standard.<sup>[12]</sup>

STAI score was represented in the range of 20–80. In Brazilian population, score higher than 49 indicated high anxiety whereas a score of lower than 33 indicated less anxiety.<sup>[11]</sup> Kruskal–Wallis and Dunn’s method were used to assess the level of significance ( $P < 0.05$ ; significant), and Spearman correlation test (strong:  $P > 0.8$ ) was used to analyze the correlation of various postoperative activities.

### RESULTS

Graph 1 highlights the demographic data for the participants included in the present study. Twenty-nine patients were males while 22 were females. The mean age of female participants was 50.18 years while mean age of male participants was 52.71 years. More than 90% of the subjects preferred dental implants because of functional requirement, whereas <10% wanted rehabilitation by dental implants because of esthetic reasons. A total of 110 dental implants were placed with 3.75 mm being the shortest diameter placed in the lateral area while 8.5 mm was the shortest length of dental implant used in the present study which was placed in the areas in the proximity of normal anatomical structures as shown in



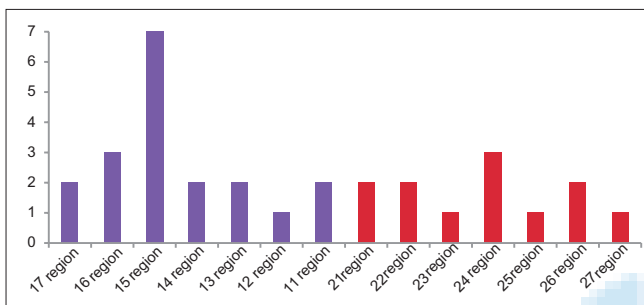
Graph 1: Patient’s demographic and clinical data (n = 51)

Table 1: Characteristics of dental implants placed in patients (n=110)

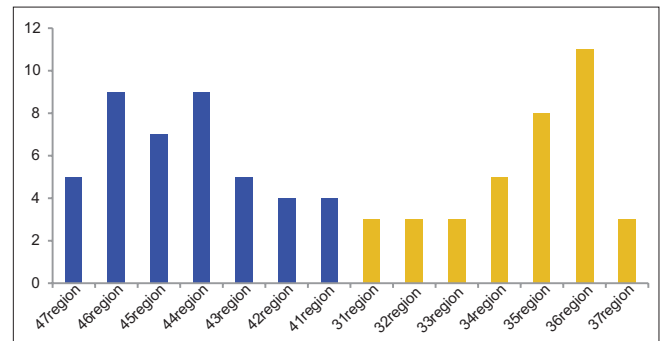
Length/width of dental implant	3.75 mm	4 mm	5 mm	Total
8.5 mm	1	12	1	14
10 mm	1	36	2	39
11.5 mm	12	17	1	30
13 mm	13	13	1	27
Total	27	78	5	110

Table 1. Maximum placement ( $n = 11$ ) of dental implants was in the 36 tooth region followed by 44, 46, and 35 tooth region as shown in Graphs 2 and 3. Graph 4 highlights the division of dental implants on the basis of quality of bone with maximum implants done in Type II bone quality ( $n = 38$ ). Assessment of the clinicopsychological state of the patients was done before the commencement of the implant surgical procedure. Torque level was measured using a mechanical torque meter, and it was observed that mandibular implants were clamped (torque) more efficiently as compared to maxillary implants and the results were statistically significant ( $P < 0.05$ ) as shown in Graph 5. While comparing the duration of surgery between the complication-free surgery and

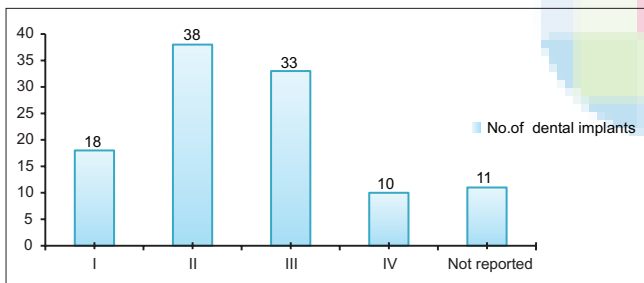
surgery with complications with Dunn's *post hoc* test, statistically significant difference ( $P < 0.05$ ) was noticed as shown in Graph 6. Swelling was seen as the predominant postoperative symptom seen in majority of patients [Graph 7]. Table 2 shows STAI-State subscale results and frequency of the responses for each STAI variable before and after the surgery. When compared before and after the surgery, the difference of average STAI-State subscore was statistically significant.



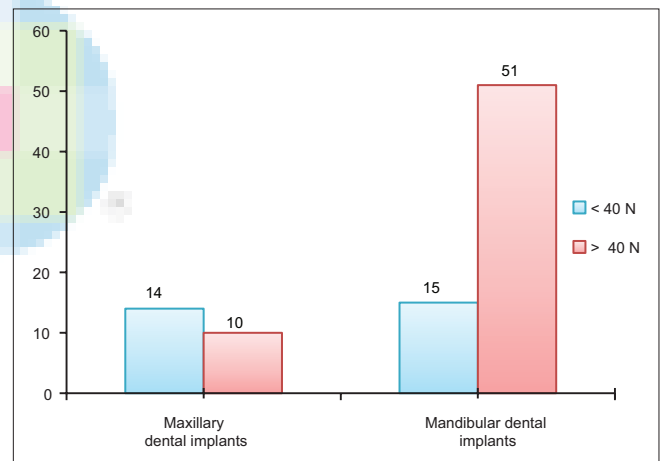
**Graph 2:** Quantity of implants placed in maxillary arch in the first and second quadrant of the patients ( $n = 31$ )



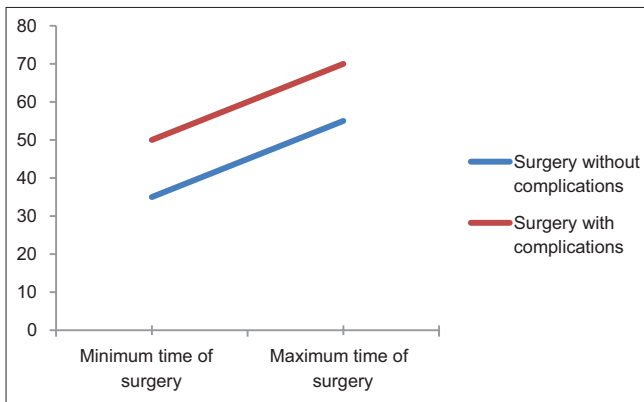
**Graph 3:** Quantity of implants placed in mandibular arch in the first and second quadrant of the patients ( $n = 79$ )



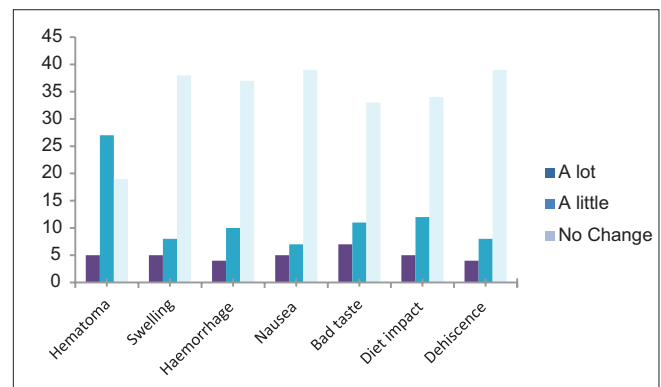
**Graph 4:** Relation of dental implants placed in the patients and the quality of bone



**Graph 5:** Correlation of torque force  $>40$  N or  $<40$  N with the number of dental implants placed in the maxilla and mandible ( $P < 0.05$ )



**Graph 6:** Correlation of the average procedure time (in minutes) with surgery without complications ( $n = 30$ ) and surgery with complications ( $n = 21$ ) ( $P < 0.05$ )



**Graph 7:** Predominant postoperative sign and symptoms ( $n = 51$ )

**Table 2: State-Trait Anxiety Inventory-State subscale results and frequency of the responses to each State-Trait Anxiety Inventory variables (n=51)**

Parameters	Before surgery				1 week after surgery				P
	Absolutely No	Slight	Somewhat	Great amount	Absolutely No	Slight	Somewhat	Great amount	
Calm	4	16	17	14	0	5	20	26	<0.05 (S)
Secure	4	11	22	14	0	4	18	28	<0.05 (S)
Tense	14	23	11	3	23	17	5	6	>0.05 (NS)
Sorry	23	18	6	4	23	18	5	5	>0.05 (NS)
Willing	4	14	18	15	4	4	23	20	<0.05 (S)
Disturbed	24	15	7	5	22	19	5	5	>0.05 (NS)
Worried about misfortunes	18	21	5	7	23	19	6	3	>0.05 (NS)
Rested	6	13	20	12	5	7	19	20	<0.05 (S)
Anxious	14	17	13	7	18	24	6	3	<0.05 (S)
At home	5	16	20	10	4	12	17	18	<0.05 (S)
Confident	4	10	22	15	3	8	18	22	>0.05 (NS)
Nervous	17	21	9	4	18	23	6	4	>0.05 (NS)
Agitated	19	19	9	4	19	23	6	3	>0.05 (NS)
Bag of upset	24	16	6	5	21	22	4	4	>0.05 (NS)
Relaxed	5	15	19	12	7	20	16	8	>0.05 (NS)
Satisfied	0	10	21	17	4	8	17	22	>0.05 (NS)
Preoccupied	17	24	6	4	16	28	4	3	>0.05 (NS)
Confused	25	18	4	4	19	25	4	3	>0.05 (NS)
Happy	5	10	17	19	3	5	18	25	<0.05 (S)
Well	5	6	15	25	3	4	15	29	>0.05 (NS)

S: Significant, NS: Nonsignificant

## DISCUSSION

Since the 1970s, endosseous dental implants have become an important part of restorative, prosthetic, and rehabilitation part of dentistry. El Askary *et al.*<sup>[13]</sup> and Chee and Jivraj<sup>[14]</sup> stated that in spite of the significant development in the field of medicine and implant dentistry, significant failure rates in various aspects is a matter of concern for both surgeon and the patient. Implant success largely depends on the interaction of various factors such as location of the implant, type of implant placed, patient factors, the skill and treatment planning by the clinician. Dental implant failure refers to loss of osseointegration while dental implant complication refers to the complications arising other than implant failure. A clear distinction should be made between the two terminologies for better prognosis.<sup>[13]</sup> Before the endosseous implants became universally accepted, a variety of dental implants were assessed both clinically and histologically for almost three decades. One of the major disadvantages of the dental implants is the complex surgical procedures and the extensive laboratory work required for dental implants.<sup>[15]</sup> Hence, we assessed the trans- and post-operative analysis of the systemic conditions of the patients receiving dental implants. In the present study, we observed that 8.5 mm or more long dental implants were predominant types of implants placed as shown in Table 1. One reason behind this,

as stated by Hobkirk *et al.*, may be that these specific lengths of dental implants offer a better clamping as well as stability, thus affecting long-term prognosis.<sup>[16]</sup> Approximately, 65% of dental implants were placed in bone of Type II and III as shown in Graph 4. Goiato *et al.* also observed similar findings in terms of predominant pattern of bone quality.<sup>[11]</sup> Lai *et al.* hypothesized that there exists a significantly higher chance of implant placement in these areas when compared with other low bone density areas.<sup>[17]</sup> We also observed that significantly higher time was required for implant placement surgeries, in which complications occurred as compared to complication-free surgeries as shown in Graph 6. Weisensee *et al.*<sup>[18]</sup> and Goiato *et al.*<sup>[11]</sup> in their respective studies also found that appearance of symptoms occurs far frequently in surgeries of longer duration as compared to shorter surgeries. Swelling, hematoma formation, nausea, and hemorrhages were the common postoperative signs and symptoms observed in the present study [Graph 7]. Our results were in correlation with the results of Hashem *et al.*, who also observed appearance of various postoperative symptoms in their study.<sup>[19]</sup> We observed a significant fall in the STAI-State subscores 1 week after the surgery. Kim *et al.* observed a significant correlation of presurgical anxious state of the patients and postsurgical pain.<sup>[20]</sup> Pal *et al.* compared the success rate of immediately placed dental implants the

in extraction socket versus implant placed after delay in extraction sockets. They divided their total patients into two groups, with Group A containing patients in which immediately placement of dental implants was done and Group B in which implants were placed after a delay. From the results, they concluded that both the groups are showed similar results, but Group A patients showed slightly higher success rate as compared to Group B.<sup>[21]</sup>

## CONCLUSION

From the above results, we concluded that dental implants when placed in the mandibular area will show more clamping (torque) than dental implants placed in the maxillary area. Furthermore, longer duration dental surgeries are associated with more complications. However, future studies with higher study groups and more parameters are advocated to further explore this field in detail.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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