



Prevalence of Peri Implantitis and Peri Implant Mucositis among Implant Patients - A Dental University Based Study

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ABSTRACT

The term peri-implantitis describes an inflammatory disease that results in the loss of supporting bone around an implant. It differs from mucositis in which the inflammation of mucosa surrounding an implant is not accompanied by bone loss and is reversible. Peri-implant diseases are not uncommon following implant therapy. This study aims to find the incidence of peri-implantitis and peri-implant mucositis among patients having undergone implant therapy in Dental University Hospital in Chennai, India. A retrospective cross-sectional study was conducted using 305 samples from the Department of Implantology after reviewing and analysing the data of 86000 patients between June 2019 and March 2020. Microsoft Excel[®] was used to tabulate the data obtained. The variables assessed were age, gender, presence of infection, type of inflammation and site of implant placement. The sample had a gender distribution of 60.33% males and 39.67% females. 41% implant patients belonged to the age group of 36-55 years. The most (27.5%) common site of implant placement was sextant 4 specifically in relation to the first molar. 98.69% of implant sites showed no signs of infection. 0.66% of implants (in one subject) showed peri-implantitis. 0.33% showed peri-implant mucositis and for 0.33% implants the data was insufficient for categorization. Within the limits of the study, the incidence of peri-implantitis and peri-implant mucositis was 1.31% among implant patients of a Dental University Hospital in Chennai, India.



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INTRODUCTION

Peri-implant health is characterized by absence of erythema, bleeding on probing, swelling and suppuration. The main clinical finding of peri-implant mucositis is bleeding on gentle probing. An increase in probing depth is often seen due to swelling. (Albrektsson, 1994; Popat *et al.*, 2014; Mombelli *et al.*, 1987) Peri-implantitis, on the other hand, is a plaque-associated pathological condition characterized by inflammation of peri-implant mucosa and subsequent progressive loss of supporting bone. (Berglundh *et al.*, 2018; Venugopalan *et al.*,

2014)

The clinical features of peri-implantitis and periodontitis are similar but there are critical histopathological differences in between the two lesions. Such differences should be considered in the diagnosis and treatment planning for peri-implantitis. (Berglundh *et al.*, 2011; Carcuac and Berglundh, 2014) It has been documented that persons with acromegaly have a reduced tendency towards periodontal lesions such as periodontitis and peri-implantitis. (Ashok *et al.*, 2014)

There is strong evidence that the risk of peri-implant diseases is higher in patients who have a history of chronic periodontitis (Jyothi *et al.*, 2017), poor plaque control skills, smoking and diabetes. (Schwarz *et al.*, 2018) Studies have shown that systemic conditions such as cardiovascular diseases, rheumatoid arthritis etc. increase peri-implant diseases. (Renvert *et al.*, 2014) In certain cases, differences in anthropometry can also lead to implant failure. (Ariga *et al.*, 2018; Kannan and Venugopalan, 2018) Microbial colonisation in the micro gap within the implant-abutment interface can lead to peri-implant inflammatory diseases as well. (Duraisamy *et al.*, 2019; Ganapathy *et al.*, 2016; Jain *et al.*, 2017) In the case of screw loosening, microleakage can occur which might also instigate tissue reaction. (Ganapathy *et al.*, 2017; Ashok and Suvitha, 2016) Drugs such as cephalosporins and penicillins can be used as prophylactic measures to prevent peri-implant diseases. (Selvan and Ganapathy, 2016) Improvement of oral health is necessary to prevent implant failure. This can be done by daily oral hygiene practices usage of mouthwash, aloe vera extracts, grape seed extract etc. (Subasree *et al.*, 2016; Basha *et al.*, 2018; Vijayalakshmi and Ganapathy, 2016; Ajay *et al.*, 2017)

Other conditions which can complicate peri-implant diseases include osteoporosis, osteopenia (Máximo *et al.*, 2008), thyroid diseases, hepatitis (Dalago *et al.*, 2017) as well as radiation and chemotherapy. (Nobre *et al.*, 2015) Occlusal overload (Kozlovsky *et al.*, 2007), malpositioning and bone augmentation (Canullo *et al.*, 2016) are also some recorded causes of peri-implant diseases. It has been hypothesized that peri-implant mucositis is a possible precursor for peri-implantitis. (Heitz-Mayfield and Salvi, 2018)

Previously our department has published extensive research on various aspects of prosthetic dentistry (Ariga *et al.*, 2018; Duraisamy *et al.*, 2019; Ganapathy *et al.*, 2017), this vast research experience has inspired us to research this topic. The aim of this study is to find the prevalence of

peri-implantitis and peri-implant mucositis among implant patients of a Dental University Hospital in Chennai, India. (Anbu *et al.*, 2019; Ashok and Ganapathy, 2019; Jain, 2017a,b; Deogade *et al.*, 2018; Varghese *et al.*, 2019)

MATERIALS AND METHODS

Study design and setting

This retrospective cross-sectional study was designed and conducted in a Dental University Hospital in Chennai, India. Data for the study was accessed and obtained after reviewing patient records and analysing the data of 86000 patients. The Data was collected from the patients reporting to the Department of Implantology from June 2019-April 2020 who were dental implant recipients.

Data Collection

A total of 305 cases of implant placement were identified. Other relevant demographic data such as age, gender, presence of infection, site of implant placement, patient ID, patient name etc. were also recorded. Duplicate patient data and incomplete records were excluded from this study. Clinical photos and radiographs were used to verify the presence, absence and type of inflammation at the site of implant placement. Data was also verified by an external reviewer. Kappa Statistics was performed to determine inter reviewer reliability ($k=0.91$).

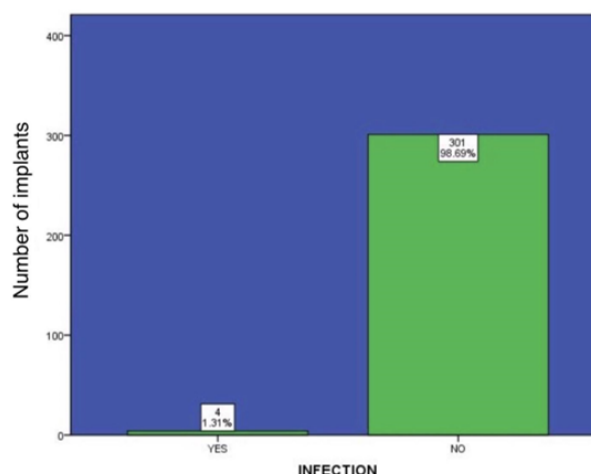


Figure 1: Bar graph showing presence/absence of infection among implant patients of a Dental University Hospital, Chennai, India.

Statistical analysis

The data obtained were recorded in Microsoft Excel and later exported to the Statistical Package for Social Sciences for Windows (SPSS Version 19.0, 2010). These variables included were gender (1. Male, 2. Female), age (1. <18 years, 2. 18-35 years,

Table 1: Age distribution among implant patients of a Dental University Hospital, Chennai, India

Age groups	Frequency	Percent
<18 years	1	0.3
18-35 years	115	37.7
36-55 years	125	41.0
>56 years	64	21.0
Total	305	100.0

Table 2: Gender distribution among implant patients of a Dental University Hospital, Chennai, India.

Gender	Frequency	Percent
Male	184	60.3
Female	121	39.7
Total	305	100.0

Table 3: Distribution of site of implant placement among patients reporting to a Dental University Hospital, Chennai, India.

Site	Frequency	Percent
Sextant 1	31	10.2
Sextant 2	53	17.4
Sextant 3	37	12.1
Sextant 4	84	27.5
Sextant 5	23	7.5
Sextant 6	77	25.2
Total	305	100.0

Table 4: Cross tabulation of presence/absence of infection and site of class 1 dental caries(DC).

Site	Infection		Total
	Yes	No	
Sextant 1	1	30	31
Sextant 2	2	51	53
Sextant 3	0	37	37
Sextant 4	1	83	84
Sextant 5	0	23	23
Sextant 6	0	77	77
Total	4	301	305

3. 36-55 years, 4. >56 years), presence of infection (1. Yes, 2. No), Type of inflammation (1. Peri-implantitis, 2. Peri-implant mucositis, 3. N/A, 4. No inflammation) and site of implant placement (1. Sextant 1- 18-14, 2. Sextant 2- 13-23, 3. Sextant 3- 24-28, 4. Sextant 4- 38-34, 5. Sextant 5- 33-43, 6. Sextant 6- 44-48).

Thereafter, the data was analysed to statistical analysis using the Statistical Package for Social Sciences (SPSS) for Windows (Version 19, 2010). Chi-square test was employed with the level of significance

set at $p < 0.05$ to determine the effect of any demographic data on the variables obtained.

RESULTS

The final data consisted of data sets from 305 implant patients who had undergone implant therapy in the Department of Implantology at a Dental University Hospital in Chennai, India. The Gender distribution (Table 2) among the patients was 60.33% males and 39.67% females. Prevalence

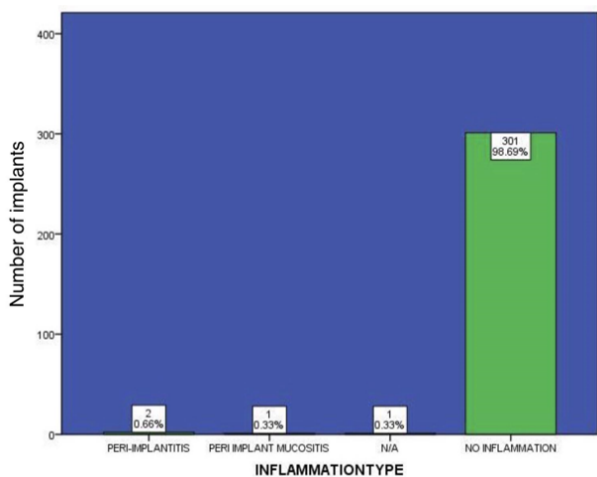


Figure 2: Bar graph showing the type of inflammation among implant patients of a Dental University Hospital, Chennai, India.

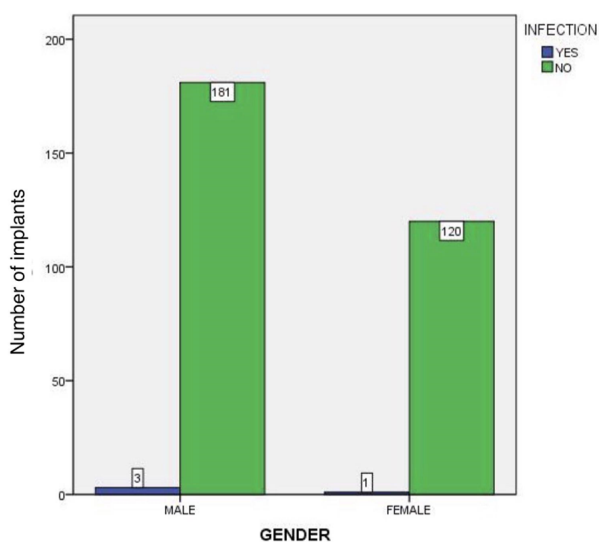


Figure 3: Bar graph showing presence/absence of infection among males and females.

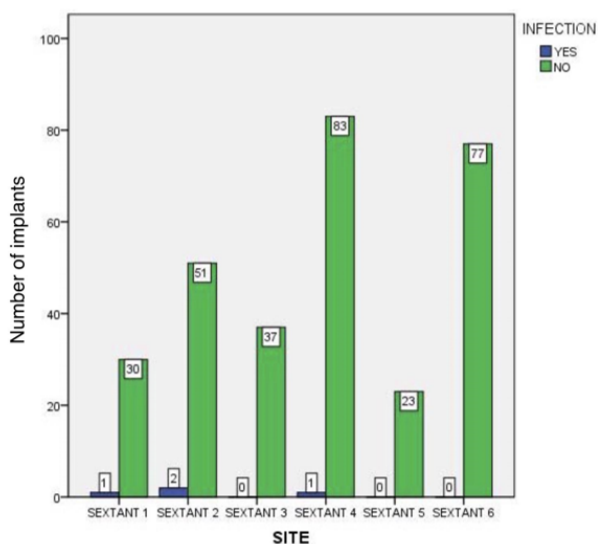


Figure 4: Bar graph showing presence/absence of infection at different sites.

of implant placement in the different age groups (Table 1) was 0.33% in patients below 18 years of age, 37.71% among 18-35-year-olds, 40.98% in 36-55-years-olds and 20.98% in more than 56-year-olds. The distribution of implant placement sites (Table 3) was 27.54% in sextant 4, 25.25% in sextant 6, 17.38% in sextant 2, 12.13% in sextant 3, 10.16% in sextant 1 and 7.54% in sextant 5.

The most common site of implant placement was in relation to lower left mandibular first molar. Overall, the maximum number of implants were placed in Sextant 4. Infection was seen in 1.3% of cases and healthy peri-implant tissues are seen in 98.7% of cases. (Figure 1) Peri-implantitis was found in 0.66% of all implants placed and peri-implant mucositis was found in 0.33% of implants. Yes 1.31%, No 98.69%. No inflammation was seen in the rest 98.7% of implants placed. (Figure 2)

Males had a higher prevalence (Figure 3) of peri-implant diseases (0.99%) compared to females (0.33%) although upon statistical analysis p-value was less than 0.05 making the data statistically significant. The most common site of infection was sextant 2 (0.66%) followed by sextant 1 and sextant 4 at 0.33% each. (Table 4, Figure 4)

DISCUSSION

In the current study, the prevalence of the peri-implant disease was found to be 1.3% of implant sites whereas 98.7% cases are infection-free. (Figure 1) This can be attributed to the meticulous protocol for case selection at Saveetha Dental College and Hospitals. Before the placement of an implant, patients are educated about the whole procedure, its pros and cons, and given specific instructions about post-treatment management of the implant. All local factors such as dental caries, periodontitis and so on are eliminated through proper treatment before the commencement of implant therapy procedure. The patient is constantly monitored throughout the treatment and special emphasis is given to the maintenance of oral hygiene before, during and after the implant therapy. Routine visits are scheduled to check for the prognosis of the implant placement site and immediate attention is given to any signs of infection or inflammation. These factors have resulted in the decreased incidence of peri-implant diseases among the implant recipients of Saveetha Dental College and Hospital, Chennai.

A study by Daubert C et al. found that successful implants were seen in 91.6% cases. (Daubert et al., 2015) In another study by Lindhe et al. peri-implant mucositis occurred in 50% of sites and peri-implantitis in 12-40% of sites. The risk factors iden-

tified were poor oral hygiene, history of periodontitis, diabetes and smoking. (Lindhe and Meyle, 2008) a cross-sectional study on implant treated subjects by Zitzmann et al. reported peri-implant mucositis in approximately 50% implants and peri-implantitis in 12% of implant sites. (Zitzmann and Berglundh, 2008)

Popat et al in 2014 reported the frequency of peri-implantitis to be 9.6% and that of peri-implant mucositis to be 30.7% implants which differs from the results obtained in this study. (Popat et al., 2014)

A 5 year follow up study found the incidence of peri-implantitis in the global to be 31.2%. (Costa et al., 2012) In a ten-year-long study by Rocuzzo et al. 2010 the implant survival rate was 96.6%, 92.8% and 90% respectively in periodontally healthy patients, moderately periodontally compromised patients and severely periodontally compromised patients. (Rocuzzo et al., 2010)

An epidemiological study by Mombelli A et al. stated the prevalence of peri-implantitis to be 10% of all implants. Smoking and history of periodontitis have been associated with a high prevalence of peri-implantitis. (Mombelli et al., 2012)

According to Koldland et al. depending on the definition of peri-implantitis, its prevalence in one study can range from 11.3% to 47.1%. (Koldslund et al., 2010)

Table 1 shows <18 years (0.33%), 18-35 years (37.70%), 36-55 years (40.98%) and 56+ years (20.98%). Table 2 shows males (60.33%), Females (39.67%). Table 3 shows sextant 1 (10.16%), Sextant 2 (17.38%), Sextant 3 (12.13%), Sextant 4 (27.54%), Sextant 5 (7.54%) and Sextant 6 (25.25%). Table 4 shows chi-square test - Site vs Presence/absence of infection among patients reporting to a Dental University Hospital, Chennai, India. Peri-implant disease was seen most commonly in Sextant 2. $p > 0.05$. There is no significant association between presence of infection and site of implant placement.

Figure 2 shows Peri-implantitis 0.66%, Peri-implant mucositis 0.33%, N/A 0.33%, No inflammation 98.69%. Figure 3 shows X-axis denotes gender and Y-axis denotes presence/absence of infection. This graph shows the correlation of presence/absence of infection among males and females in patients reporting to a Dental University Hospital, Chennai, India. Green colour represents absence of infection and blue represents presence of infection. Peri-implant disease was seen more commonly in Males. However, this was statistically not significant. (Chi-square test; p -value=0.985; statistically not signif-

icant) There was no significant difference in the occurrence of infection in males and females.

Figure 4 shows X-axis denotes site of implant placement and Y-axis denotes presence/absence of infection. This graph shows the correlation of presence/absence of infection at different sites in patients reporting to a Dental University Hospital, Chennai, India. Green colour represents absence of infection and blue represents presence of infection. Most common site of infection is sextant 2 followed by sextants 1 and 4. However this was statistically not significant. (Chi-square test; p -value=0.503; statistically not significant) There is no significant difference in the occurrence of infection at various sites.

CONCLUSIONS

Within the limits of the study, it can be concluded that the prevalence of peri-implant diseases among the implant patients of Saveetha Dental College, Chennai is 1.3% which is lower than various other studies done by other authors.

Conflict of interest

The authors declare that they have no conflict of interest for this study.

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