

## Original Research

### Prognosis of dental implants in smokers

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#### ABSTRACT:

**Background:** To estimate the prognosis of dental implants in smokers. **Materials & methods:** A total of 100 patients were enrolled. Out of which 60 were female and 40 were male. An age group included was 24-70 years with 306 total number of implants. The non smokers and a group with history of smoking for a longer time period duration were considered. Clinical parameters were assessed. Statistical analysis was performed using SPSS software. The significance was considered to be < 0.05. **Results:** Mean PD scores were also significantly higher in smokers as compared to non-smokers (P<0.001), ranging from 4.86 in the anterior mandible to 4.86 in the posterior maxilla in smokers and from 3.23 in the anterior mandible to 3.83 in the posterior maxilla in non-smokers. MBL was significantly greater in smokers (P<0.001) as compared to non-smokers in both jaws. **Conclusion:** Smoking is associated with increase in marginal bone loss around implants and probing depths were observed to be greater in smokers than in non-smokers.

**Keywords:** smoking, dental implants, bone loss.

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#### INTRODUCTION

Smoking affects the oral and general health of an individual. Smoking reduces leukocyte activity and causes reduced chemotactic migration rate and low phagocytic activity leading to low infection resistance and delayed wound healing. Smoking also decreases calcium absorption. <sup>(1)</sup> Dental implants have a lower survival rate in smokers. Smoking affects osseointegration process by lowering blood flow rate due to increased peripheral resistance and platelet aggregation. Smoking residues are carbon monoxide and cyanide, which delay wound healing capacity and along with nicotine, inhibit cell proliferation rate. <sup>(2)</sup> Tobacco directly inhibits osteoblast function. Some of the researchers reported that smoking affects implant prognosis with/without augmentations. Studies show significant marginal bone absorption in smokers when compared to non smokers. <sup>(3)</sup>

Implant-supported restorations offer extremely effective and predictable treatment of complete and partial edentulism. However, while implants enjoy high success and survival rates, the incidence of peri-implant disease has been gradually increasing. <sup>(4,5)</sup> An important factor in implant failure, peri-implant disease occurs as a result of a disruption in the balance between bacteria and host-response following osseointegration. <sup>(6)</sup> Any efforts at prevention and treatment of peri-implant disease must clearly address the contributing factors, which include poor oral hygiene, smoking, a history of periodontitis, diabetes mellitus, genetic factors, alcohol consumption, and implant surface characteristics, all of which have been mentioned as possible risk factors in the development of peri-implant disease. <sup>(7,8)</sup> Effects of smoking on implant survival and success are more pronounced in areas of poor quality trabecular bone. <sup>(9)</sup> In smokers, maxillary implants

have more failure rate as compared to mandibular implants. <sup>(10)</sup> Probably, maxillary bone is of lower quality and consequently more susceptible to the damaging effects of smoking. <sup>(11)</sup> Hence, this study is conducted to estimate the prognosis of dental implants in smokers.

## MATERIALS & METHODS

A total of 100 patients were enrolled. Out of which 60 were female and 40 were male. An age group included was 24-70 years with 306 total number of implants. The non smokers and a group with history of smoking for a longer time period duration were considered. Clinical parameters were assessed. Probing depth and crestal bone level was measured with the help of radiographs. Marginal bone attachment at the distal and mesial surfaces of all implants was visually assessed, the average of their measurements was calculated, and the difference in

marginal bone over time was recorded as the MBL of each implant. Statistical analysis was performed using SPSS software. The significance was considered to be < 0.05.

## RESULTS

Mean PD scores were also significantly higher in smokers as compared to non-smokers ( $P < 0.001$ ), ranging from 4.86 in the anterior mandible to 4.86 in the posterior maxilla in smokers and from 3.23 in the anterior mandible to 3.83 in the posterior maxilla in non-smokers.

MBL was significantly greater in smokers ( $P < 0.001$ ) as compared to non-smokers in both jaws. MBL did not vary significantly by location in either group (smokers:  $p = 0.326$ ; non-smokers:  $p = 0.135$ ). No significant sex differences were found in either group ( $p = 0.156$ ).

**Table 1: Probing depth scores in the maxillary and mandibular anterior and posterior regions in smokers and non-smokers.**

| Probing depth  | Non-smokers | Smokers | P- value |
|----------------|-------------|---------|----------|
| Maxilla        |             |         |          |
| Anterior zone  | 3.48        | 4.48    | 0.001    |
| Posterior zone | 3.83        | 4.86    | 0.001    |
| Mandible       |             |         |          |
| Anterior zone  | 3.23        | 4.32    | 0.02     |
| Posterior zone | 3.86        | 4.96    | 0.001    |

**Table 2: Marginal bone loss values in the maxillary and mandibular anterior and posterior regions in smokers and non-smokers.**

| Marginal bone loss | Non - smokers | Smokers | P- value |
|--------------------|---------------|---------|----------|
| Maxilla            |               |         |          |
| Anterior zone      | 0.81          | 2.6     | 0.001    |
| Posterior zone     | 0.86          | 2.8     | 0.001    |
| Mandible           |               |         |          |
| Anterior zone      | 0.63          | 2.3     | 0.001    |
| Posterior zone     | 0.58          | 2.4     | 0.001    |
| P- value           | 0.135         | 0.326   |          |

## DISCUSSION

Radiography plays an essential role in routine clinical practice and in studies assessing MBL around implants. Periapical and panoramic radiography are the most common imaging methods used in clinical practice. <sup>(12)</sup> Age is considered as one of the important prognostic factors in implant success. Older patients are more prone to altered systemic health conditions, have poor local bone conditions and potentially longer healing times. <sup>(13)</sup> In our study conducted, mean PD scores were also significantly higher in smokers as compared to non-smokers ( $P < 0.001$ ), ranging from 4.86 in the anterior mandible to 4.86 in the posterior maxilla in smokers and from 3.23 in the anterior mandible to 3.83 in the posterior maxilla in non-smokers.

In one the study, they assessed 120 patients (68 women, 52 men, ages 19–74 years (mean age: 55.10

years) with 315 implants. They also measured MBL, plaque index (PI), sulcus bleeding index (SBI), and probing depth (PD). P-values less than 0.05 were considered statistically significant. MBL was statistically greater in smokers ( $P < 0.001$ ) as compared to non-smokers in both jaws. MBL did not vary significantly by location in either group (smokers:  $p = 0.415$ ; non-smokers:  $p = 0.175$ ). Mean PI and PD scores were significantly higher in smokers as compared to non-smokers ( $P < 0.001$ ). A positive correlation was found between PI and PD scores in both groups. <sup>(14)</sup> In our study, MBL was significantly greater in smokers ( $P < 0.001$ ) as compared to non-smokers in both jaws. MBL did not vary significantly by location in either group (smokers:  $p = 0.326$ ; non-smokers:  $p = 0.135$ ). No significant sex differences were found in either group ( $p = 0.156$ ).

Another study was done which consisted of 464 consecutively treated completely and partially edentulous patients who had a total of 1852 implants placed between 1979 and 1999. The overall implant failure rate was 7.72%. Patients who were smokers at the time of implant surgery had a significantly higher implant failure rate (23.08%) than non smokers (13.33%). Multivariate survival analysis showed early implant failure to be significantly associated with smoking at the time of stage 1 surgery and late implant failure to be significantly associated with a positive smoking history. Short implants and implant placement in the maxilla were additional independent risk factors for implant failure.<sup>(15)</sup>

One of the meta-analysis reported that smoking increases MBL around implants by 0.16 mm per year, and a long-term retrospective study was concluded that MBL was more severe in smokers compared to non-smokers at all assessed time periods.<sup>(16)</sup> Some researchers demonstrated more MBL in smokers than non-smokers over a 10 year follow-up period, and concluded that localized exposure of peri-implant tissue to cigarette smoke is the main factor causing the higher implant failure rates observed in smokers as compared to non-smokers.<sup>(17)</sup> Furthermore, based on their systematic review and meta-analysis of smoking and dental implants, others suggested that smoking affects the rate of implant failure as well as the incidence of postoperative infection and amount of MBL following implant insertion.<sup>(18)</sup>

## CONCLUSION

Smoking is associated with increase in marginal bone loss around implants and probing depths were observed to be greater in smokers than in non-smokers.

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