

# ASSESSMENT OF CONSEQUENCE OF SMOKING ON SURVIVAL OF DENTAL IMPLANT

*Running title: Consequence of smoking on survival of dental implant*

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**Abstract**

**Aims:** For replacement of missing teethosseointegrated implants are used. Survival rate of implant based on many aspectscomprising ofimplant material used, oral hygiene, personal oral habit such as smoking and bone quality. The current retrospective study was done to evaluate the consequence of smoking on survival of dental implant.

**Materials and Methods:** The study subjects were included from all the patients who undertook for dental implant in implant center from 2012 to 2018. For every patient, severaldataconcerning implant characteristics and smoking habits were noted. The readings were statistically calculated by SPSS statistical software by IBM version 20with Chi-square test at  $P \leq 0.01$ .

**Results:** There was in that 128 (64%) smoker and 72 (36%) were non-smokers. More implants were placed in mandible (124 62%) compared to maxillary area (76 38 %). From 200 implants, total 181 were successful and 20 were failed. Success of implant was considerably more in nonsmokers 71 (98.6%) than smokers 110 (86%). Implant failure rate was more in smokers with greater frequency and duration of cigarette smoking habit.

**Conclusion:** The current study shown that higher risk of implant failure and it wasrelatedto long term and increased frequency of smoking because of bone resorption.

**Keywords:** Dental implant, failure, mobility, smoking

## Introduction

To replace missing teeth an osseointegrated implant are used and which is gaining public demand. These implants are fabricated from biocompatible materials. Numerous authors have described the long-term success of implant treatment; nevertheless, still implants are disposed to failure which produces problem to dentist as well as patients.<sup>[1]</sup> In general, implant failure is defined as the mobility of the implant during osseointegration or postoperative loading.<sup>[2]</sup> The risk factors for implant are due to surgical procedure (type of implant, location, time lapse between tooth removal and loading) and patient characteristics (oral hygiene, smoking, uncontrolled diabetes, and alcohol consumption).<sup>[1],[3]</sup> Success rate of implant based on many factors including operator skill, oral hygiene, implant material (type and length) used, bone quantity and quality, absence of medical conditions, and smoking habit.<sup>[2],[3],[4]</sup> For implant success, immunological and genetic factors such as tumor necrosis factor- $\alpha$  and interleukin-1 $\beta$  have been recognized as markers. Formerly, success of implant was evaluated by the absence of mobility and absence of apical radiolucency.<sup>[3]</sup>

Studies have shown that smokers have a higher risk of loss of tooth, periodontal disease, and oral cancer.<sup>[5]</sup> It has been detected that smoking is related with decreased bone loss, bone height, poor bone quality, and peri-implantitis.<sup>[1]</sup> Bain and Moy decided that both systemic and local injury to the tissues occurs with smoking and which is a collective cause for decrease in tissue oxygenation, which intern disturbs wound healing.<sup>[6]</sup> Heitz-Mayfield and Huynh-Ba from systematic review found an increased risk of peri-implantitis in smokers over nonsmokers.<sup>[7]</sup> DeLuca *et al.* from their 10-year follow-up study found significantly higher failure rate in smokers than nonsmokers.<sup>[8]</sup> The current retrospective study was done to evaluate the effect of smoking on survival rate of dental implant.

## **Materials and methods**

In this retrospective study, 200 participants data for implant were selected from the department of Prosthodontics and Oral Implantology from June 2012 to August 2018. Demographic profile of each participants ( smoking habit, gender, age) was recorded along with information concerning implant characteristics (implant type, region/ jaw, failure) was obtained. Informed consent was obtained from all participants, and ethical approval was obtained from review board. The age range of patients was between 35 and 55 years. After the study, it was divided into either smoker (Group I) or nonsmokers (Group II) based on the history of smoking habit. Smoking characteristics such as type, number of cigarette smoking per day, and year of smoking on implant-treated patients were recorded based on self-administered questions.

From the collected data, success or failure of implant was evaluated based on smoking habit (frequency, duration), non-smoking habit, implant condition, and mobility.

The data were statistically analyzed using SPSS statistical software from IBM version 20 (IBM Corp., Armonk, NY) and using Chi-square test.

## **Results**

In the current study, we included 200 patients in that 120 (60%) were males and 80 (40%) were female participants for implant placement. There was in that 128 (64%) smoker and 72 (36%) were non-smokers. More implants were placed in mandible (124 62%) compared to maxillary area (76 38 %) [Table 1].The age range was 35 and 55 years. From 200 implants, total 181 were successful and 20 were failed. Success of implant was considerably more in nonsmokers 71 (98.6%) than smokers 110 (86%). Implant failure rate was more in smokers with

greater frequency and duration of cigarette smoking habit, but it was not statistically significant [Table 2].

Table 3 shows the role of mobility in success of dental implant. Smokers had 9 (0.045%) mobility compared to 1 (0.005 %) in nonsmokers but it was statistically not significant. When compared for number of cigarette <20/day had lesser mobility compared to >20/day, and it was statistically significant (0.001). When year of smoking compared, more than 10 years smoking had higher failure compared to less than 10 years smoking, it was statistically significant (0.001).

## Discussion

In the current study, 200 implant patients were evaluated for effect of smoking habit on implant success or failure rate. We found that, smokers had higher implant failure compared to nonsmokers and failure rate was higher with increased frequency and duration of smoking habit.

Similar to present study, Shenava *et al.* detected higher implant failure rate in smokers (63.63%) associated to nonsmokers (36.37%) and determined that smoking is not contraindicated, but its adverse effects should be informed to patients.<sup>[21]</sup> Comparable conclusions were made by Takamiya *et al.* from a systematic review.<sup>[11]</sup> Bain and Moy from meta-analysis associated implant success among smokers over nonsmokers, and they found 11.28% failure in smokers compared to 4.76% in nonsmokers which is in accordance with our study.<sup>[6]</sup>

Shenava *et al.* found 69.05% survival of implant in patients with >10 years over 30.95% in <10 years smoking habit. They also found that failure was higher with cigarette consumption >20 packets/year than <20 packets/year, which was statistically not substantial and concluded no significant difference between smokers and nonsmokers.<sup>[21]</sup> We observed increased failure rate of

implant in patients with cigarette smoking >20 packets/day as well as in patients with >10 years of smoking history, this is similar to research by Twito and Sade.<sup>[4]</sup>

Sun *et al.* and Lima *et al.* from their study detected decrease bone healing in smokers over nonsmokers.<sup>[9],[10]</sup> Bezerra Ferreira *et al.* concluded that cigarette smoking has a significant role on early bone tissue response around sandblasted acid-etched implant surface.<sup>[11]</sup> It can be reflected that bone loss around the implant can result in implant mobility. We found that increased mobility was associated with increased frequency of smoking per day and duration >10 years. Shibli *et al.* concluded that smoking has a significant effect on bone healing around dental implant.<sup>[12]</sup> Nogueira-Filho Gda *et al.* observed negative effect of marijuana smoke inhalation on implant success.<sup>[13]</sup> Peleg *et al.* compared long-term success rate of implant placed simultaneously with sinus grafting in smokers over nonsmokers and observed no significant implant failure rate between two groups.<sup>[14]</sup> Twito and Sade similar to our study observed higher implant failure rate among smokers (5.6%) compared to nonsmokers (3.5%),  $P < 0.001$ .<sup>[4]</sup> It has been observed from earlier studies that higher implant failure in maxillary than mandibular jaw.<sup>[14]</sup>

Some studies stated that complete termination of cigarette smoking habit can reverse its negative consequence on implant.<sup>[15]</sup>

The current study found that, implant failure was more among smokers compared to nonsmokers, higher implant failure with increased cigarette smoking frequency (>20 packets/day), and increased risk with increased duration of smoking (over 10 years of duration). The current findings has short coming of; long-term clinical study with higher sample size to prove the adverse effect of smoking on dental implant failure. Additional clinical and

histochemical research should be carried out to evaluate adverse effect of cigarette on implant and bone healing.

### **Conclusion**

The current study indicated that that longer duration and increased frequency of smoking were related with decreased implant survival rate compared to nonsmokers, but it was not statistically significant. Patients should be well-versed about the damaging effect about tobacco smoking.

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**Legends for illustration**

**Tables**

**Table-1: Demographic profile with in relation to gender, jaw type, and smoking habit**

<b>Type</b>	<b>N (%)</b>	<b>P*</b>
<b>Gender</b>		0.001
Male	120 (60%)	
Female	80 (40%)	
<b>Jaw</b>		
Maxilla	76 (38 %)	
Mandible	124 (62 %)	0.001
<b>Smoking type</b>		0.001
Smoker	128(64 %)	
Non-smoker	72 (36 %)	

P\*=0.001

**Table-2: Smoking habit with respect to implant survival over number of cigarette/day**

<b>Smoking habit</b>	<b>Variables</b>	<b>Implant failure, n (%)</b>	<b>Implant survival, n (%)</b>	<b>P</b>
Smoking	Yes	18 (14%)	110 (86 %)	0.031
	No	2 (2.8%)	71(98.6%)	
Number of cigarette per day	<20	6 ( 4.7%)	68(50.8%)	0.042
	>20	12 (9.4%)	42(32.8%)	
	Non smokers	2 (2.8%)	71(98.6%)	
Years of Smoking	<10	7 (5.5%)	64(50 % )	0.021
	>10	11(8.6%)	46(36 %)	

**Table-3: Implant mobility in respect to smoking habit (number of cigarette/day and year of smoking habit)**

<b>Smoking habit</b>	<b>Variables</b>	<b>Mobility (%)</b>	<b>P*</b>
Smoker	Yes	9 (0.045)	0.021
	No	1 (0.005)	
Number of cigarette per day	<20	1	0.001
	>20	3	
Years of smoking	<10	2	0.001
	>10	4	