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Evaluation of Bone Loss around Dental Implants in Smokers and Nonsmokers

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Abstract---Introduction: Dental implants are used to replace missing teeth. Smoking tobacco is considered as risk factor in implant success rate. **Materials and method:** In present study 50 patients were divided into equal two groups: Group I with smokers and Group II with nonsmokers. After considering the inclusion and exclusion criteria, implant was placed by slandered aseptic procedure in both the groups. The success of implant was assessed clinically for mobility f implant and radiographically for marginal bone loss at 3, 6 and 9

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months after implant placement. The difference in the parameters at each recall interval was examined and recorded. The obtained data for both the groups were statistically analyzed. *Results:* There was marginal loss around dental implant and implant mobility was observed in smoker at 3,6 and 9 months. The finding was statistically significant in group I. *Conclusion:* There is definite correlation of smoking on failure of dental implants.

Keywords---implant, mobility, risk factor, smoking, success rate.

Introduction

Nowadays dental implants are gaining importance for replacing missing teeth. Generally, implant failure is defined as the mobility of the implant during osseointegration or postoperative loading. The risk factors for the implant are due to surgical procedure and patient characteristics (smoking, uncontrolled diabetes, oral hygiene, and alcohol consumption).¹ The use of osseointegrated implants as a foundation for the prosthetic replacement of missing teeth has become widespread in the last decade.²

The success rate of implant depends on oral hygiene, operator skill, implant material (type and length) used, bone quality and quantity, occlusal load, absence of medical conditions, and personal oral habit such as smoking. In the oral cavity, the smoking habit is associated with delayed bone healing, reduced bone height, increased rate of bone loss, formation of poor quality bone as well as increased incidence of peri-implantites. The effect of smoking on the success of implants was established by measuring the bone loss around mesial, distal, buccal, and lingual side of each implant using periapical radiographs. It was found that smoking can delay the wound healing. Implant failure in smokers is generally due to the deposition of fibrous tissue at the bone-implant interface. Nicotine present in cigarette may induce microvascular obstruction which results in ischemia, and decreases the blood cells proliferation.³ The carbon monoxide released during cigarette smoking lowers oxygen tension in tissues by displacing oxygen from hemoglobin.⁴ Cigarette smoke may have a cytotoxic effect on human gingival fibroblasts, which results in a decrease in their capacity for adhesion and proliferation.² There are very few reported studies on effect of smoking on survival of dental implants hence the present study was done to evaluate the effect of smoking on implant success.

Materials and Methods

The present clinical trial was conducted on 50 patients comprising both males and females with an age range of 25 years to 60 years, in whom the dental implants were placed between 3 years. The 50 patients were divided into equal two groups: Group I with smokers and Group II with nonsmokers. Demographic data and detailed smoking history were recorded from each of the patients. Those patients who were smoking more than 10 cigarettes in every 24 h for 3 years minimum were included in Group I like smokers.

After considering the inclusion and exclusion criteria, participants were included for group I and group II. The ethical approval was obtained from institutional ethics committee. Informed consent was obtained from participants.

The demographic data was recorded for all the participants. Each implant was placed by standard aseptic procedure in both the groups. The success of implant was assessed clinically for mobility of implant and radiographically for marginal bone loss at 3, 6 and 9 months after implant placement. The difference in the parameters at each recall interval was examined and recorded. The obtained data for both the groups were statistically analyzed using one-way ANOVA keeping the level of significance at $P \leq 0.05$.

Results

The crestal bone loss was evaluated on the digital intraoral periapical radiographs both on the mesial and distal sites of the implants. The mean values are depicted in Tables 1 and 2. There was marginal loss around dental implant in smoker at 3, 6 and 9 months. Mobility in dental implants in both the groups is elaborated in Table 3. The finding was statistically significant in group I.

Table 1
Marginal bone loss around dental implants in Group I

Location	At 3 months follow up	At 6 months follow up	At 9 months follow up
Maxillary anterior region	2.0±0.13	2.3±0.14	3.1±0.31
Maxillary posterior region	2.2±0.23	2.4±0.23	3.3±0.12
Mandibular anterior region	2.4±0.12	2.7±0.45	3.6±0.34
Mandibular posterior region	2.7±0.13	2.9±0.53	3.7±0.26

Table 2
Marginal bone loss around dental implants in Group II

Location	At 3 months follow up	At 6 months follow up	At 9 months follow up
Maxillary anterior region	1.0±0.12	1.2±0.24	1.4±0.14
Maxillary posterior region	1.0±0.23	1.4±0.13	1.8±0.34
Mandibular anterior region	1.2±0.43	1.7±0.12	2.1±0.33
Mandibular posterior region	1.4±0.36	1.8±0.22	2.3±0.46

Table 3
Implant mobility with respect to smoking habit

Habit	Variables	Mobility	% P
Smoking history	Positive	18 (72 %)	0.001
	Negative	7(28%)	
Number of cigarette per day	<20	4 (16%)	0.001
	>20	6 (24%)	
Smoking years	<10	5(20%)	0.001
	>10	16 (64%)	

Discussion

Tobacco smoking is considered the principal environmental risk factor affecting the pathogenesis of periodontitis. ⁵ Smoking in spite of everything is one of the main public health concerns worldwide. ⁶

The presence of peri-implant bone tissue is essential for the long-term success of dental implants. ⁷ Alfadda stated that smoking is associated with significantly increased rates of implant failure and marginal bone loss. ⁴ Ashfaq Yaqoob evaluated the influence of smoking on success of dental implant for 3,6 and 9 months of follow-up and concluded that implant success rate is directly proportional to smoking duration and frequency. ⁸ Kandasamy et al assessed the smoking effect on dental implant survival rate. They stated that greater risk of implant failure was related to increased frequency and longer duration of smoking habit. ¹ Mumcu and Beklen observed effect of smoking on the marginal bone loss around implant. They stated that smokers have higher marginal bone loss rates. ⁹

Kumar et al evaluated the marginal bone loss and implant failure rate in Smokers and Nonsmokers with 12 months follow up and concluded that smoking is associated with long-term implant failure which is directly proportional to the duration and frequency of smoking. ¹⁰ Wychowanski et al concluded that smoking cigarettes has a negative effect on the stability of immediate implants in the maxilla. ¹¹ Lindquist *et al* reported significantly greater marginal bone loss around implants in heavy smokers. Szpak et al analyzed the relationship between marginal bone loss around dental implants with 46-month follow-up, They concluded that loss of marginal bone around the implant increased with the patient's age, but had no significant association with the patient's gender or smoking habits.¹² The drawback of the present study is smaller sample size. Further studies are needed to confirm the results.

Conclusion

There is definite correlation of smoking on failure of dental implants.

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