# Original Research

## Comparative evaluation of marginal bone loss and implant failure rate in smokers and nonsmokers

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**ABSTRACT:**
**Background:** Loss of teeth eventually leads to compromised esthetics giving functional disability and incomplete smile appearance, which at last affects the life quality of patients.The present study was conducted to assess marginal bone loss and implant failure rate in smokers and non-smokers. **Materials & Methods:**90 patients of both genders who received dental implant in last 2 yearswere divided into 2 groups. Group I with smokers and group II with non-smokers. Smokers were patients who smoked more than 10 cigarettes per day for 2 years at least. Following the implant placement, the recall was scheduled at 3, 6, and 12 months after implant loading. Marginal bone loss and dental implant failure rate was recorded in both groups. **Results:** Group I comprised of 35 males and 10 females and group II had 25 males and 20 females. Implants were placed in maxillary anterior region in 22%, maxillary posterior region in 28%, mandibular anterior region in 15% and mandibular posterior region in 35%. The mean marginal bone loss (mm) in maxillary anterior region at 3 months in group I was 2.14, at 6months was 2.40 and at 12 months was 2.71 and in group II was 1.18, 1.32and 1.46, in maxillary posterior region was 2.44, 2.72 and 3.20 in group I and in group II was 1.24, 1.42 and 1.68, in mandibular anteriorregion in group I was 2.61, 1.81 and 3.26 and in group II was 1.32, 1.82 and 2.04, in mandibular posterior region in group I was 2.72, 2.64 and 3.22 and in group II was 1.58, 2.05 and 2.26 respectively. There was failure seen in 12% in group I and 4% in group II. The difference was significant (P< 0.05). **Conclusion:** Maximum dental implant failures was seen among smokers than non-smokers. Similarly, marginal bone loss is also higher in smokers as compared to non-smokers.
**Key words:** dental implant, bone loss, Smoker

## INTRODUCTION

Loss of teeth eventually leads to compromised esthetics giving functional disability and incomplete smile appearance, which at last affects the life quality of patients.[1] With the advancements in modern dentistry, using dental implants for replacing missing teeth has revolutionized treatment. Using implant dentistry alleviates various problems associated with the restorative procedures for single as well as multiple teeth.[2]In dental implants, the epithelial cells in the sulcular region are surrounded by the connective tissue above the bone. The tissue stability is influenced via various cellular and molecular events. Bone levels measured radiographically represent the most predictive clinical parameters of these molecular and cellular events. Long-term implant survival depends largely on the surrounding bone due to its dynamic nature.[3]
Smoking has been shown to be a primary risk factor for general health and responsible for many serious

diseases, as for 90% of all lung cancers, 70% of chronic lung diseases, 80% of myocardial infarctions before the age of 50, and 30% of chronic ischemic heart diseases and strokes. There are an estimated 1.3 billion smokers around the world, and 4.9 million people die from tobacco smoking-related diseases every year (WHO).[4] Besides the general role healthcare professionals play in tobacco smoking cessation and prevention, certain aspects pertaining to modern dental implant practice should be considered in tobacco smokers for thorough patient evaluation before oral surgical procedures and implant treatment planning.[5] The present study was conducted to assess marginal bone loss and implant failure rate in smokers and non-smokers.

## MATERIALS & METHODS
The present study comprised of 90 patients of both genders who received dental implant in last 2 years. All were informed regarding the study and their written consent was obtained.

Data such as name, age, gender etc. was recorded. All patients were divided into 2 groups. Group I with smokers and Group II with non-smokers. Smokers were patients who smoked more than 10 cigarettes per day for 2 years at least. All were assessed carefully. Plaque index scores were recorded as follows: 0 = no plaque, 1 = plaque on the probe, 2 = plaque on the implant seen by the naked eye, and 3 = abundance of soft matter. The gingival index recorded the presence of bleeding and was scored as follows: 0 = no bleeding, 1 = isolated bleeding spots visible, 2 = blood forms a confluent red line along the margin, and 3 = heavy or profuse bleeding.Following the implant placement, the recall was scheduled at 3, 6, and 12 months after implant loading. Radiographic bone loss was assessedwith intraoral periapical radiographs by measuring the distance from the implant (widest part) to the crest of the alveolar bone mesially and distally. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

## RESULTS
**Table I Distribution of patients**

| Groups | Group I | Group II |
|---|---|---|
| Status | Smokers | Non- smokers |
| M:F | 35:10 | 25:20 |

Table I shows that group I comprised of 35 males and 10 females and group II had 25 males and 20 females.

**Table II Presence of implants at various sites**

| Site | Percentage | P value |
|---|---|---|
| Maxillary anterior | 22% | 0.91 |
| Maxillary posterior | 28% | |
| Mandibular anterior | 15% | |
| Mandibular posterior | 35% | |

Table II shows that implants were placed in maxillary anterior region in 22%, maxillary posterior region in 28%, mandibular anterior region in 15% and mandibular posterior region in 35%. The difference was on- significant (P> 0.05).
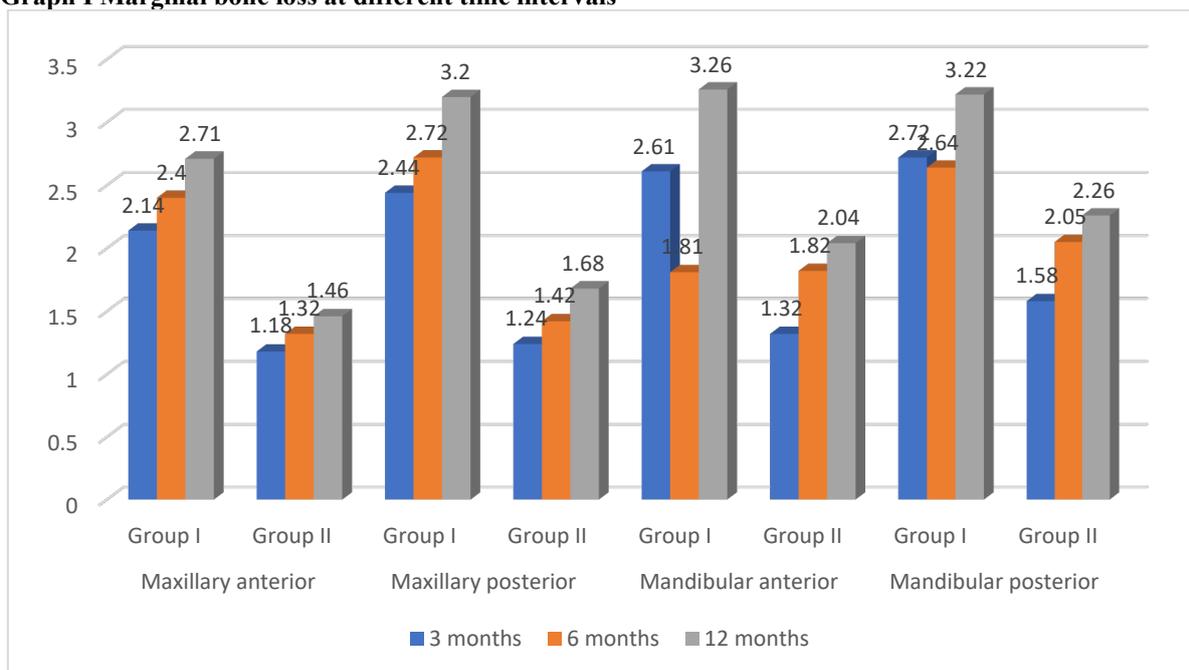
**Table III Marginal bone loss at different time intervals**

| Region | Groups | 3 months | 6 months | 12 months | P value |
|---|---|---|---|---|---|
| Maxillary anterior | Group I | 2.14 | 2.40 | 2.71 | 0.02 |
| | Group II | 1.18 | 1.32 | 1.46 | 0.05 |
| Maxillary posterior | Group I | 2.44 | 2.72 | 3.20 | 0.01 |
| | Group II | 1.24 | 1.42 | 1.68 | 0.03 |
| Mandibular anterior | Group I | 2.61 | 1.81 | 3.26 | 0.04 |
| | Group II | 1.32 | 1.82 | 2.04 | 0.02 |
| Mandibular posterior | Group I | 2.72 | 2.64 | 3.22 | 0.01 |
| | Group II | 1.58 | 2.05 | 2.26 | 0.03 |

Table III, graph I shows that mean marginal bone loss (mm) in maxillary anterior region at 3 months in group I was 2.14, at 6months was 2.40 and at 12 months was 2.71 and in group IIwas 1.18, 1.32 and 1.46, in maxillary posterior region was 2.44, 2.72 and 3.20 in group I and in group II was 1.24, 1.42 and 1.68, in mandibular anterior region in group I was 2.61, 1.81 and 3.26 and in group II was 1.32, 1.82 and 2.04, in mandibular posterior region in group I was 2.72, 2.64 and 3.22 and in group II was 1.58, 2.05 and 2.26 respectively. The difference was significant (P< 0.05).

**Graph I Marginal bone loss at different time intervals**



**Table IV Dental implant failure rate in both groups**

| Groups | Failure | P value |
|--------|---------|---------|
| Group I | 12% | 0.01 |
| Group II | 4% | |

Table IV, graph II shows that there was failure seen in 12% in group I and 4% in group II. The difference was significant (P< 0.05).

## DISCUSSION

An osseointegrated implant used to replace missing teeth is gaining widespread public demand. These implants are made up of biocompatible materials. Several authors have reported the long-term success of implant treatment; however, still implants are prone for failure which creates problem to dentist as well as patients.[6] In general, implant failure is defined as the mobility of the implant during osseointegration or postoperative loading. The risk factors for implant are due to surgical procedure (type of implant, location, time lapse between tooth removal and implant placement, and loading) and patient characteristics (smoking, oral hygiene, uncontrolled diabetes, and alcohol consumption). Success rate of implant depends on many factors including 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.[7] For implant success, immunological and genetic factors such as tumor necrosis factor-α and interleukin-1β have been recognized as markers. Previously, success of implant was assessed by the absence of mobility and apical radiolucency. However, presently, the width of the attached gingiva, associated medical problems, smoking, and width of the implant can be considered as key factors in assessing the success of implant.[8] The present study

was conducted to assess marginal bone loss and implant failure rate in smokers and non-smokers.

In present study, group I comprised of 35 males and 10 females and group II had 25 males and 20 females. Arora et al[9] in their study participants were selected from all the patients who underwent for dental implant in implant. The age range of patients was between 30 and 54 years. There were 2142 (57.2%) male and 1579 (42.4%) female participants, in that 72.2% were non-smokers and 27.7% were smokers. Implant placed more in mandible (2312, 62%) than in maxillary region (1409, 37.8%). From 3721 patients, 3600 were successful and 121 failures. Success of implant was considerably more in non-smokers than smokers. Implant failure rate was more in smokers with increased frequency and duration of cigarette smoking habit, but it was statistically not significant. In the present study, we have observed 0.049% mobility in smokers compared to 0.007% in non-smokers.

We found that implants were placed in maxillary anterior region in 22%, maxillary posterior region in 28%, mandibular anteriorregion in 15% and mandibular posterior region in 35%. Kumar et al[10]aimed to evaluate the smoking effect on dental implant survival rate as well as marginal bone loss in dental implants.Out of 86 patients, Group I had 43 patients who were smokers and Group II had non-smokers. Following the implant placement, marginal

bone loss radiographically and mobility were assessed clinically at 3, 6, and 12 months after implant loading.The mean marginal loss seen in smokers at 3 months was $2.13 \pm 0.21$, $2.46 \pm 0.09$, $2.60 \pm 0.0.92$, and $2.74 \pm 0.11$ for maxillary anterior, maxillary posterior, mandibular anterior, and mandibular posterior regions, respectively. The 12-month recall visit showed a higher proportion of smokers having implant mobility. In smokers, 13.95% ($n = 6$) of the study participants had implant mobility, whereas 6.97% ($n = 3$) of the non-smokers had mobility.

We found that mean marginal bone loss (mm) in maxillary anterior region at 3 months in group I was 2.14, at 6months was 2.40 and at 12 months was 2.71 and in group II was 1.18, 1.32and 1.46, in maxillary posterior region was 2.44, 2.72 and 3.20 in group I and in group II was 1.24, 1.42 and 1.68, in mandibular anteriorregion in group I was 2.61, 1.81 and 3.26 and in group II was 1.32, 1.82 and 2.04, in mandibular posterior region in group I was 2.72, 2.64 and 3.22 and in group II was 1.58, 2.05 and 2.26 respectively. We found that there was failure seen in 12% in group I and 4% in group II.Shenava et al[11] observed higher implant failure rate in smokers (63.63%) compared to non-smokers (36.37%) and concluded that smoking is not contraindicated, but its adverse effects should be informed to patients. Bain and Moy[12] from meta-analysis compared implant success among smokers over non-smokers, and they found 11.28% failure in smokers compared to 4.76% in non-smokers.

## CONCLUSION

Authors found that maximum dental implant failures was seen among smokers than non- smokers. Similarly, marginal bone loss is also higher in smokers as compared to non-smokers.

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