

ORIGINAL RESEARCH

To assess the disparity in success rates of dental implants between individuals who smoke and those who do not smoke

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Received: 14 March, 2022

Accepted: 16 April, 2022

ABSTRACT

Aim: To assess the disparity in success rates of dental implants between individuals who smoke and those who do not smoke. **Material and methods:** This retrospective investigation includes a cohort of 120 patients who had dental implant operations throughout the study period. The patient selection criteria were individuals who had received dental implant therapy for one or more missing teeth and were at least eighteen years of age. The study sample included 60 smokers and 60 non-smokers. This was accomplished via meticulous examination of patient records and smoking history information housed in the center's database. **Results:** The study found that there were significant disparities in implant survival rates between smokers and non-smokers. The implant survival rate was much higher in the non-smoking group, with a rate of 98.33%, compared to the smoking group, which had a rate of 91.67%. The prevalence of peri-implantitis was 26.67% in the smoking group, compared to just 11.67% in the non-smoking group. This study highlights the heightened susceptibility of smokers to develop inflammatory complications related to implants. Smokers had an average marginal bone loss of 2.6 mm, but non-smokers showed a much lower average of 1.2 mm. The significant disparity in bone loss suggests that those who smoke have inferior bone remodeling and maintenance in the vicinity of their implants. **Conclusion:** The finding of this study underscores the substantial detrimental impact of smoking on the outcomes of dental implant procedures. Smoking adversely affects osseointegration and the longevity of implants, as shown by poorer rates of implant survival, a higher occurrence of peri-implantitis, and increased marginal bone loss in those who smoke. These findings emphasize the need of personalized treatment strategies and rigorous postoperative care guidelines, particularly for those who smoke.

Keywords: Dental implants, Smokers and Non-smokers

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INTRODUCTION

Dental implantology has significantly transformed restorative dentistry, providing edentulous patients with a feasible option [1]. However, despite these advancements, ongoing research is being conducted to determine the long-term sustainability of dental implants, particularly in relation to the impact of smoking on the success of implants [2]. Smoking is associated with inadequate osseointegration and increased rates of implant failure, establishing it as a well-recognized risk factor for several diseases [3]. Nevertheless, the existing literature presents conflicting findings about the specific influence of smoking on the success of dental implants [4,5]. Although there are variations depending on individual patient factors and implant characteristics, research conducted by Berglundh T et al [6] suggests that smoking can have an impact on dental implants.

Conversely, a study by De Ry SP et al. [5] has demonstrated that smokers have notably higher rates of peri-implantitis and implant failure. Despite these disparities, doing a comprehensive comparative study is still important in order to provide substantial evidence of this [7,8]. This research aims to address the discrepancy by doing a thorough analysis of dental implant outcomes in both smokers and non-smokers, over an extended length of time. This study seeks to rectify the limitations of previous studies by investigating a larger sample size and using rigorous statistical analysis to comprehend the correlation between smoking and the success rates of implants. Furthermore, the development of specific intervention approaches necessitates a comprehension of the underlying processes by which smoking affects osseointegration and implant stability [9]. Furthermore, with the growing number of

individuals seeking dental implants and the overall population of smokers, it is crucial to clarify the impact of smoking on the success of implants [10]. The objective of this study is to provide significant new insights that might influence the treatment plans in implant dentistry and the methods for advising patients.

MATERIAL AND METHODS

This retrospective investigation includes a cohort of 120 patients who had dental implant operations throughout the study period. The patient selection criteria were individuals who had received dental implant therapy for one or more missing teeth and were at least eighteen years of age. The study sample included 60 smokers and 60 non-smokers. This was accomplished via meticulous examination of patient records and smoking history information housed in the center's database. An exhaustive analysis of patient records was required to collect data. This evaluation included data about smoking behaviors, medical history, implant attributes (such as kind, dimensions, and placement), surgical techniques used, and postoperative monitoring information. Prosthodontists and oral surgeons, who have undergone considerable training, perform prosthetic procedures and implant insertions, ensuring consistent protocols in every instance. The primary outcome measures that were assessed were marginal bone loss, incidence of peri-implantitis, and rates of implant success. Implant success is defined based on established criteria, including functional stability, absence of pain or movement, and absence of radiological evidence of issues. The diagnosis of peri-implantitis was made based on clinical and radiological evidence of inflammation and bone loss around the implants. Quantification of marginal bone loss was achieved by using standardized radiography measures conducted at predefined intervals after implant placement. The statistical analysis was conducted using SPSS version 22.0 software. Inferential statistics were used to compare outcomes between smokers and non-smokers, while descriptive statistics were utilized to characterize the study population. The evaluation of categorical and continuous variables was conducted using chi-square tests and t-tests, respectively. To ascertain the individual influence of smoking on implant outcomes, a multivariate regression analysis was conducted. This study took into consideration pertinent aspects that might potentially affect the results, such as age, gender, and implant-related characteristics. The extended length of follow-up, ranging from 1 to 2 years following the insertion of the implant, enabled a comprehensive evaluation of the results of the implant in groups including both smokers and non-smokers.

RESULTS

The study found that there were significant disparities in implant survival rates between smokers and non-smokers. The implant survival rate was much higher in the non-smoking group, with a rate of 98.33%, compared to the smoking group, which had a rate of 91.67%. This discrepancy highlights a notable difference in the long-term success rates of dental implants between the two groups. Smokers' lower survival rate suggests that smoking may have a detrimental effect on the stability and longevity of dental implants [table 2].

There was a notable disparity in the occurrence of this prevalent complication connected to implants between those who smoke and those who do not smoke. The prevalence of peri-implantitis was 26.67% in the smoking group, compared to just 11.67% in the non-smoking group. This study highlights the heightened susceptibility of smokers to develop inflammatory complications related to implants. Smoking may increase the inflammatory response, which in turn increases the chances of developing peri-implantitis and puts the implant and surrounding tissues at risk [table 2].

Smokers had a considerably higher degree of marginal bone loss compared to non-smokers, indicating a crucial indication of implant longevity and osseointegration. Smokers had an average marginal bone loss of 2.6 mm, but non-smokers showed a much lower average of 1.2 mm. The significant disparity in bone loss suggests that those who smoke have inferior bone remodeling and maintenance in the vicinity of their implants. The smoking cohort has had substantial bone resorption, indicating potential compromise to the implant's structural integrity. This may result in challenges for the implant's long-term effectiveness, necessitating careful monitoring and tailored treatments to avoid further deterioration of the bone [table 2]. Taken together, these results highlight how smoking negatively affects a number of dental implant outcomes. When compared to non-smokers, smokers showed greater rates of peri-implantitis, marginal bone loss, and monitoring and customized therapies to prevent additional bone degradation.

Taken together, these results highlight how smoking negatively affects a number of dental implant outcomes. When compared to non-smokers, smokers showed greater rates of peri-implantitis, marginal bone loss, and worse implant survival rates. The findings highlight the necessity of individualized treatment plans and strict postoperative care guidelines, particularly for smokers, in order to increase dental implants' long-term stability and success.

Table 1: Demographic Characteristics

Characteristic	Smoking Group		Non-Smoking Group	
	Number	Percentage	Number	Percentage
Gender				
Male	35	58.33	40	66.67
Female	25	41.67	20	33.33
Age(mean± SD)	46.85±4.36		44.74±4.63	
Implant Location				
Molar	24	40	23	38.33
Premolar	18	30	20	33.33
Anterior:	18	30	17	28.33

Table 2: Implant Outcomes

Outcome Measure	Smoking Group		Non-Smoking Group	
	Number	Percentage	Number	Percentage
Implant Survival Rate	55	91.67	59	98.33
Peri-implantitis	16	26.67	7	11.67
Marginal Bone Loss(mm)	2.6mm		1.2mm	

Table 3: Complications and Adverse Events

Complication Type	Smoking Group		Non-Smoking Group	
	Number	Percentage	Number	Percentage
Infection	14	23.33	5	8.33
Implant Mobility	8	13.33	1	1.67

DISCUSSION

The investigation's results elucidate the complex correlation between smoking and the functioning of dental implants. The complex effects of smoking on the functioning and lifespan of dental implants are shown by the differences in implant survival rates, frequency of peri-implantitis, and loss of marginal bone between individuals who smoke and those who do not smoke. Previous research has shown that smoking has a detrimental effect on the durability and integration of dental implants, as shown by lower survival rates among smokers compared to non-smokers [1, 2]. The molecular mechanisms of this phenomena include decreased blood circulation, impaired wound healing, and altered immune response caused by the components of cigarette smoke [3, 4]. These factors hinder the implant's capacity to fuse with the adjacent bone tissue, hence reducing the success rate of implants in individuals who smoke. Studies that relate smoking to an increased risk of periodontal diseases are consistent with the significantly greater incidence of peri-implantitis among smokers [5,6]. Smoking's immunosuppressive effects lead to a dysregulated inflammatory response, which facilitates bacterial colonization and the eventual deterioration of the tissue around the implants [7]. Smokers' increased inflammatory state accelerates the development of peri-implantitis, making it extremely difficult to manage and preserve implant health in this population.

Smoking also has a negative effect on bone remodeling and maintenance around dental implants, as evidenced by the significant difference in marginal

bone loss between smokers and non-smokers [8,9]. The long-term stability of implants is compromised by excessive bone loss, which may result in implant failure or the need for additional operations such as bone grafting or implant revision surgeries [10]. Changes in osteoblastic and osteoclastic activity are the mechanisms behind bone resorption in smokers, upsetting the delicate balance of bone remodeling processes [11]. These findings have consequences for implant dentistry that go beyond the clinical setting and impact patient counseling and treatment planning. Because smoking carries more hazards, a customized strategy is required to reduce these obstacles and maximize implant results. To increase implant success rates, dental professionals should prioritize smoking cessation programs in preoperative evaluations and postoperative care guidelines [12, 13]. It is imperative to inform patients about the deleterious impact of smoking on oral health and the particular hazards linked to dental implants in order to promote positive behavioral modifications and improve treatment results. Even though this research emphasizes how smoking negatively affects dental implant outcomes, there are some important caveats to be aware of. The results' generalizability may be impacted by the research's retrospective design and its small sample size. Furthermore, confounding variables such as differences in patient characteristics, implant kinds, and surgical methods might have affected the outcomes. It is necessary to do more extensive prospective studies with larger sample numbers and long-term follow-up in order to confirm these results and fully explain the underlying molecular mechanisms. Additionally, comparative studies examining how well smoking cessation

programs work to enhance implant outcomes would be extremely helpful in directing evidence-based treatment procedures. To improve implant success rates in this high-risk population, novel strategies such as supplementary therapy or modifications to implant designs specifically designed for smokers need investigation[14, 15].

CONCLUSION

The finding of this study underscores the substantial detrimental impact of smoking on the outcomes of dental implant procedures. Smoking adversely affects osseointegration and the longevity of implants, as shown by poorer rates of implant survival, a higher occurrence of peri-implantitis, and increased marginal bone loss in those who smoke. These findings emphasize the need of personalized treatment strategies and rigorous postoperative care guidelines, particularly for those who smoke. To enhance the success rates of implants and mitigate associated risks, substantial efforts in patient education and smoking cessation programs are necessary. To optimize the long-term outcomes of dental implants, it is essential for dentists to prioritize advising patients on smoking cessation. To effectively tackle the problems related to smoking in implant dentistry, it is essential to do more research on innovative treatments and develop implant designs specifically tailored for smokers. In order to enhance the efficacy and durability of dental implants in individuals who smoke, it is essential to adopt a holistic strategy that encompasses patient education, personalized treatment, and continual advancements in implantology.

REFERENCES

- Schwarz F, Derks J, Monje A, Wang HL. Peri-implantitis. *J Periodontol*. 2018;89(Suppl 1):267–s90
- Albrektsson T, Chrcanovic B, Östman PO, Sennerby L. Initial and long-term crestal bone responses to modern dental implants. *Periodontol* 2000. 2017;73(1):41-50. doi:10.1111/prd.12179.
- Heitz-Mayfield LJ, Heitz F, Lang NP. Implant Disease Risk Assessment IDRA—a tool for preventing peri-implant Disease. *Clin Oral Implants Res*. 2020;31(4):397–403
- Chrcanovic BR, Albrektsson T, Wennerberg A. Smoking and dental implants: a systematic review and meta-analysis. *J Dent*. 2015;43(5):487-498. doi:10.1016/j.jdent.2015.02.009.
- De Ry SP, Rocuzzo A, Lang NP, Heitz-Mayfield LJ, Ramseier CA, Sculean A, et al. Evaluation of the implant Disease risk assessment (IDRA) tool: a retrospective study in patients with treated periodontitis and implant-supported fixed dental prostheses (FDPs). *Clin Oral Implants Res*. 2021;32(11):1299–307.
- Berglundh T, Armitage G, Araújo MG, et al. Peri-implant diseases and conditions: Consensus report of workgroup 4 of the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions. *J Periodontol*. 2018;89Suppl1:S313-S318. doi:10.1002/JPER.17-0739.
- Lin GH, Madi IM. Soft-tissue conditions around Dental implants: a Literature Review. *Implant Dent*. 2019;28(2):138–43.
- Timmenga NM, Raghoobar GM, van Weissenbruch R, Vissink A. Maxillary bone height in the resorbed edentulous maxilla. Implant-supported prostheses compared with overdentures. *Clin Oral Implants Res*. 1997;8(3):150-155.
- Lang NP, Berglundh T. Peri-implant diseases: where are we now?—Consensus of the Seventh European Workshop on Periodontology. *J Clin Periodontol*. 2011;38Suppl 11:178-181. doi:10.1111/j.1600-051X.2010.01674.x.
- Schwartz-Arad D, Grossmann Y, Chaushu G. The clinical effectiveness of implants placed in extraction sites with bone defects. A retrospective research. *J Periodontol*. 2000;71(3):360-366.
- Yaffe A, Fine N, Binderman I. Regional accelerated phenomenon in the mandible following mucoperiosteal flap surgery. *J Periodontol*. 1994;65(1):79-83.
- Tobacco Use and Dependence Guideline Panel. Treating Tobacco Use and Dependence: 2008 Update. Rockville (MD): US Department of Health and Human Services; 2008 May. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK63952/>.
- Tonetti MS, Chapple IL, Jepsen S, Sanz M; European Workshop on Periodontology group C. Primary and secondary prevention of periodontal and peri-implant diseases: Introduction to, and objectives of the 11th European Workshop on Periodontology consensus conference. *J Clin Periodontol*. 2015;42Suppl 16:S1-S4. doi:10.1111/jcpe.12368.
- Wychowski P, Starzyńska A, Jereczek-Fossa BA, Iwanicka-Grzegorek E, Kosewski P, Adamska P, Woliński J. The Effects of Smoking Cigarettes on Immediate Dental Implant Stability—A Prospective Case Series Study. *Applied Sciences*. 2021; 11(1):27.
- Wang Q, Tang Z, Han J, Meng H. The width of keratinized mucosa around dental implants and its influencing factors. *Clin Implant Dent Relat Res*. 2020;22(3):359–65.