

REVIEW ARTICLE**Smoking and Dental Implants: A Review of Literature**

Shabeena Mustafa

PG Student, Department of Prosthodontics, Institute of Dental studies and technology, Modinagar, UP, India

ABSTRACT:

The use of osseointegrated implants as a foundation for the prosthetic replacement of missing teeth has become widespread in the last decade. Owing to the remarkable success of dental implants, there has been growing interest in identifying the factors associated with implant failure. Given the well-documented deleterious effect of smoking on wound healing after tooth extraction and its association with poor quality bone and periodontal disease, a negative effect of tobacco use on implant success is to be expected. Hence; in the present review, we aim to highlight the data on the correlation of smoking and dental implants.

Key words: Dental, Implants, Smoking

Corresponding author: Dr. Shabeena Mustafa, PG Student, Department of Prosthodontics, Institute of Dental studies and technology, Modinagar, UP

This article may be cited as: Mustafa S. Smoking and dental implants: A review of literature. J Adv Med Dent Scie Res 2017;5(8):63-65.

Access this article online	
Quick Response Code 	Website: www.jamdsr.com
	DOI: 10.21276/jamdsr.2017.5.8.16

INTRODUCTION
 4.83 million persons worldwide died in 2000 as a result of their addiction to nicotine. This number is sufficient to explain the harm being caused by tobacco. Tobacco appears to be as old as human civilization and was introduced into India by Portuguese traders during AD 1600. It spread like fire to such a great extent that today India is the second largest producer and consumer of tobacco in the world. Nicotine increases the heart rate, blood pressure, and respiratory rate, and makes the user feel more alert. Unfortunately, these effects wear off after 20 min or so and the tobacco user is left craving for another pick-me-up.¹⁻³

Smoking has its influence on general as well as oral health of an individual. A primary relationship between smoking and coronary heart disease, stroke, subclinical atherosclerosis, chronic obstructive pulmonary disease, pneumonia, low birth weight, and various cancers has been established without doubt. Pregnant women who smoke tobacco have increased risk of stillbirth.⁴⁻⁶

Reported predictors for implant success and failure are generally divided into patient-related factors (e.g. general patient health status, smoking habits, quantity and quality of bone, oral hygiene maintenance), implant characteristics (e.g. dimensions, coating, and loading), implant location, and clinician experience. In general, factors related to the patient appear to be more critical than those related to the implant in determining the likelihood of implant failure.⁷⁻⁹

Clinical trials of endosseous implants consistently rate smoking as a primary patient-centered risk factor for implant loss. Various studies report a failure rate of implants in smokers compared to non-smokers, ranging from 6.5% to 20%. The negative impact of tobacco smoking in implant outcome may be related to multiple factors and their mechanism may be mediated through both local and systemic biologic routes.¹⁰⁻¹²

Cigarette smoking is still considered a common habit. Of smokers, increased plaque accumulation, higher incidence of gingivitis and periodontitis, higher rate of tooth loss, and increased resorption of the alveolar ridge have been found in the oral cavity. Cigarette smoking may adversely affect wound healing, and, thus, jeopardize the success of bone grafting and dental implantation. Bone grafts and sinus lift operations are both common and well-documented procedures before dental implant placement. Heat as well as toxic by-products of cigarette smoking, such as nicotine, carbon monoxide, and hydrogen cyanide, have been implicated as risk factors for impaired healing, and, thus, may affect the success and complications of those surgical procedures. An association among dental implants, grafting procedures (i.e., bone grafts, maxillary sinuses augmentation), and history of smoking has been reported. A higher degree of complication, or implant failure rates, were found in smokers with and without bone grafts.^{13,14}

REVIEW OF LITERATURE

Baig MR et al established the relationship between smoking and implant-related surgical procedures (i.e. sinus lift procedures, bone grafts and dental implants), including the incidence of complications related to these procedures and the long-term survival and success rates of dental implants among smokers and nonsmokers based on relevant literature. Relevant clinical studies published in English between 1990 and 2006 were reviewed. The articles were located through Medline and, manually, through the references of peer-reviewed literature. This was supplemented with a hand search of selected dental journals and text books. The majority of the past and current literature implicates smoking as one of the prominent risk factors affecting the success rate of dental implants with only a handful of studies failing to establish a connection. Most of the studies report the failure rate of implants in smokers as being more than twice that in nonsmokers. These findings are difficult to ignore. There is a statistically significant difference between smokers and nonsmokers in the failure rates of dental implants. Smoking also has a strong influence on the complication rates of implants: it causes significantly more marginal bone loss after implant placement, it increases the incidence of peri-implantitis and affects the success rates of bone grafts. The failure rate of implants placed in grafted maxillary sinuses of smokers is again more than twice that seen in nonsmokers. Smokers have higher failure rates and complications following dental implantation and implant-related surgical procedures. The failure rate of implants placed in grafted maxillary sinuses of smokers is more than twice that seen in nonsmokers.¹⁵

Twito D et al analyzed the influence of smoking habits and other possibly relevant factors on dental implant survival. The study population included all patients who underwent dental implants between the years 1999 and 2008 at a large military dental clinic and were examined in the periodic medical examination center. Correlation between implant characteristics and patients' smoking habits, as mentioned in the questionnaire answered by patients in the periodic examination, was performed. Besides standard statistical methods, multiple linear regression models were constructed for estimation of the relative influence of some factors on implant survival rate. The long-term results of the implant treatment were good. The study refers to 7,680 implants. 7,359 (95.8%) survived and 321 (4.2%) did not survive. Concerning smoking habits, in a uni-variable analysis, factors found to have an association with implant survival were the smoking status of the patients (smoking/no smoking), the amount of smoking, passive smoking, and the time elapsed in ex-smokers from the time they ceased smoking to the time of implantation. In a multi-variable analysis, factors found to have an association with implant survival were smoking status (smoking/no smoking) and amounts of smoking as expressed in pack years.¹⁶

Koszuta P et al evaluated the influence of cigarette smoking on the degree of bone loss and the success rate of the implantation. The study covered 101 patients (71 females and 30 males) that received dental implant treatment between 2009 and 2012. The group included 32 addicted cigarette smokers and 69 non-smokers. The mean age of women was 44.8 yr (21–67 ±13.5), whereas that of men was 44.3 yr (26–64 ±12.4). The extent of bone loss was estimated by comparing the post-implantation radiographs to the post-loading ones using a millimeter scale template. The therapy was entirely successful when bone loss was smaller than 25% and partially successful when bone loss was greater than 25%; the treatment was considered a failure when implants were totally rejected.¹⁷

Cavalcanti R et al evaluated the influence of cigarette smoking on the survival of dental implants with a retrospective observational study of 5 years. A total of 1727 consecutively treated patients at four private practices were divided into non-smokers (NS group, 1178 patients) and smokers (S group; 549 patients) according to what they declared prior to implant placement. Non-smokers received 4460 implants and 2583 implant-supported prostheses, whereas smokers received 2260 implants and 1292 implant supported prostheses. Various implant systems and procedures were used. Outcome measures were prosthesis and implant survival. Over the 5 years after loading, 159 (17%) non-smokers and 91 (13%) smokers were lost to follow-up; 20 (0.9%) prostheses could not be placed or failed in 15 non-smokers and 12 prostheses (1.2%) could not be placed or failed in 12 smokers. One hundred and twelve (2.9%) implants failed in 105 non-smokers and 107 (5.5%) implants failed in 75 smokers. Most of the implant failures (90%) occurred before implant loading. Fitting a logistic regression for early implant failures and total implant failures, taking into account the clustering of implants in patients, there were no statistically significant differences for prosthesis failures (P value not calculated as too few failures) and early implant failures between the two groups (P = 0.13). However, when considering all implant failures up to 5 years after loading, significantly more failures (5.5%) occurred in smokers compared with non-smokers (2.9%). Due to the retrospective nature of this study, conclusions have to be interpreted with caution. Five years after loading, smokers experienced almost twice as many implant failures compared with non-smokers. Non-statistically significant trends in favour of non-smokers were observed for early implant failures and prosthesis failures.¹⁸

Chrcanovic BR et al aimed to test the null hypothesis of no difference in the implant failure rates, risk of postoperative infection, and marginal bone loss for smokers versus non-smokers, against the alternative hypothesis of a difference. Main search terms used in combination: dental implant, oral implant, smoking, tobacco, nicotine, smoker, and non-smoker. An electronic search was undertaken in September/2014 in PubMed/Medline, Web of Science, Cochrane Oral Health Group Trials Register plus hand-

searching. Eligibility criteria included clinical human studies, either randomized or not. The search strategy resulted in 1432 publications, of which 107 were eligible, with 19,836 implants placed in smokers, with 1259 failures (6.35%), and 60,464 implants placed in non-smokers, with 1923 failures (3.18%). The insertion of implants in smokers significantly affected the failure rates, the risk of postoperative infections as well as the marginal bone loss. The results should be interpreted with caution due to the presence of uncontrolled confounding factors in the included studies. Smoking is a factor that has the potential to negatively affect healing and the outcome of implant treatment. It is important to perform an updated periodic review to synthesize the clinical research evidence relevant to the matter.¹⁹

CONCLUSION

Although smoking is a risk factor for implant failure, it is not considered an absolute contraindication. When implant treatment is planned, smoking history should first be obtained and should include the duration, the intensity (past and present), and the present status of smoking.

REFERENCES

- Ezzati M, Lopez AD. Estimates of global mortality attributable to smoking in 2000. *Lancet*. 2003;13:847–52.
- Reddy KS, Gupta PC, editors. Vol. 9. New Delhi: Shree Om Enterprises Pvt. Ltd; 2004. Report on Tobacco Control in India; p. 26.
- Benegal V, Isaac M, Murthy P, Rekha D, Joseph J, Sahoo S, et al., editors. New Delhi: Ministry of Health and Family Welfare, Government of India; 2005. Manual for Tobacco Cessation; p. 7.
- Gupta PC, Subramoney S. Smokeless tobacco use and risk of stillbirth: A cohort study in Mumbai, India. *Epidemiology*. 2006;17:47–51.
- Koszuta A, Szymańska J, Szpak P. (2012). Leczenie protetyczne z zastosowaniem implantów zębowych. *Zdr Publ*, 122(2): 217–221.
- Alsaadi G, Quirynen M, van Steenberghe D. (2006). The importance of implant surface characteristics in the replacement of failed implants. *Int J Oral Maxillofac Implants*, 21(2): 270–274.
- DeLuca S, Habsha E, Zarb GA. (2006). The effect of smoking on osseointegrated dental implants. Part I: implant survival. *Int J Prosthodont*, 19: 491–498.
- Kronström M, Svensson B, Ericson E, Houston L, Braham P, Persson GR. (2000). Humoral immunity host factors in subjects with failing or successful titanium dental implants. *J Clin Periodontol*, 27:875–882.
- Sverzut AT, Stabile GA, de Moraes M, Mazzonett R, Moreira RW. (2008). The influence of tobacco on early dental implant failure. *J Oral Maxillofac Surg*, 66:1004–1009.
- Schenkein et al. (1995) Schenkein HA, Gunsolley JC, Koertge TE, Schenkein JG, Tew JG. Smoking and its effects on early-onset periodontitis. *The Journal of the American Dental Association*. 1995;126(8):1107–1113.
- Strietzel et al. (2007) Strietzel FP, Kale A, Kulkarni M, Wegner B, Küchler I. Smoking interferes with the prognosis of dental implant treatment: a systematic review and meta-analysis. *Journal of Clinical Periodontology*. 2007;34(6):523–544.
- Truhlar et al. (1994) Truhlar RS, Morris HF, Ochi S, Winkler S. Second-stage failures related to bone quality in patients receiving endosseous dental implants: DICRG Interim Report No. 7. Dental Implant Clinical Research Group. *Implant Dentistry*. 1994;3(4):252–255.
- Hinode et al. (2006) Hinode D, Tanabe S, Yokoyama M, Fujisawa K, Yamauchi E, Miyamoto Y. Influence of smoking on osseointegrated implant failure: a meta-analysis. *Clinical Oral Implants Research*. 2006;17(4):473–478.
- Vardavas & Panagiotakos (2009) Vardavas CI, Panagiotakos DB. The causal relationship between passive smoking and inflammation on the development of cardiovascular disease: a review of the evidence. *Inflammation & Allergy Drug Targets*. 2009;8(5):328–333.
- Baig MR1, Rajan M. Effects of smoking on the outcome of implant treatment: a literature review. *Indian J Dent Res*. 2007 Oct-Dec;18(4):190-5.
- Twito D, Sade P. The effect of cigarette smoking habits on the outcome of dental implant treatment. *Elangovan S, ed. PeerJ*. 2014;2:e546. doi:10.7717/peerj.546.
- Koszuta P, Grafka A, Koszuta A, Łopucki M, Szymańska J. The Effect of Cigarette Smoking on the Therapeutic Success of Dental Implants. *Iranian Journal of Public Health*. 2016;45(10):1376-1377.
- Cavalcanti R, Oreglia F, Manfredonia MF, Gianserra R, Esposito M. The influence of smoking on the survival of dental implants: a 5-year pragmatic multicentre retrospective cohort study of 1727 patients. *Eur J Oral Implantol*. 2011 Spring;4(1):39-45.
- Chrcanovic BR1, Albrektsson T2, Wennerberg A3. Smoking and dental implants: A systematic review and meta-analysis. *J Dent*. 2015 May;43(5):487-98.

Source of support: Nil

Conflict of interest: None declared

This work is licensed under CC BY: *Creative Commons Attribution 3.0 License*.