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A 12-year retrospective study to evaluate the frequency of dental implant failures in relation to several risk variables

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Abstract

Dental implants used to replace missing teeth. Several factors affect on success of implant. The goal of the present research was to evaluate the frequency of dental implant failures in relation to several risk variables. In current retrospective research,142 dental implants were placed in 100 participants of both genders. Implant's length and risk factors were recognized, such as smoking habits, a history of diabetes, and high cardiovascular disease. Dental implant failure was highest among males compared to females and failure was more among patients with uncontrolled diabetes (33.3%), cardiovascular disease (25%), and smoking habits (20%). Healthy patients have least implant failure of 6.7%. Smaller implant length of less than 100 mm and 10-11.5 mm have higher failure than implant length more than 11.5 mm. The highest implant failure rates were observed in individuals with diabetes and dental implants with lengths lesser than 11 mm. Males have more failure than females due to smoking habit.

Keywords: Cardiovascular, dental implant, diabetes, failure, risk factor

Full-length article *Corresponding Author, **Rinkee Mohanty,** e-mail: rinkeemohanty@soa.ac.in

1. Introduction

Dental implants are the greatest option for patients who are either partially or fully edentulous. Dental implants need to be placed in regions with a high success rate. For implant surgery, a five-year outcome of 95% has been judged successful. The patient-relevant and dental implant-concerned features are among several factors that influence the outcome of dental implant treatment. However, the early or delayed failure of dental implants may be due to various etiologic factors including mechanical, biological, or iatrogenic factors [1]. Bone quality, quantity, oral hygiene and periodontal status, anatomical position and medical conditions are all important patient-associated features that can affect on implant success [2]. Dental implant-related factors, such as the implant's length, design, width, and components can affect the dental implants success [3].A dental implant's failure is identified by implant mobility, pain while functioning, or loss of bone that is greater than fifty percentage of the implant's length, (Pisa Consensus Conference of the International Congress of Oral Implantologists [ICOI])[4]. The goal of the present research was to evaluate the dental implant failures in relation to several risk factors.

2. Materials & Methods

The current retrospective investigation of 12 years data was carried out in the department of Periodontics and oral implantology with the institutional ethical committee's approval. Everyone who took part provided their informed consent. 100 participants from both sexes received 142 dental implants as part of the trial. Patients with severe periodontitis, persistent infectious diseases, immunosuppressive medication, pregnancy, substance abuse disorders, and hormonal imbalances were all excluded from the study. Each participant's dental and demographic information was recorded. Each patient's clinical features and radiographic information was recorded in relation to implant's size and associated risk factors such as smoking habits, diabetes status, and cardiovascular conditions, etc.

Table 1. Patient and implant distribution

Gender	Males	Females	Total
Number of patients	60 (60%)	40(40%)	100
Number of dental implants	78 (55%)	64(45%)	142

Table 2. Percentage of implant failures

Total	Number	Failure	P value
Males	78	12 (8.4%)	0.03
Females	64	6 (4.2 %)	

One-way ANOVA, p< 0.05

Table 3. Implant failure based on implant length

Implant length (mm)	Number	Failure	P value
<10	21	8 (5.6%)	0.04
10-11.5	56	6(4.2%)	
>11.5	65	4 (2.8%)	

One-way ANOVA, p< 0.05

Table 4. Dental implant failures related with Risk factors

Risk factors	Number of implants	Failure	P value
Smoking	30	6(20%)	0.001
Diabetes	12	4 (33.3%)	
Hypertension	6	1 (16.7%)	
CVDs	4	1 (25%)	
Healthy	90	6 (6.7%)	

One-way ANOVA, p< 0.05

Local factors such implant mobility, radiographic evidence of any infection, discomfort or pain, peri-implant radiolucency, and bone loss greater than two mm around the dental implant were determined to be indicators of implant failure.

2.1. Statistical analysis

The results were later entered into an Excel spreadsheet. SPSS version 23.0 was used for data evaluation (IBM, Chicago, USA) with one-way ANOVA test and P value of 0.05 or less.

3. Results

Total 100 patients with 60 males and 40 females received 78 (55%) and 64(45%) dental implants respectively (Table 1).Out of 78 placed implants, there was 12 (8.4%) failure in males and out of 64 implants, 6 (4.2 %) failure in females, which indicates dental implants failure was highest in males compared to females (Table 2).The highest rates of dental implant failure were seen in implant lengths lesser than 10 mm 8 (5.6%), followed by 6(4.2%) failure with length of 10-11.5 mm and least with >11.5 mm of 4 (2.8%) (Table III). The difference was statistically significant (P 0.04).According to Table IV, smoking (20%), diabetes (33.3%), hypertension (16.7%), cardiovascular illnesses (25%), and are the leading causes of dental implant failures, with healthy people having the lowest failure rate (6.7%). Implant failure rates varied significantly (P 0.01) based on risk factors, according to an ANOVA study.

4. Discussion

Dentists offer a range of treatment choices for missing teeth, including conventional removable, fixed prosthesis or implant procedure [5].Dental implants are frequently used as an alternative to one or more missing teeth [6].A dental implant therapy is responsible for the revolution in dentistry. Because of its high success rate in treating healthy individuals, it is accepted by both patients and dentists. The success rate of the implant procedure is determined by osseointegration between the bone and the dental implant [7]. Dental implants are still at danger from diabetes, smoking, and cardiovascular disease [8].The goal of this research was to determine the various risk factors in failure of dental implants.

Krisam et al examined a number of factors that influence the success rate of dental implants and concluded that, shorter implants have greater a risk factor [9]. According to Raikar et al., the 60+ age group had the highest rate of implant failures [10].Singh et al. evaluated the risk factors influencing dental implant success as well as the prevalence rate of dental implant failure. They came to the conclusion that type IV bone, dental implants with a diameter of less than 3.75 mm, implants with a length less than 10.0 mm, and smokers all had higher rates of dental implant failure [11]. These findings are in association with our result. Implant surface, bone density, and placement in a recently extracted socket were found to be potential risk factors for early implant failure by Mohajerani et al. [12]. According to Thiebot et al's research, the biggest risk factors were III–IV bone type density, smoking, sinus lift implant,

rheumatoid arthritis, and surgical site infection [13]. The mandible implant placement and younger age are the main risk factors for early implant failure [14]. Male gender, maxillary implant site, and implant brands were discovered by Thi Khanh et al to be the risk factors for early implant loss. [15] Implant brands have much lower early failure rates.

Early implant failure may be caused by a number of causes, including smoking, implant features, infection, and insufficient bone quality or quantity. It is recommended that implants should be placed as soon as possible. Longer implants are thought to have a higher success rate and better prognosis [12].The evaluation of risk factors and the choice of implant type contribute to the success of dental implants. Additional research is necessary to verify the results from prospective studies using a larger sample size.

5. Conclusion

The highest implant failure rates were observed in individuals with diabetes and dental implants with lengths lesser than 11 mm. Males have more failure than females due to smoking habit.

References

[1] E.Borie, I.A.Orsi, and C.P.de Araujo. (2015). The influence of the connection, length and diameter of an implant on bone biomechanics. Acta OdonatologicaScandinavica.73:321-9.

[2] R.Yeşildal, F.Karabudak, F.Bayındır, H.Zamanlou, M.P.Yildirim, N.P.Sağsöz et al. (2015). Effect of implant diameter and length on stress distribution for titanium and zirconia implants by using finite element analysis (FEA). Open Access Library Journal. 2:1-7.

[3] H.M.Abraham, J.M.Philip, A.R.Jain, and C.J.Venkatakrishnan. (2016). The effect of implant and abutment diameter on peri-implant bone stress: A three-dimensional finite element analysis. Journal of Oral Research and Review. 8:49-52.

[4] C.E.Misch, M.L.Perel, H.L.Wang, G.Sammartino, P.Galindo-Moreno, P.Trisi, et al. (2008). Implant Success, Survival, and Failure: The International Congress of Oral Implantologists (ICOI) Pisa Consensus Conference. Implant Dentistry. (1):5-15.

[5] T.Jemt. (2017). A retro-prospective effectiveness study on 3448 implant operations at one referral clinic: A multifactorial analysis. Part I: Clinical factors associated to early implant failures. Clinical Implant Dentistryand Related Research. 19(6):980-988. doi: 10.1111/cid.12539.

[6] F.G.Draenert, P.W.Kämmerer, M.Berthold, and A.Neff. (2016). Complications with allogeneic, cancellous bone blocks in vertical alveolar ridge augmentation: prospective clinical case study and review of the literature. Oral Surgery, Oral Medicine, Oral Pathology, and Oral Radiology. 122:31–43.

[7] P.Papaspyridakos. (2015). Implant success rates for single crowns and fixed partial dentures in general dental practices may be lower than those achieved in well-controlled university or specialty settings. Journal of Evidence-Based Dental Practice. 15:30–2.

[8] D.Termeie, P.R.Klokkevold, and A.A.Caputo. (2015). Effect of implant diameter and ridge dimension on stress distribution in mandibular first molar sites-A photoelastic study. Journal of Oral Implantology. 41:165-73.

[9] J.Krisam, L.Ott, S.Schmitz, A.L.Klotz, A.Seyidaliyeva, P.Rammelsberg, and A.Zenthöfer. (2019). Factors affecting the early failure of implants placed in a dental practice with a specialization in implantology–a retrospective study. BMC Oral Health. 19(1):208.

[10] S.Raikar, P.Talukdar, S.Kumari, S.K.Panda, V.M.Oommen, and A.Prasad. (2017). Factors affecting the survival rate of dental implants: A retrospective study. Journal ofInternational Society of Preventive and Community Dentistry.7:351-5.

[11] R.Singh, A. Sarihar, V.Vaibhav,K.Kumar, R.Singh, and J.J.Jerry. (2020). A 10-year retrospective study of assessment of prevalence and risk factors of dental implants failures. Journal of Family Medicine and Primary Care. 9(3): 1617–1619. doi: 10.4103/jfmpc.jfmpc_1171_19

[12] H.Mohajerani, R.Roozbayani, S.Taherian, and R. Tabrizi (2017). The Risk Factors in Early Failure of Dental Implants: a Retrospective Study. J Dent (Shiraz). 18(4): 298–303.

[13] N.Thiebot, A.Hamdani, F.Blanchet,M.Dame,S.Tawfik, M. bapou. et al., (2022). Implant failure rate and the prevalence of associated risk factors: a 6-year retrospective observational survey. Journal of Oral Medicine, Oral Surgery. 28(2):19. https://doi.org/10.1051/mbcb/2021045

[14] H.Staedt, M.Rossa, K.M.Lehmann, B.Al-Nawas, P.W. Kämmerer, andD.Heimes**.** (2020). Potential risk factors for early and late dental implant failure: a retrospective clinical study on 9080 implants. International Journal of Implant Dentistry. 81:1-10. https://doi.org/10.1186/s40729-020-00276-w

[15] H.N.T.Khanh, D.M.Nguyen, and T.T.Xuan (2021). Risk Factors of Early Dental Implant Failure: A Retrospective Study. Dental Oral Biology and Craniofacial Research. 1-6. DOI: 10.31487/j.DOBCR.2020.04.08