

Retrospective Evaluation of Implant Related Factors on its Success Rate

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ABSTRACT

Background: The survival rate of dental implants is depending upon many factors. This was done to evaluate the implant related factors on its success rate.

Materials & Methods: This study includes 186 dentals placed in 128 healthy patients in last 10 years. Information regarding implant factors such as implant diameter, length of implant, surrounding bone quality was collected from patient's case file.

Results: Out of 128 patients, males were 69 with 107 dental implants and females were 59 with 79 dental implants. Age group <40 years had 101 dental implants of which 6 had failure, 41-60 years had 49 dental implants, of which 5 showed failure and >60 years had 37 dental implants, of which 9 had failure. Dental implant with diameters less than 3.75 mm had maximum failure. There was higher implant failure was observed with <10mm (10) followed by with diameter 10-11.5 mm. The difference was significant ($P < 0.05$). Type III bone showed 25% of dental implant failure followed by type IV bone 15.3%. The difference was significant ($P < 0.05$).

Conclusion: The success rate of dental implants depends on length and diameter of implant, bone quality, region of implant placement etc. Maximum implant failures were seen in patients above 60 years of age, with implant diameter < 3.75 mm and implant placed in type III bone.

Keywords: Dental implant, diameter, Failure.

INTRODUCTION

A dental implant is commonly used method to replace missing teeth. Dental implants have emerged as new treatment modality for the majority of patients and are expected to play a significant role in oral rehabilitation.¹

The implant success rate of 90%-95% has been reported over the 10 years.² Though there is significant increase in number of dental implant insertion in last few days, pain, infection and

hemorrhage and occasionally neuropathy are early complications of implant. Implants have got failure rates also. There are many related factors affecting implant failure. First group of factors is host related, such as patient age, gender, systemic disease, smoking and oral hygiene.³ Second group is implant placement site related factors such as position in arch, bone quality and quantity. Third group is surgery related factors including an initial stability, angulation and direction of implant and the

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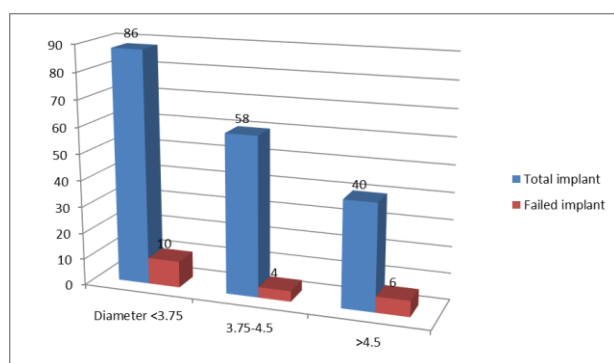
skillfulness of an operator. Fourth one is implant fixture related factors, such as surface roughness, length, diameter, macrostructure and microstructure of an implant fixture. Fifth group is implant prosthesis related factor.⁴ The present study was conducted to assess factors related to dental implant failure.

Table 1: Distribution of patients.

Total- 128		
Gender	Males	Females
Number	69	59
Dental implant	107	79

Table 2: Total number of implants and failures.

Age group	Male	Female	Failed implants	P value
<40 years	58	43	6	0.01
41-60 years	29	19	5	
>60 years	21	17	9	
Total	108	79	20	



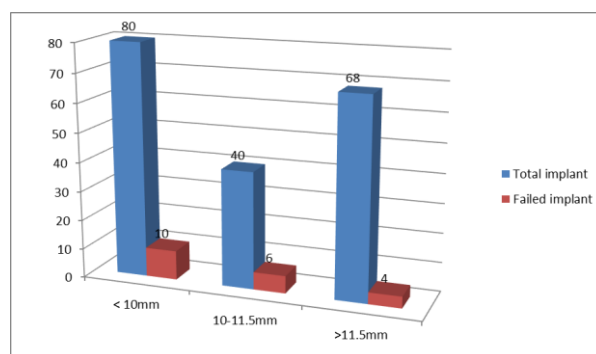
Graph 1: Dental implant failure based on implant diameter.

MATERIALS & METHODS

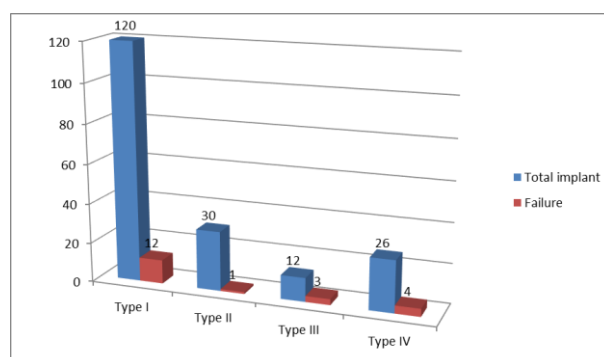
This study was conducted in the department of Periodontics and implantology Bhopal. It comprised of 128 healthy patients who received 186 dental implants in last 10 years. The study was approved from institutional ethical committee.

Data regarding name, age, gender etc. was obtained from record. Parameters such as length of implant,

diameter of implant, bone quality were retrieved from the patient's case file. Results thus obtained were subjected to statistical analysis using IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. P value less than 0.05 was considered significant.



Graph 2: Dental implant failure based on implant length.



Graph 3: Dental implant failure based on bone quality.

RESULTS

Table I shows that out of 128 patients, males were 69 with 107 dental implants and females were 59 with 79 dental implants. Table II shows that age group <40 years had 101 dental implants of which 6 had failure, 41-60 years had 49 dental implants, of which 5 showed failure and >60 years had 37 dental implants, of which 9 had failure. The difference found to be significant ($P < 0.05$). Graph I shows that maximum failures were in dental implant with diameters less than 3.75 mm. The difference was significant ($P < 0.05$). Graph II shows that maximum dental implant failure was seen with <10mm (10) followed by with diameter 10-11.5 mm. The difference was significant ($P < 0.05$). Graph III shows that type III bone showed 25% of dental implant

failure followed by type IV bone 15.3%. The difference was significant ($P < 0.05$).

DISCUSSION

For complete or partial edentulous patients, dental implant is one of the treatment option for replacing missing teeth. With successful osseointegration of dental implants it provides an idea for modifications to surface topography.⁵ Various factors are involved in the success or failure of dental implants such as, implant factors (diameter, length, and type), bone quality, patient factors (medical condition, smoking, oral hygiene maintenance).⁶ The present study was done to evaluate implant related factors such as diameter and length on its success.

Borba et al⁷ assessed the placement location, length, diameter of implant, over a period of 2 years under load. They also evaluated the local and systemic risk factors for implant failure. Overall survival rate of 96.8% (2.84% and 0.38% early and late implant failures, respectively) was observed. The patient-based survival rate was 91.8%. Bone grafting seems to be a risk factor for implant failure.

We observed in our study that dental implant failure was maximum with diameters less than 3.75 mm and diameter <10mm (10) followed by with diameter 10-11.5 mm. Type III bone showed 25% of dental implant failure followed by type IV bone 15.3%. Berberi A et al⁸ assessed the marginal bone loss around titanium implants placed in fresh extraction sockets using two loading protocols after a 5-year follow-up period. There were 40 titanium implants in 36 patients intended for single-tooth replacement. Marginal bone levels were assessed at four time intervals using intraoral radiographs: at time of implant placement, and 1, 3, and 5 years after implant placement. They found that mesial surfaces remained stable for the 5-year observation period, significant marginal bone loss was observed on distal surfaces of implants after cementation of interim prostheses and after 12 months.

Eazhil evaluated Impact of implant diameter and length on stress distribution in osseointegrated implants by 3D FEA study and concluded that implant diameter and length affect the mechanisms of biomechanical load translation to the neighboring tissues, there was statistically

significant decrease in von Mises stress as the implant diameter increased.⁹

Mohajerani et al¹⁰ conducted a retrospective cohort study on two groups of patients, the patients with a failed implant before loading and those without a failed implant. Age, gender, implant type, implant surface, implant length, bone type, type of surgery (one- or two-stage) and immediate (fresh socket) or delayed placement of implant were the variables were assessed in this study. Out of the 1,093 evaluated implants, 73 cases (6.68%) failed in early stages. The two groups were significantly different in terms of implant surface, fresh socket placement, prophylactic use of antibiotics, and bone density ($p < 0.05$). Age, gender, implant height, implant type (cylindrical or tapered) and one-stage or two-stage placement were not significantly different between the two groups ($p > 0.05$).

Further studies are required to assess the effect of risk factors such as, local factors (implant quality, bone quality, smoking, oral hygiene, periodontal condition) and systemic factors (medical condition) on different population.

CONCLUSION

Authors found that success rate of dental implants depend on length of implant, diameter of implant, bone quality, region of implant etc. Authors found that maximum implant failures were seen in patients above 60 years of age, with implant diameter < 3.75 mm and implant placed in type III bone.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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