

# Evaluation of prevalence of dental implants failures with various risk factors: A 15 years retrospective study

Dr. Mohd Atheequr Rehman Pyare<sup>1</sup>, Dr. Asmita Yogesh Lade<sup>2</sup>, Dr. Nidhi Manhas<sup>3</sup>, Dr. Davis Nadakkavukaran<sup>4</sup>, Dr. Madhika Patidar<sup>5</sup>, Dr. Parul Jain<sup>6</sup>, Dr. Richa Goel<sup>7</sup>

<sup>1</sup>Senior Lecturer, Albadar Rural Dental College and Hospital, Kalaburagi, Karnataka, India

<sup>2</sup>Senior Lecturer, Department of Oral and Maxillofacial Surgery, Pravara Dental College and Hospital, Loni, Maharashtra, India

<sup>3</sup>Department of Conservative Dentistry and Endodontics, Swami Devi Dayal Hospital, and Dental College, Golpura, Barwala, India

<sup>4</sup>Senior Lecturer, Department of Oral and Maxillofacial Surgery, Malabar Dental College and Research Centre, Manoor, Edappal, Malappuram, Kerala, India

<sup>5</sup>Assistant Professor, Nodal Officer FICT Centre for HIV, Department of Oral Pathology and Microbiology, Government College of Dentistry, Indore, MP, India

<sup>6</sup>Assistant Professor, Department of Periodontics and Implantology, Government College of Dentistry, Indore, MP, India

<sup>7</sup>Professor and HOD, Department of Public Health Dentistry, Karnavati School of Dentistry, Gandhinagar, Gujarat, India

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## Abstract

**Background:** Dental implants must be positioned in areas with a high rate of success. The current retrospective study's objective was to identify risk variables that might have an impact on dental implant success rates as well as the prevalence of dental implant failure among patients who had their implants placed more than 10 years ago.

**Materials & Methods:** The current retrospective analysis involved 1230 dental implants placed in 728 patients of both sexes. The implant's length, diameter, placement, and bone quality were all noted. Risk factors were noted, including smoking behaviour, diabetes history, hypertension, etc.

**Results:** Dental implants were inserted in 415 male patients (764, or 62%) and 313 female patients (466, or 38%). Dental implants failed in 81 (10.6%) male patients and 34 (7.3%) female patients. Statistically, it was significant. Greatest failure of dental implant was observed with lengths of 10 mm in 42 cases (17%), 10–11.5 mm in 30 cases (9%), and >11.5 mm in 54 cases (8.2%). The variation was substantial.

Greatest failure of dental implant was observed with diameters of 3.75 mm or below (12.4%), 3.75 mm to 4.5 mm (8.1%), and > 4.5 mm (7.5%). It was determined that the difference was significant (P 0.05). Type IV bone had the highest rate of dental implant failure (16.8%), subsequently type three (9.4%), type two (8.2%), and type one bone (6.4%). The variation was determined to be important (P 0.05). Smoking (41%) and CVDs (35.7%), diabetes (30.8%), and hypertension (18.8%) were the two factors that caused the most dental implant failures, while healthy individuals had the lowest failure rate (2.9%). ANOVA analysis revealed a variation among implant failure depending on risk factors that was significantly different (P 0.05).

**Conclusion:** Researchers discovered that dental implants have a high rate of success. Dental implants with a length of less than 10.0 mm, a diameter of less than 3.75 mm, and patients with diabetes and type four bone had the highest failure rates.

**Keywords:** Dental implant, diabetes, failure, Smoker.

## INTRODUCTION

The best choice for patients who are partially or completely edentulous is dental implant treatment. Dental implants must be positioned in areas with a high rate of success. A 5-year success rate of 95% has been deemed flourishing for implant procedure. The patient-relevant and dental implant-concerned aspects are just two of the many variables that affect how well dental implant therapy works. However, a number of etiologies, such as mechanical, biological, or iatrogenic causes, may result in the initial or delayed failure of dental implants. 1

Bone amount, bone quality, and hidden diseases are all patient-related characteristics that are significant. Other elements influencing the outcome of therapy include the patient's overall health and anatomical placement. 2 Dental implants may not

be used in certain situations. Medical disorders including smoking, diabetes, hypertension, CVDs, etc. have an ongoing impact on the success of dental implant therapy. However, the goal of any implant treatment is to guarantee favorable conditions, such as maintaining good oral hygiene and restricting occlusal stresses. The success rate of dental implants is influenced by elements connected to dental implants, such as the implant's design, its length, width, and prosthetic components, among others. 3

Numerous research have shown different ways to evaluate the survival and success rate of dental implants.<sup>4,5</sup> According to a report from the Pisa Consensus Conference of the International Congress of Oral Implantologists (ICOI), a dental implant's failure is indicated by movement, pain during function, or bone loss that exceeds half of the implant's length. A dental implant is considered successful implant therapy if there is no movement, no peri-implant radiolucency, no bone loss during the first year of loading, and no discomfort, chronic pain, or infection, according to Albrektsson et al.<sup>6</sup> In light of this, the current study sought to determine the prevalence rate of dental implants failing after more than ten years of implantation, as well as the risk factors influencing dental implant success.

## Materials & Methods

The department of prosthodontics and oral implantology conducted the current retrospective investigation after receiving approval from the institutional ethics committee. All participants gave their informed consent. The study included 1230 dental implants for 728 participants of both sexes. Patients suffering from severe periodontal disease, chronic infectious diseases, immunosuppressive therapy, pregnant women, drug and alcohol addicts, and patients suffering from hormonal imbalance were all disqualified.

The department provided dental data for each participant. General data was logged, including name, age, gender, etc. Clinical characteristics and radiographic data from departmental records were analysed for each patient to record the implant's length, diameter, placement, and bone quality. Risk factors were noted, including smoking behaviour, diabetes history, hypertension, etc.

Based on the patients' recollected information, any dental implant mobility, radiographic proof of any infection, peri-implant radiolucency, discomfort, or pain, and bone loss larger than 2 mm around the dental implant were judged symptoms of implant failure.

### Statistical analysis

The outcome was then entered into a Microsoft Excel spreadsheet. Data evaluation was done with SPSS version 22. (IBM. Chicago, USA). The failure rate of dental implants was assessed with one-way ANOVA test. A P value of 0.05 or less was considered as statistically significant.

## Results

According to Table I, dental implants were inserted in 415 males (764, or 62%) and 313 females (466, or 38%). According to Table II, there were 34 (7.3%) and 81 (10.6%) dental implant failures in females and males, respectively. ANOVA analysis revealed a significant difference in the rates of dental implant failures between the sexes.

Table I Allotment of patients

Gender	Males	Females	Total
Number of patients	415 (57%)	313(43%)	728
Number of dental implants	764 (62%)	466(38%)	1230

Table II Dental implant failures Prevalence

Total	Number	Failure	P value
Males	764	81 (10.6%)	0.05
Females	466	34 (7.3 %)	

One-way ANOVA,  $p < 0.05$

Table III depending on implant length dental implant failure

Implant length (mm)	Number	Failure	P value
<10	242	42 (17%)	0.05
10-11.5	332	30(9%)	
>11.5	656	54 (8.2%)	

One-way ANOVA,  $p < 0.05$

According to Table III, the lengths of 10 mm 42 (17%), 10–11.5 mm 30 (9%), and >11.5 mm 54 (8.2%) had the highest rates of dental implant failure. The On Way ANOVA test revealed a variation among implant failure depending up on length that was significantly different (P 0.05).

Table IV Depending on implant diameter Dental implant failure

Implant diameter (mm)	Number	Failure	P value
<3.75	258	32 (12.4%)	0.01
3.75-4.5	342	28 (8.1%)	
>4.5	630	47 (7.5%)	

One-way ANOVA,  $p < 0.05$ ,

According to Table IV, the diameter of dental implants with the highest failure rate were 3.75 mm or smaller (12.4%), 3.75 mm to 4.5 mm (8.1%), and >4.5 mm (7.5%). The distinction was determined to be substantial ( $P < 0.05$ ).

Table V Depending on bone quality Dental implant failure

Type	Number	Failure	P value
I	532	34 (6.4%)	0.021
II	343	28(8.2%)	
III	224	21 (9.4%)	
IV	131	22 (16.8%)	

One-way ANOVA,  $p < 0.05$

Table V demonstrates that type IV bone (16.8%) had the highest rate of dental implant failure, subsequently type three (9.4%), type two (8.2%), and type one bone (6.4%). The difference was determined to be important (P 0.05).

Table VI dental implant failures associated with Risk factors

Risk factors	Number	Failure	P value
Smoking	92	38(41.3%)	0.001
Diabetes	78	24 (30.8%)	
Hypertension	64	12 (18.8%)	
CVDs	42	15 (35.7%)	
Healthy	954	28 (2.9%)	

One-way ANOVA,  $p < 0.05$ ,

Table VI reveals that smoking (41%) had the highest risk of dental implant failures, followed by cardiovascular diseases (35.7%), diabetes (30.8%), and hypertension (18.8%), with healthy individuals having the lowest failure rate (2.9%). ANOVA analysis revealed a variation among implant failure depending up on risk conditions that was significantly different (P 0.05).

## Discussion

For patients who are missing a few teeth or all of their teeth, dentists have a variety of treatment options available, including traditional implant-supported, tooth-supported, or shared tooth-implant-supported prosthetics. 7 For the alternate of one or more lost teeth, dental implants are now often employed. 8 Dentistry has undergone a revolution thanks to dental implant therapy. It is popular with both patients and dentists because to its high success rate in healthy people. Different dental surgeons have different options for dental implants. Osseointegration among the bone AND dental implant decideS the survival rate of the treatment. 9 The limiting criteria for dental implant success include bone quality and quantity. Poor bone quality, like that found in type IV and III, is what leads to failures. Smoking, high blood pressure, cardiovascular disease, and diabetes pose risks to dental implants, nevertheless.10 The purpose of this research was to ascertain the dental implant failure after placement in 15 years follow up.

A study by Krisam et al.11 evaluated a number of variables that affect how frequently dental implants succeed. They found that 9 out of 186 implants (4.8%) failed before the final prosthesis in 106 individuals. Shorter implants (less than 10 mm) and the necessity for augmentation treatments were risk factors for early implant failure. The risk was discovered to be 5.8 times higher for shorter implants than for longer implants ( $p = 0.0230$ ). The risk was multiplied by 5.5 when augmentation methods were used ( $p = 0.0174$ ).

Maximum implant failures (55), according to Raikar et al., were found to be in the 60+ age group. A group of 40-year-olds had 20 unsuccessful implants. The largest failure rates were seen in dental implants with lengths  $>11.5$  mm (40/700), 10 mm (20%), and 10-11.5 mm (40%) (60). The procedures that failed were 3.3% (mandibular posterior), 2.2% (maxillary posterior), 2.1% (maxillary anterior), and 1% (maxillary anterior) (mandibular anterior). Type I bone had an implant failure rate of 0.3%, type II bone of 1.95 %, type III bone of 3%, and type IV bone of 0.8%. 12

Jafarian et al. 13 evaluation of dental implant success factors. Researchers discovered that 61 (4%) of 1533 dental implants had failed. The mandibular incisor region had the longest survival time (3,182 days), while the maxillary canine region had the maximum failure rate (6.8%). Canine maxillary areas had the lowest survival, at 2996 days. The implants with the greatest survival times were 11 mm long (3179.72 days) and 3.75–4 mm in diameter (3131.161 days), while the implants with the shortest survival times were 11.5 mm long (2317.79 days) and 6.5 mm in diameter (2241.45 days).

In a study by Wang et al.14 to assess the accomplishment percentage of dental implants positioned into early implant failure sites, it was discovered that 90 out of 100 implants initially failed (0.98%). 67 replacement dental implants were given to 66 individuals who experienced early implant failure. A cumulative survival percentage of 94.6% was achieved with 1 out of 67 replacement implants failing prior to prosthesis delivery and one implant failing 20 months after prosthesis delivery.

French et al.<sup>15</sup> conducted a retrospective analysis to determine the long-term survival of dental implants. After a few months, a year, a year and a half, three years, and seven years, 4591 Straumann implants were evaluated altogether. The authors found collective survival rates of 99.3%, 99.0%, and 98.4%, respectively, at three, five, and seven years. Tissue-level implants had a high survival rate of 99% at three years. Further researches are needed to verify the results on larger sample size with prospective studies.

## Conclusion

According to authors, dental implants have a good likelihood of succeeding. Dental implant failure rates were higher in patients with type IV bone, those who smoked, and those who received implants with a diameter and length less than 3.75 mm.

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