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REVIEW

The Success Rate of Dental Implants in Type 2 Diabetic Patients. A Systematic Review

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ABSTRACT

Purpose: **Diabetes has always been a challenge in implant treatment. The hyperglycemia present in diabetic individuals negatively affects bone healing, and with an increased risk of osteoporosis and delayed wound healing, it impacts the success rate of implants. However, implants in diabetic patients with controlled diabetes have a high success rate similar to that of non-diabetic individuals. This study aims to determine the success rate of dental implants in patients with type 2 diabetes.**

Materials and Methods: **Based on PRISMA guidelines, this systematic review included 23 articles, comprising 10 articles from the PubMed database and 13 from the Google Scholar database. The search strategy included terms related to dental implants in diabetic patients, and the performance of articles was examined systematically.**

Results: **Overall, the success rate of dental implants in individuals with type 2 diabetes in the articles included in this study was 93.67%, and the failure rate was 6.33%. Specifically, the average HbA1c was 7.26%, the average age was 52.41 years, the average number of implants was 1.91, and the duration of diabetes in individuals included in this study was 7.46 years. Therefore, factors such as HbA1c, age, number of implants, duration of diabetes, and blood sugar control (whether controlled or uncontrolled) are reasons for the similarities and differences in the success rate of implants in patients with type 2 diabetes. An increase in these factors leads to a higher rate of dental implant failure in these individuals (due to delayed wound healing, weakened immune system, and increased susceptibility to osteoporosis and infections). While the first three factors were reasons for the differences in implant success rates between diabetic and non-diabetic groups, the success rate for non-diabetic individuals included in this study was 98.68%, and the failure rate was 1.32%. The average HbA1c was about 5.39%, the average age was 49.98 years, and the average number of implants was 1.63.**

Conclusion: **In conclusion, this systematic review aimed to determine the success rate of dental implants in patients with type 2 diabetes. Our findings indicate that dental implants in patients with controlled type 2 diabetes have a high success rate similar to non-diabetic patients. However, in patients with poorly controlled diabetes, the success rate decreases significantly. Therefore, the controlled blood sugar, HbA1c level, age, number of implants and the duration of diabetes are crucial factors in achieving a high success rate in diabetic patients.**

Keywords: Dental Implant, Success Rate, Type 2 Diabetes Mellitus.

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1. Introduction

Today, dental implants are one of the replacement methods for missing teeth. With advancements in implant design, surface characteristics, and surgical protocols, this treatment has become a safe and highly predictable procedure, associated with a mean survival rate of 94.6% and a success rate of 89.7% after ten years [1], [2]. Implant commonly, in the absence of local and systemic risk factors, proper osseointegration, and the lack of periodontal and peri-implant disease, the success rate is high. The foundation of dental implants is osseointegration, which is the direct connection between the implant and the bone

without the intervention of any connective tissue [3]. Several local and systemic factors influence the success of implants, one of which is diabetes mellitus [4]. Diabetes is a metabolic disorder, and according to the International Diabetes Federation (IDF), in 2021, the prevalence of diabetes was estimated at 536 million people, projected to reach 783.2 million by 2045, equally affecting both men and women [5]. Although the incidence of both types of diabetes has increased, type 2 diabetes has surged more significantly due to increased obesity and decreased physical activity [5]. Approximately 10% of diabetes cases are type 1, and 90% are type 2 [6].

Diabetes is generally categorized as follows:

1. Type 1 diabetes results from the destruction of pancreatic beta cells, leading to a complete lack of insulin production. Autoimmune diseases cause it or are idiopathic (of unknown cause).
2. In type 2 diabetes, insulin is secreted by the pancreas, but resistance to insulin receptors or impaired glucose absorption and utilization occurs. Without insulin administration, these patients can control their blood sugar [7], [8].

Other factors include:

- Monogenic diabetes syndromes (such as neonatal diabetes and maturity-onset diabetes of the young)
- Disorders of the exocrine pancreas (such as cystic fibrosis and pancreatitis)
- Diabetes induced by drugs or chemicals (such as glucocorticoid use, treatment for HIV (Human Immunodeficiency)/AIDS (Acquired Immune Deficiency), or post-organ transplantation) [7], [8].

Due to increased periodontal problems, higher caries rates, and dry mouth in diabetic individuals, the likelihood of tooth loss in these individuals is 1.46 times higher than in non-diabetic individuals. Issues arising from partial or complete edentulism include difficulty chewing, occlusal disharmony, temporomandibular joint disorders, and ridge resorption. For at least two decades, implants have emerged as a promising treatment for restoring lost teeth. However, various local and systemic factors can limit the success of implants. Diabetes mellitus, as a systemic condition, is a relative contraindication for implants [9].

Diabetes affects implant success by increasing the risk of osteoporosis. The effects of diabetes in the oral cavity include dry mouth, increased glucose levels in the salivary glands, parotid gland swelling, increased caries, interference from opportunistic infections in the oral cavity (due to the sweetness of the saliva), delayed wound healing (due to the viscosity of diabetic blood and affected immune system), periodontitis, gingivitis, tissue necrosis, and interference with the osseointegration process [1], [10].

Therefore, performing implants in poorly controlled diabetic patients can lead to increased rates of periodontitis, delayed wound healing, delayed socket healing, bone degeneration, reduced mineralization in the jawbone, peri-implantitis, peri-implant mucositis, mucosal hyperplasia, mucosal recession, loss of crystal bone, tissue necrosis, increased levels of inflammatory mediators, acute post-implant inflammation, implant loosening, and consequently implant failure, causing economic, social, psychological, and health issues (both aesthetic and functional) for the individual [11], [12].

2. Materials and Methods

2.1. Study Design

The research method is a systematic review based on the PRISMA guidelines to determine the success rate of dental implants in patients with type 2 diabetes (Fig. 1).

2.2. Identification and Selection of Samples

Articles were selected based on English-language studies conducted on humans, specifically individuals with type 2 diabetes, from PubMed and Google Scholar databases. The search was conducted using the AND operator to retrieve English articles published between 2010 and 2023 using the following keywords: The search strategy on PubMed was success rate AND dental implant AND type 2 diabetes mellitus, and on Google Scholar, it was *success rate* and *dental implant*, and *type 2 diabetes mellitus* (full-text search).

2.3. Study Variables

The first variable is the success rate of dental implants in patients with type 2 diabetes. The second variable included in this study is the success rate of dental implants in non-diabetic patients. The third variable is the failure rate of dental implants in both type 2 diabetic and non-diabetic patients. The fourth variable is the success rate of dental implants in these patients (both diabetic and non-diabetic) based on factors such as:

1. HbA1c levels
2. Age
3. Duration of diabetes
4. Number of implants placed in these patients

2.4. Data Collection, Management, and Analysis

All articles were included in the study's conclusions after screening titles and abstracts and after obtaining and reading the full texts.

3. Results

3.1. Selection and Characteristics of Studies

The selected studies in this research are presented as a systematic review based on the PRISMA chart and guidelines (Fig. 1). The results of the variables in this study are interpreted as follows:

3.1.1. Success Rate of Dental Implants in Type 2 Diabetic Patients

This systematic review includes 23 studies. Among these 23 studies, eight reported a 100% success rate of dental implants in patients with type 2 diabetes [13]–[20]. In the remaining 15 studies, the success rates were reported as follows: 85.7%–95.6%, 95%, 90%, 70.7%–99%, 85.7%–100%, 85.5%–100%, 96%, 87.5%, 31.8%–100%, 95.1%, controlled diabetes 90% and uncontrolled 76.7%, 89.23%, 97.4%, 98%, and 95.8% [8], [21]–[34] (Table I, Figs. 2–4).

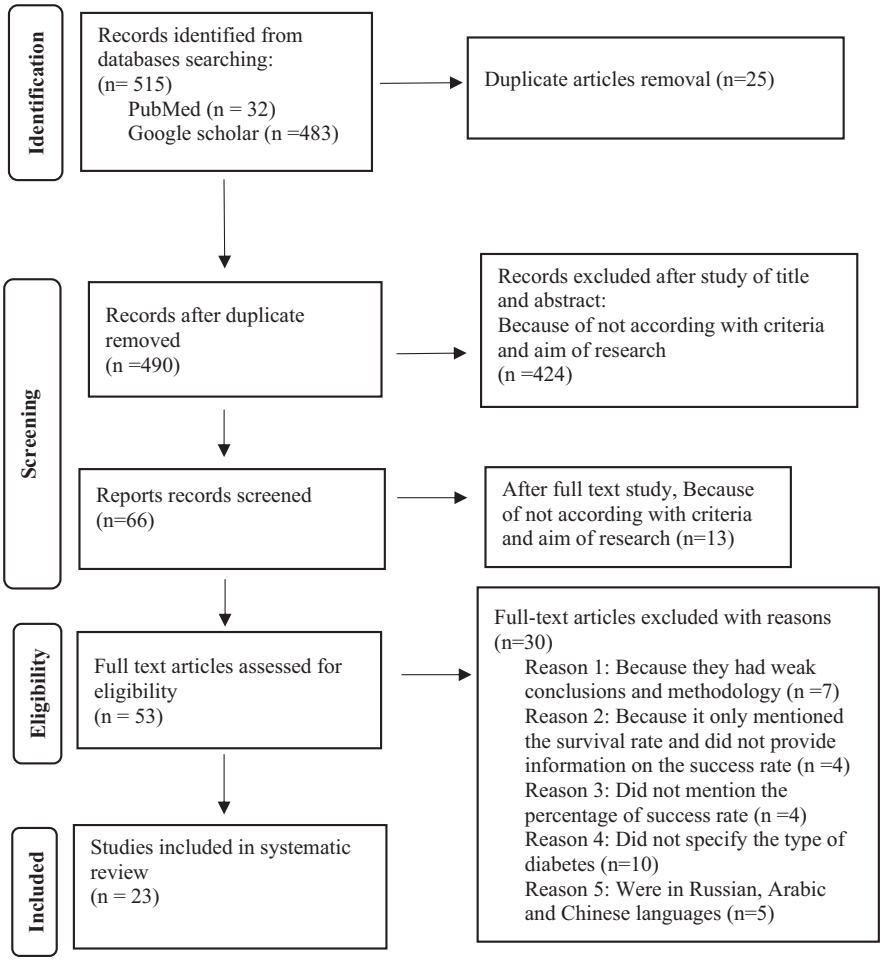

Fig. 1. PRISMA flow diagram of the inclusion and exclusion of initial studies and the final synthesis.

TABLE I: The Success Rate of Implants in T2DM Patients in 23 Studies Included

Names of the authors of the articles	Success rate
Al Amri *et al*. [13]	100%
Mostafa *et al*. [14]	100%
Cabrera-Domínguez *et al*. [15]	100%
Bignozzi *et al*. [16]	100%
Al-Shibani *et al*. [17]	100%
Marconcini *et al*. [18]	100%
Abdelhamid and Elkholy [19]	100%
Amri *et al*. [20]	100%
Marchand *et al*. [21]	85.7%–95.6%
Erdogan *et al*. [22]	95%
Bunchongruchakul *et al*. [23]	90%
Wagner *et al*. [24]	70.7%–99%
Kasat *et al*. [25]	85.7%–100%
Taha and Taha [26]	85.5%–100%
De Angelis *et al*. [27]	96%
Fathalla Shawky and Ashour [28]	87.5%
Moraschini *et al*. [29]	31.8%–100%
Nordin [8]	95.1%
Alayon and Rahab [30]	Controlled diabetes 90% and uncontrolled 76.7%
Tang *et al*. [31]	89.23%
Uslu *et al*. [32]	97.4%
Georgiev and Balcheva [33]	98%
Angelis *et al*. [34]	95.8%

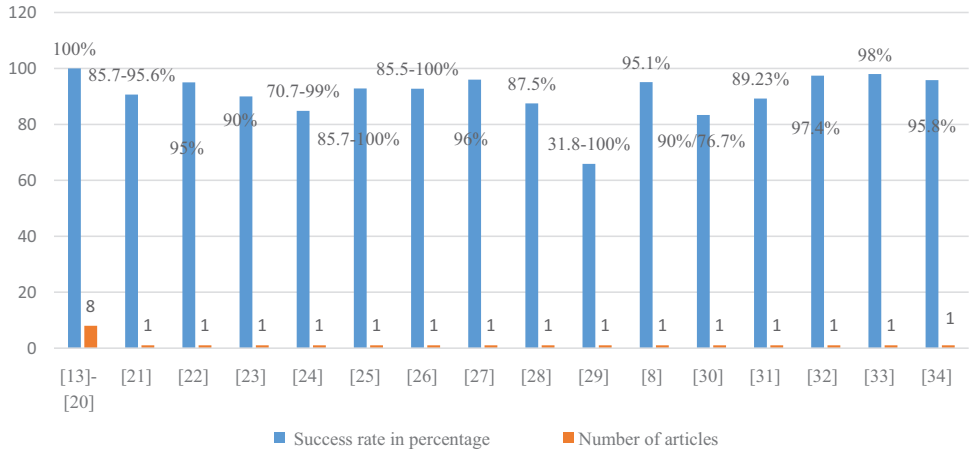

Fig. 2. Display of the Success rate of implants in type 2 diabetes patients based on the number of articles.

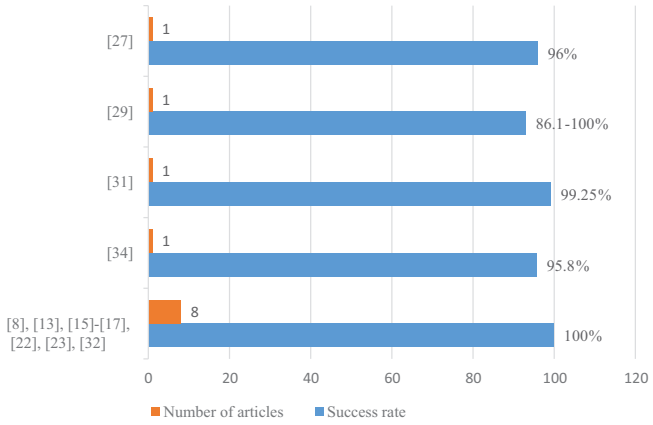

Fig. 3. Display of the Success rate of implants in non-diabetes patients based on the number of articles.

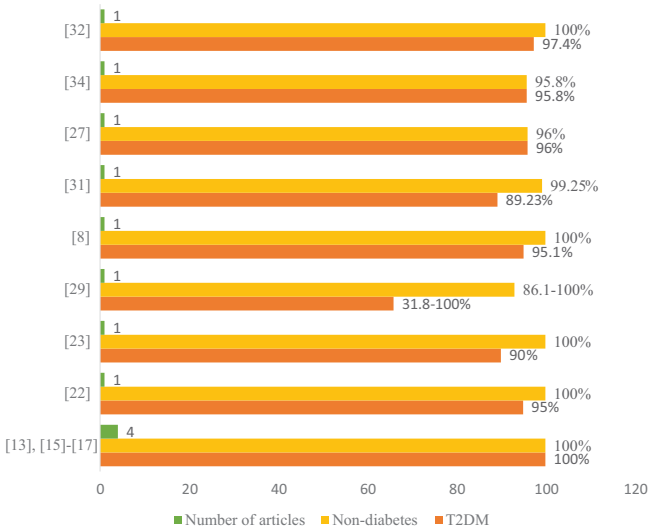

Fig. 4. Comparison of implant success rates in type 2 diabetic and non-diabetic patients.

3.1.2. Success Rate of Dental Implants in Non-Diabetic Patients

Among the 23 studies included in this research, 12 reported implant success rates in non-diabetic individuals. In 8 studies, a 100% success rate was noted [8], [13], [15]–[17], [22], [23], [32]. In the remaining four studies, the success rates were reported as follows: 86.1%–100%, 99.25%, 96%, and 95.8% [27], [29], [31], [34] (Table II and Figs. 3–5).

TABLE II: 100% Success Rate of Implants in Non-Diabetic Patients in 12 Studies of this Research

Names of the authors of the articles	Success rate
Erdogan *et al*. [22]	100%
Al Amri *et al*. [13]	100%
Bunchongruchakul *et al*. [23]	100%
Cabrera-Domínguez *et al*. [15]	100%
Bignozzi *et al*. [16]	100%
Al-Shibani *et al*. [17]	100%
Nordin [8]	100%
Uslu *et al*. [32]	100%
Moraschini *et al*. [29]	86.1%–100%
Tang *et al*. [31]	99.25%
De Angelis *et al*. [27]	96%
Angelis *et al*. [34]	95.8%

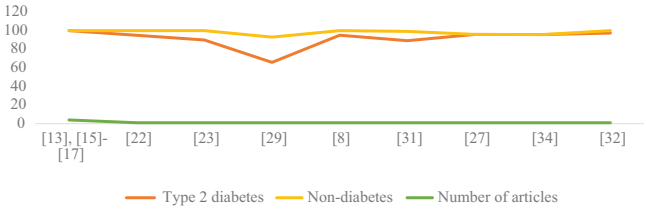

Fig. 5. Display of implant success rates in type 2 diabetic and non-diabetic patients as a line graph.

3.1.3. Failure Rate of Dental Implants in Type 2 Diabetic Patients

Table III and Fig. 6 present the failure rate of dental implants in Type 2 diabetic patients in the studies included in this research.

3.1.4. Failure Rate of Dental Implants in Non-Diabetic Patients

Table IV and Fig. 7 present the failure rate of dental implants in nondiabetic patients in the studies included in this research.

TABLE III: The Failure Rate of Implants in Patients with Type 2 Diabetes in the 23 Studies of this Research

Names of the authors of the articles	Failure Rate
Al Amri *et al*. [13]	0%
Mostafa *et al*. [14]	0%
Cabrera-Domínguez *et al*. [15]	0%
Bignozzi *et al*. [16]	0%
Al-Shibani *et al*. [17]	0%
Marconcini *et al*. [18]	0%
Abdelhamid and Elkholy [19]	0%
Amri *et al*. [20]	0%
Marchand *et al*. [21]	4.4%–14.3%
Erdogan *et al*. [22]	5%
Bunchongruchakul *et al*. [23]	10%
Wagner *et al*. [24]	1%–29.3%
Kasat *et al*. [25]	0%–14.3%
Taha and Taha [26]	0%–14.5%
De Angelis *et al*. [27]	4%
Fathalla Shawky and Ashour [28]	12.5%
Moraschini *et al*. [29]	0%–68.2%
Nordin [8]	4.9%
Alayon and Rahab [30]	Controlled diabetes 10% and uncontrolled 23.3%
Tang *et al*. [31]	10.77%
Uslu *et al*. [32]	2.6%
Georgiev and Balcheva [33]	2%
Angelis *et al*. [34]	4.2%

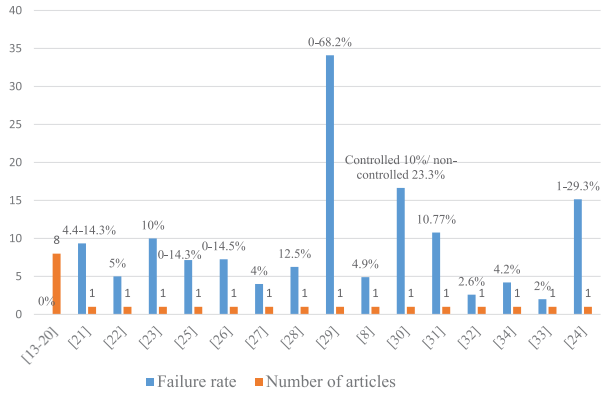

Fig. 6. The failure rate of implants in patients with type 2 diabetes in the 23 studies of this research.

TABLE IV: The Failure Rate of Implants in Non-Diabetes Patients in the 12 Studies of this Research

Names of the authors of the articles	Failure rate
Erdogan *et al*. [22]	0%
Al Amri *et al*. [13]	0%
Bunchongruchakul *et al*. [23]	0%
Cabrera-Domínguez *et al*. [15]	0%
Bignozzi *et al*. [16]	0%
Al-Shibani *et al*. [17]	0%
Nordin [8]	0%
Uslu *et al*. [32]	0%
Moraschini *et al*. [29]	0%–13.9%
Tang *et al*. [31]	0.75%
De Angelis *et al*. [27]	4%
Angelis *et al*. [34]	4.2%

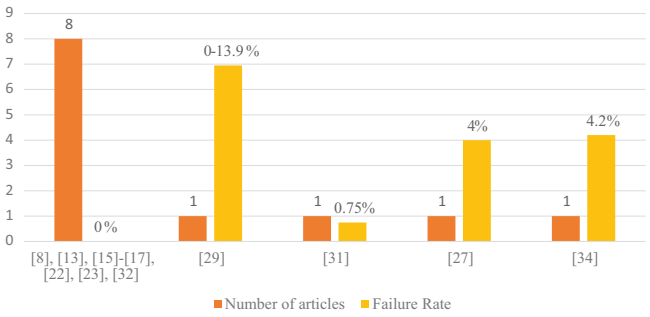

Fig. 7. The graph shows the failure rate of implants in nondiabetic patients in the 12 mentioned studies of this research.

3.1.5. Success Rate of Dental Implants in Diabetic and Non-Diabetic Individuals Based on HbA1c Levels

Among the eight studies that reported a 100% success rate of implants in patients with type 2 diabetes, the HbA1c levels in all these studies (in one study not mentioned) ranged from approximately 4.9% to 10.12%, with an average of around 6.89%. In the remaining 15 studies (in 2 studies, the HbA1c levels were not mentioned), the HbA1c levels ranged from 4.5% to 10.5%, with an average of 7.47% (Table V). In contrast, in the eight studies that reported a 100% success rate of implants in non-diabetic individuals, the HbA1c levels (in 2 studies not mentioned) ranged from 4.45% to 6%, averaging 5.19%. In the remaining four studies (in 2 studies not mentioned), the average HbA1c reached 6% (Table V).

3.1.6. Success Rate of Dental Implants in Diabetic and Non-Diabetic Individuals Based on Age

Among the eight studies that reported a 100% success rate of implants in patients with type 2 diabetes, the age of diabetic patients in all these studies (in one study not

TABLE V: Authors' Names, Success Rate of Implants, HbA1c Levels, Age, Duration of Diabetes, and Number of Implants in Diabetic and Non-Diabetic Patients Included in this Study

Names of the authors of the articles	Success rate in T2DM patients	Success rate in non-diabetic patients	HbA1c level (Average)	Age (Average)	Average duration of diabetes (in year)	Average number of implants placed (in number)
Marchand *et al.* [21]	85.7%–95.6%		7%	Not specified	Not specified	Not specified
Erdogan *et al.* [22]	95%	100%	T2DM: 6.1–7.5 (6.8%)	T2DM: 45.3–59.9 (52.6Y)	5–18 (7.5 Y)	Diabetes: 1.83
			Non-diabetes: Not specified	Non-diabetes: 40.2–58.8 (49.5 Y)		Non-diabetes: 1.75
Al Amri *et al.* [13]	100%	100%	T2DM: 6.5–6.6 (6.55%)	T2DM: 42.5 Y	4.3 Y	In both groups, it is unspecified
			Non-diabetes: 4.45%	Non-diabetes: 40.6 Y		
Bunchongruchakul *et al.* [23]	90%	100%	T2DM: 5.87–7.07 (6.47%)	T2DM: ≥18 Y	Not specified	Diabetes: 1
			Non-diabetes: 5–5.2 (5.1%)	Non-diabetes: ≥18 Y		Non-diabetes:1
Kasat *et al.* [25]	85.7%–100%		6–12 (9%)	Not specified	Not specified	2.94
Taha *et al.* [26]	85.5%–100%		4.5–10.5 (7.5%)	40–62 (51 Y)	Not specified	Not specified
Cabrera-Domínguez *et al.* [15]	100%	100%	T2DM: 5.59–8.51 (7.05%)	T2DM: 40.02-71.84 (55.93 Y)	2 Y	In both groups, it is unspecified
			Non-diabetes: 4.89–5.49 (5.19%)	Non-diabetes: 40.02–71.84 (55.93 Y)		
Bignozzi *et al.* [16]	100%	100%	T2DM: 7.98–10.12 (9.05%)	T2DM: 40–70 (55 Y)	Not specified	Diabetes: 1.87
			Non-diabetes: 5.3–6.6 (5.95%)	Non-diabetes: 40–70 (55 Y)		Non-diabetes: 1.63
Al-Shibani *et al.* [17]	100%	100%	T2DM: 6.7%	T2DM: 45.2 Y	5–12.6 (9.2 Y)	Diabetes: 1
			Non-diabetes: 4–5 (4.5%)	Non-diabetes: 41.6 Y		Non-diabetes:1
Marconcini *et al.* [18]	100%		Not specified	21–80 (50.3 Y)	2 Y	1.32
Georgiev *et al.* [33]	98%		7.5–9 (8.25%)	45–84 (64.5 Y)	Not specified	Not specified
Mostafa *et al.* [14]	100%		6.5–7.5 (7%)	55–69 (62 Y)	20 Y	2
De Angelis *et al.* [27]	96%	96%	T2DM: <7%	T2DM: 57–75 (66 Y)	Not specified	Diabetes: 1.47
			Non-diabetes: <5.7, <6.5 (6%)	Non-diabetes: 69.56 Y		Non-diabetes: 1.47
Fathalla Shawky and Ashour [28]	87.5%		<8%	45–70 (59 Y)	Not specified	2
Moraschini *et al.* [29]	31.8%–100%	86.1%–100%	T2DM: Not specified	T2DM: 15–89 (52 Y)	Not specified	Diabetes: 1.93
			Non-diabetes: Not specified	Non-diabetes: 15–89 (52 Y)		Non-diabetes: 4.14
Nordin [8]	95.1%	100%	T2DM: 6.1–10.1 (8.1%)	T2DM: 27–65 (46 Y)	Not specified	Diabetes: 2.01
			Non-diabetes: ≤6%	Non-diabetes: 27–65 (46 Y)		Non-diabetes: 0.274
Abdelhamid and Elkholy [19]	100%		<7%	Not specified	Not specified	2
Alayon and Rahab [30]	Controlled 90% Non-controlled 76.7%		7.5%	37–51 (45.6 Y)	Not specified	2.5
Uslu *et al.* [32]	97.4%	100%	T2DM: <7%	T2DM: 52.81–60.43 (56.62 Y)	5 Y	Diabetes: 2.1
			Non-diabetes: Not specified	Non-diabetes: 51.3 Y		Non-diabetes:2
Tang *et al.* [31]	89.23%	99.25%	T2DM: <8%	T2DM: 49.24–67.76 (58.5 Y)	3.3-13.36 (8.33 Y)	Diabetes: 3.42
			Non-diabetes: Not specified	Non-diabetes: 46.98–65.62 (56.3 Y)		Non-diabetes: 1.75
Angelis *et al.* [34]	95.8%	95.8%	T2DM: <7%	T2DM: 48–80 (64 Y)	Not specified	Diabetes: 1.31
			Non-diabetes: <5.7, <6.5 (6%)	Non-diabetes: 48–80 (64 Y)		Non-diabetes: 1.31
Wagner *et al.* [24]	70.7%–99%		Not specified	Not specified	Not specified	Not specified
Amri *et al.* [20]	100%		4.9–5.1 (5%)	48.4 –53.5 (51.2 Y)	8.85 Y	Not specified

mentioned) ranged from 21 to 80 years, with an average of around 51.73 years. In the remaining 15 studies (in 3 studies not mentioned), the age ranged from 15 to 89 years, with an average of 52.81 years (Table V). In contrast, in the eight studies that reported a 100% success rate of implants in non-diabetic individuals, the age of individuals ranged between 18 and 71.8 years, with an average of 44.74 years. In the remaining four studies, the age ranged from 15 to 89 years, with an average of 60.46 years (Table V).

3.1.7. Success Rate of Dental Implants in Diabetic Individuals Based on Duration of Diabetes

Among the eight studies that reported a 100% success rate of implants in patients with type 2 diabetes, the duration of diabetes (not mentioned in 2 studies) ranged from 2 to 20 years with an average of around 7.7 years. In contrast, the 3 studies that reported an implant success rate of less than 100% and also mentioned the duration of diabetes ranged from 3.3 to 18 years with an average of 10.65 years (Table V).

3.1.8. Success Rate of Dental Implants in Diabetic and Non-Diabetic Individuals Based on Number of Implants Placed

Among the 8 studies that reported a 100% success rate of implants in patients with type 2 diabetes, the number of implants placed (not mentioned in 3 studies) ranged from 1 to 2, with an average of 1.63 implants. In the remaining 15 studies (not mentioned in 4), the number of implants placed ranged from 1 to 3, with an average of 2 implants (Table V). In contrast, in the 8 studies that reported a 100% success rate of implants in non-diabetic individuals (not mentioned in 2 studies), the number of implants ranged from 1 to 2, with an average of 1.27. The average number of implants in the remaining four studies, where individuals received between 1 and 4 implants, was 2.16 (Table V).

4. Discussion

The present study, a comprehensive exploration, aimed to determine the success rate of dental implants in patients with type 2 diabetes. The success rates for dental implants in patients with type 2 diabetes across the studies included in this research ranged from 31.8% to 100%. Factors contributing to a 100% success rate in patients with type 2 diabetes included well-controlled blood glucose levels, an average HbA1c of less than 7%, preventive measures before and after surgery, age (average age 51.73 years), duration of diabetes (shorter duration associated with fewer complications), and the number of implants (average of one or two implants per patient; more implants generally lead to more complications). In two studies where both age and duration of diabetes were high, success rates remained unchanged due to well-controlled diabetes. Success rates lower than 100%, down to 31.8%, were due to the absence of one or more of these factors.

Overall, the general success rate of dental implants in patients with type 2 diabetes in this study was 93.67%, and the failure rate was 6.33%. The average HbA1c was 7.26%, the average age was 52.41 years, the average number of implants was 1.91, and the average duration of diabetes was 7.46 years. Most participants in this study took preventive measures before and after surgery (intake of 2 grams of amoxicillin, 600 mg of ibuprofen, and chlorhexidine mouthwash). The success rate of dental implants in non-diabetic patients in this study was 98.68%, and the failure rate was 1.32%. The average HbA1c was 5.39%, average age was 49.98 years, and average number of implants was 1.63. Preventive measures before and after surgery were also commonly adopted for these patients.

Similar to this study, a clinical trial conducted by Khandelwal *et al.* in 2011 involved 48 implants in 42 patients with type 2 diabetes, achieving a high success rate of about 98% and a failure rate of 2% (one implant). The high success rate was attributed to an average age of 50.7 years (similar to the average age in our study) and the use of preventive antibiotics, analgesics, and chlorhexidine. Despite high HbA1c levels (average 9.45%) and blood pressure (185/105 mmHg) in these patients, no significant difference in implant success was observed. However, these two factors, which were significant in our study, did not seem to influence success in their study [35].

Additionally, a case series study by Turkilmaz *et al*. [36] involved 23 implants in 10 patients with type 2 diabetes, achieving a 100% success rate. The success was likely due to an average HbA1c of 7.7%, and the use of antibiotics and chlorhexidine mouthwash before and after surgery, similar to our study. However, in this study, factors like age (45 to 71 years) and duration of diabetes (5 to 20 years) did not affect the success rate, whereas these factors were significant in our study.

In comparison, a study by Peled *et al*. in 2003 involving 41 patients with type 2 diabetes undergoing implant surgery, despite well-controlled blood glucose levels, appropriate HbA1c, and preventive measures before and after surgery, showed a success rate of 97.2% after one year and 94.4% after five years, with a failure rate of 2.98% to 5.6%. The increased failure rate could be attributed to receiving 3 or 4 implants per patient, leading to delayed wound healing, a higher risk of osteoporosis, and an increased risk of infections. This finding is not only similar to several studies in our research [37] but also highly relevant to our understanding of the success rates of dental implants in patients with type 2 diabetes.

Lastly, a significant study by Morris *et al*. in 2000 in New Zealand, involving 2887 implants in both type 2 diabetic (255 implants) and non-diabetic patients (2632 implants), examined the role of age in achieving success. The overall success rate was 93.2% (failure rate 6.8%) in non-diabetic patients and 92.2% (failure rate 7.8%) in type 2 diabetic patients. Success rates varied with age; non-diabetic patients aged 40 to 49 years had a success rate of 90.7%, and those under 30 years had a success rate of 98.3%. In contrast, type 2 diabetic patients aged 60 to 69 years had a success rate of 95.4%, and those aged 80 to 89 years had a success rate of 83.3%. The study's findings underscore the importance of age in the success of dental implants, echoing our own research [38] and highlighting the implications for patient care and treatment planning.

TABLE VI: Overall Success and Failure Rates of Dental Implants in Patients with Type 2 Diabetes in the sTudies Included in this Research

Success rate	Failure rate
93.67%	6.33%

TABLE VII: Overall Success and Failure Rates of Dental Implants in Nondiabetic Patients in the 12 Mentioned Studies of this Research

Success rate	Failure rate
98.68%	1.32%

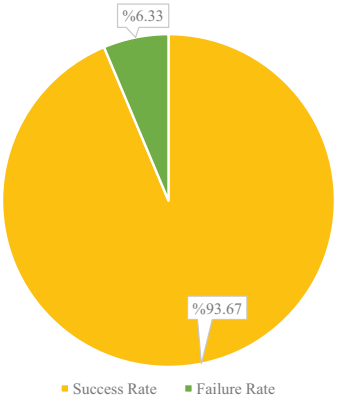

Fig. 8. Overall average success and failure rates of dental implants in patients with type 2 diabetes in this study.

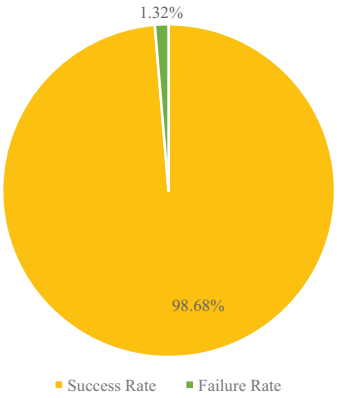

Fig. 9. Overall average success and failure rates of dental implants in non-diabetic patients in this study.

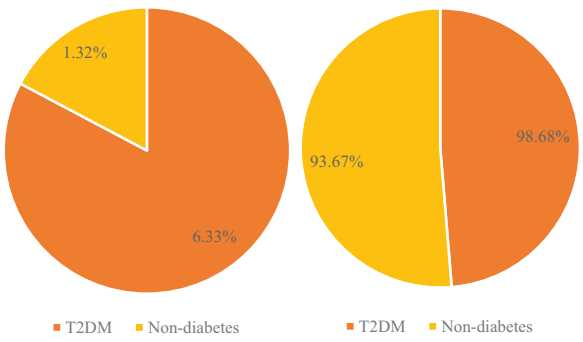

Fig. 10. Comparison of implant success and failure rates between patients with type 2 diabetes and non-diabetic individuals in the studies included in this research.

5. Conclusion

The overall success and failure rates of dental implants in patients with type 2 diabetes in this study were 93.67% and 6.33%, respectively. In contrast, the success and failure rates were 98.68% and 1.32% in non-diabetic patients, respectively. These findings are summarized in Tables VI and VII and Figs. 8–10

Conflict of Interest

Authors declare that they do not have any conflict of interest.

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