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Rate of Failure of Dental Implants in Diabetic Patients: A Systematic Review

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ABSTRACT

Diabetes has long been known to be a risky factor for implant failure due to susceptibility to infection, impaired healing and other complications. Diabetes is always considered a relative contraindication to treatment with dental implants. Implant treatment is highly preferred by the majority of patients due to its advantages of minimizing harm to the adjacent teeth and reduced impact on alveolar bone in contrast to fixed bridge treatment and removable restoration.

There are few studies reporting the success or failure rate of implants in Type-1 diabetes. So this study was planned to check the success and failure rate of implants in Type-1and Type-2 diabetic patient.

Keywords: Dental Implants, Type I Diabetes, Type II Diabetes

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INTRODUCTION

Diabetes Mellitus is a chronic metabolic disease, which is caused by impaired insulin secretion, function or both.[1] This can lead to severe complications including kidney failure, neuropathy, cardiac infraction

and non-traumatic limb amputation. and is closely related to overall oral health. Therefore, successful implant treatment has been a subject for many diabetic patients.[2]

MATERIALS AND METHOD

Information sources

(PRISMA) was followed. Manual and electronic article search were performed in several databases studies, including Pubmed and MEDLINE, Cochrane, Google Scholar for articles from January 2000 to June 2021 with limitation to English language.

Selection And Data Collection Process

Search Strategy

MeSH keywords-
“Dental Implants, "Diabetes Mellitus “, "Type I Diabetes” and “, "Type II Diabetes “, “failure rate” "Systematic Review’’. In addition, other terms not indexed as Me SH were searched using the following key terms and Boolean operators (AND, OR, NOT).
The search string was:
((dental implant Abstract]) OR Diabetes [Title/Abstract]
or
((diabetes) OR (implants) OR (Endoseeous implant) OR (implant restoration) OR (dental implantation) OR (Osseointegrated implants) AND (failure rate) AND (bone loss) OR (clinical outcomes) AND (peri-implantitis) OR (peri-implant mucositis).

In addition to this, screening was conducted with reference to researched articles and website.

PICO Criteria was followed:

INCLUSION CRITERIA	EXCLUSION CRITERIA
Randomized and non-randomized studies	Animal studies
Endosseous implants	Non-English studies
Human studies	Patients on other systemic medications.
Patients who are known diabetic and are on medication	Studies done before 2000.
Studies published after 1 January 2000	

Authors	Type of study	Year	Diabetes type	Total subjects	Age of the study population	Sex of the study population	On medication (if any)	no. of Implants placed
José J. Cabrera-Domínguez[3]	Prospective case-control study	2017	Type 2 Diabetes Mellitus	28 subjects	Mean age- 56.75 ± 14.76 years.	12 Men & 16 Women	Prophylactic antibiotics	28 Implants
Nouf Al-Shibani[4]	Prospective case-control study	2018	Type 2 Diabetes Mellitus and non-diabetic individuals	86 subjects	Mean age- 45.2yrs (37-49yrs) for Type 2 Diabetes Mellitus 41.6yrs (30-50yrs) for non diabetic individuals	Not specified	Postoperative nonsteroidal analgesics	86 Implants
Mohammed Alrabiah [5]	Prospective case-control study	2018	Prediabetic	79 Subjects	Mean age- 54.3 ± 3.6 yrs	Male subjects	Not specified	79 Implants
Gerardo Gomez-Moreno[9]	Prospective study	2014	Type 2 diabetes mellitus	67 subjects	Mean age- 59- 64 years	34 Women, 33 Men	Not specified	67 Implants
T.W. Oates[6]	Prospective pilot study	2009	Type 2 Diabetes Mellitus	32 Subjects	Mean age:- Non-diabetic patients 29-61 yrs. Diabetic Patients - 51-81 yrs.	17 Women	Not specified	42 Implants

Tariq Abduljabbar [11]	Prospective case-control study	2017	Prediabetes and Type-2 diabetes mellitus	130 subjects	Mean age of participants in prediabetics, type 2 diabetics and non-diabetics were 53.4, 51.1 and 50.6 ± 2 years..	Not specified	Not specified	148 Implants
Hassan Abdulwassie [15]	Prospective study	2002	Not specified	25 Subjects	Mean age-35 to 62 years	10 Men, 15 Women	Controlled diabetes either by diet or oral hypoglycemic or insulin. Prophylactic broad spectrum antibiotics	113 Implants
Abdulaziz Alsahhaf [13]	Retrospective study	2019	Not specified	119 Subjects	Mean age-33 to58 yrs	76 Males, 43 Females	Not specified	195 Implants
Saeed Al Zahrani [12]	Prospective study	2011	Type 2 Diabetes Mellitus	70 Subjects	Not specified	46 Males, 24 Females	Post operative prophylactic antibiotic	118 Implants
Mohammad D. Al Amri [10]	Prospective study	2015	Pre-Diabetic	24 Subjects	Not specified	12 Males, 12 Females	Prophylactic antibiotics	24 Implants

Mohammed N. Alasqah[8]	Prospective study	2012	Type 2 Diabetes Mellitus	86 Subjects	Mean age-52to 66 yrs	86 Males	Prophylactic antibiotics	172 Implants
Ozgur Erdogan[2]	Prospective study	2010	Type 2 Diabetes Mellitus	30 Subjects	Mean age-40 to 60 yrs	12 Males, 12 Females	Not specified	43 Implants
Payam Farzad[16]	Retrospective Study	2002	Type 1& 2 Diabetes Mellitus	25 Subjects	Mean age-63 yrs	12 Males, 13 Females	Prophylactic Oral Antibiotics	136 Implants
Namita Khandelwal[8]	Randomized Controlled Trial	2009	Poorly Controlled Type 2 Diabetes Mellitus	24 Subjects	Mean age-57.3 yrs	8 Males, 15 Females	Not Specified	48 Implants

DISCUSSION

This systematic review analyses the failure rate between diabetic and non-diabetic patients and comparing between Type I and Type II diabetic patients.Cabrera Dominguez et al concluded that reduced-diameter Ti Zr alloy implants having hydrophilic surface represents a safe treatment option in patients with type 2 diabetes with well-controlled glycemia (HbA1c).[3]

Nouf -al Shibani stated that NDIs show reliable clinical stability and radiographic bone levels as RDIs placed in T2DM and non-diabetic individuals, who maintained their oral hygiene and glycemic status.[4] Gerardo Gomez-Moreno et all showed that Marginal bone loss was found to increase in relation to increases in HbA1c levels.[9] T.W Oates[6], Marchand F[7,] Mohammad N Alasqah[14] and Tariq Abduljabbar[11] proved that Implant therapies for diabetic patients can be predictable, providing these patients fall within controlled ranges of glycemia over time, assessed by monitoring HbA1c levels.

Mohammad D., Al.Amri in his study on Comparison of clinical and radiographic status around dental implants placed in patients with and without prediabetes with 1 year follow up , concluded that dental implants inserted in prediabetic and healthy patients have similar success rates and remain

clinically and radiographically stable after 1-year follow-up. [10]

Payam Farzad's showed that 5 of the 136 implants in 25 patients failed after first-stage surgery, yielding a success rate of 96.3% during the healing period.[16] Namita Khandelwal's study showed clinically successful implant placement even in poorly controlled diabetic patients. She evaluated the potential for a chemically modified Sand blasted, Large grit, Acid etched (SLA) surface, compared with a conventional SLA surface, to enhance implant healing and integration in poorly controlled diabetic patients. [8]

CONCLUSION

Dental-implant surgery is feasible in selected diabetic patients with the provision of patient preparation and follow-up. In some studies, slightly higher rate of failure in type I Diabetic patients could have been due to higher blood glucose levels or presence of insulin in the tissues in type II diabetes.

In conclusion diabetic patients can be successfully treated if the patient maintains controlled blood glucose levels.

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