Limited evidence suggests no difference in implant failure rates among people with or without diabetes


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Systematic review conclusion. Within the limits of the existing evidence, no significant difference exists in the dental implant failure rates in people with or without diabetes.

Critical summary assessment. This systematic review of 7 retrospective studies and 7 controlled clinical trials with high risk of bias and confounding factors found no difference in implant failure rates among people with or without diabetes.

Evidence quality rating. Limited.

Clinical question. In patients with dental implants, what are the differences in implant survival, postoperative infections, and marginal bone loss between people with or without diabetes?

Review methods. In March 2014, the reviewers searched 3 electronic databases, without time or language restrictions, for clinical human studies comparing implant failure rates in people with or without diabetes. They defined implant failure as the complete loss of the implant. The reviewers assessed postoperative infections and marginal bone loss. They also conducted a manual search of journals relating to dental implants, explored the reference list of studies identified and related reviews for additional studies, and checked online databases for ongoing clinical trials. All 3 reviewers independently screened titles and abstracts, and assessed risk of bias among the studies using established criteria and guidelines. They resolved disagreements through discussions and contacted authors for missing data.

Main results. A meta-analysis of 14 studies consisting of 12,736 dental implants placed in 4,247 participants found that people with diabetes did not experience significantly higher implant failure rates than people without diabetes (risk ratio = 1.07; 95% confidence interval [CI], 0.80-1.44, P = .65; heterogeneity $I^2 = 9\%$, $P = .36$). A limited meta-analysis of 2 studies reported the amount of marginal bone loss was statistically significant and greater for people with diabetes than for people without diabetes (mean difference $= 0.20$ millimeters; 95% CI, 0.08-0.31, $P = .001$; heterogeneity $I^2 = 81\%$, $P < .005$). A meta-analysis could not be conducted for postoperative infections. The reviewers considered all 7 controlled clinical trials and 7 retrospective studies to have high risk of bias. The number and types of people with diabetes varied in each study.

Conclusions. Within the limitations of the available evidence, the implant failure rate in people with or without diabetes did not differ significantly. People with diabetes had more statistically significant marginal bone loss than did people without diabetes.

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COMMENTARY

Importance and context. From 1980 to 2008, the number of people with diabetes increased worldwide from an estimated 153 million to 347 million.1 Diabetes is associated with delayed wound healing and response to infection that may lead to decreased levels of implant osseointegration. Consequently, diabetes may be a relative contraindication for implant placement; those with well-controlled diabetes are considered possible and better candidates for implant therapy than are those with diabetes lacking good glycemic control.2 This systemic review aimed to investigate the effects of diabetes on implant failure rates, postoperative infections, and marginal bone loss.

Strengths and weaknesses of the systematic review. The reviewers conducted a thorough literature search and assessed the risk of bias according to accepted methods and standards.3,4 They also conducted a meta-analysis of implant failure rates only on studies with similar comparisons reporting the same outcome measures, which was not possible for postoperative infections. The funnel plot analyzing studies reporting on implant failures suggested no publication bias was present. The reviewers contacted various study authors to obtain any missing information.

Strengths and weaknesses of the evidence. The studies assessed patient-oriented outcomes with implant failure rates and marginal bone loss and disease-oriented outcomes with postoperative infections. The meta-analysis on marginal bone loss contained some of the following methodological limitations: it is based on only 2 studies with considerable heterogeneity ($I^2 = 81\%$, $P < .005$), the 2 studies were each a retrospective analysis and a controlled clinical trial, and the unit of analysis for both studies was at the implant level instead of the patient level, which does not adjust for the clustering effect.5 The mean difference of 0.20 mm in marginal bone loss (95% CI, 0.08-0.31, $P = .001$) found between people with diabetes and people without diabetes may be statistically, but not necessarily clinically, significant. Most studies had far fewer people with diabetes than people without diabetes and did not identify or consider whether patients had either type 1 or type 2 diabetes when reporting the data. Only 2 of the 14 studies objectively assessed the patient’s level of glycemic control with glycosylated hemoglobin A1c (HbA1c) values. All the studies had high risk of bias with nonrandomized sequence generation, inadequate allocation concealment, and no masking. The 7 retrospective studies included had gaps in information or incomplete records. Numerous confounding factors may have affected the outcomes.

For example, the patients’ ages ranged from 15 to 87 years old. Some of the patients were smokers or were taking bisphosphonates, which may have further complicated healing times or implant failures. Investigators placed implants with different lengths, brands, and surface treatments into fresh extraction sockets and grafted sites. The follow-up periods varied from 4 months to 17 years. All these are confounding factors that should be considered in future clinical trials.

Implications for dental practice. With diabetes on the rise globally, people with diabetes will increasingly be among the patient population considering dental implant therapy. Aware that diabetes is associated with delayed wound healing and impaired response to infection, practitioners must know the risks of implant failure and postoperative complications when helping patients make informed decisions concerning their treatment. This systemic review with its significant limitations suggests that there is no difference in implant failure rates among people with or without diabetes; the review does not provide practitioners concrete answers to questions patients may ask. For more definitive conclusions, more studies on the importance of glycemic control involving both type 1 and type 2 diabetes with larger sample sizes; longer follow-ups reporting 1-, 2-, 5-, and 10-year survival rates; and separate outcomes reported for each group are needed to clarify the parameters of diabetes that affect successful implant therapy.

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