**Critically Appraised Topic (CAT)**

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| **Project Team:** |
| **6A-2** |
| **Project Team Participants:** |
| **Daniella Eglash** |
| **Clinical Question:** |
| **How does diabetes affect stability of dental implants?** |
| **PICO Format:** |
| **P:** |
| **Patient with both diabetes and peri-implantitis** |
| **I:** |
| **Glycemic control** |
| **C:** |
| **Uncontrolled HbA1C levels versus controlled HbA1c levels** |
| **O:** |
| **Degree of peri-implantitis** |
| **PICO Formatted Question:** |
| **Among patients with both diabetes and peri-implantitis, does establishing glycemic control in those that have controlled HbA1c levels versus uncontrolled HbA1C levels effect the degree of peri-implantitis?** |
| **Clinical Bottom Line:** |
| **Glycemic control of diabetes reduces the severity of peri-implantitis.** |
| **Date(s) of Search:** |
| **9/17/20** |
| **Database(s) Used:** |
| **PubMed** |
| **Search Strategy/Keywords:** |
| **1. Dental implants, diabetes mellitus, hyperglycemia, osseointegration, periodontal bone loss**  **2. Dental implants, implant survival, diabetes mellitus, glycemic control, peri-implantitis, systemic disease, risk factor** |
| **MESH terms used:** |
| **dental implants, diabetes mellitus, glycated hemoglobin A, oral hygiene, osseointegration, peri-implantitis** |
| **Article(s) Cited:** |
| **1.** Javed, F., & Romanos, G. E. (2009). Impact of diabetes mellitus and glycemic control on the osseointegration of dental implants: a systematic literature review. *Journal of periodontology*, *80*(11), 1719–1730. <https://doi.org/10.1902/jop.2009.090283>  2. Naujokat, H., Kunzendorf, B., & Wiltfang, J. (2016). Dental implants and diabetes mellitus-a systematic review. *International journal of implant dentistry*, *2*(1), 5. https://doi.org/10.1186/s40729-016-0038-2 |
| **Study Design(s):** |
| **Systematic Reviews** |
| **Reason for Article Selection:** |
| **1. High level research with a good method of choosing the studies that it included in the systemic review. Directly assessed patients with good glycemic control and the effect of dental implant therapy.**  **2. The aim of the article followed the PICO question “Do diabetic patients with dental implants have a higher complication rate in comparison to healthy controls?” Although this wasn’t the direct question we are trying to answer (as we are looking how glycemic control affects dental implant therapy) the conclusions did align with our initial question as those that had poorly controlled diabetes suffered from impaired osseointegration, elevated risk of peri-implantitis, and higher level of implant failure. This systematic review also took high level research and thorough method to collect the research it to conclude its findings.** |
| **Article(s) Synopsis:** |
| **1. This article is a systematic review that focused in on the question “Can subjects with diabetes be good candidates for dental implant therapy?” After initially yielding 33 articles, the committee narrowed down to 18 articles total. They found these through a search protocol on MEDLINE/Pubmed of articles dating from 1982-2009. To find which articles were eligible for the review, they followed a 6 unit criteria. The critieria was 1. Human studies of type 1 or type 2 diabetics, 2. Experiemental studies, 3. Intervention (implants), 4. Control group, 5. Reference list, 6. English language publications. To quantify bone or bone-like tissues adjacent to the implants they used histologic/histomorpholmetric techniques. To compare implant survival rates, some studies used resonance frequency analysis, electronic mobility testing, life-table methods, radiographs, and measurements of clinical parameters of periodontal inflammation. Three clinical studies to evaluate implant survival rates in patients with diabetes measured periodontal inflammatory parameters. To monitor serum glycemic levels – standard techniques were used. Overall, 7 studies showed diabetes negatively affected osseointegration of dental implants. 11 studies reported successful osseointegration can be accomplished in individuals with diabetes with an optimal serum glycemic control. Those with strict glycemic control had reduced microvascular complications (such as periodontal disease) in diabetes. It was found that maintenance of serum glycemic levels may help to improve the function of osteoblasts and progression of peridotnal bone loss in markedly reduced in subjects with well-controlled diabetes compared to those with poorly controlled. Serum/GCF concentrations of proinflammatory cytokines are also significantly reduced in subjects with well-controlled diabetes. They found that under optimal glycemic control subjects with diabetes can have a periodontal bone height similar to the healthy individual. Overall, they found those with good metabolic control will have higher survival rates of implants. By using antiseptic mouthrinses and oral hygiene maintenance, this will help achieve implant osseointegration in subjects with diabetes.**  **2. This article is also a systemic review that focused on the PICO question “Do diabetic patients with dental implants have higher complication rate in comparison to healthy controls?” Out of the 327 articles screened to use for the review, only 22 were actually used. This was chosen through a systemic strategy by first selecting based on titles/abstracts. Then, these articles that passed the first stage were taken through quality assessment through US Agency for Healthcare Research – there was no major risk of biases found. This review compared diabetes with osseointegration, peri-implantitis, implant survival, and bone augmentation. The results showed that there was no difference in osteointegration of the implant after 1 year, even for those that have poorly controlled diabetes. The number of patients suffering from peri-implant inflammation increases with the elevated HbA1c values – but for this study there was no healthy control. The two cross-sectional studies showed an elevated relative risk of peri-implantitis of 1.9 and 4.1 caused by diabetes. Concerning implant survival, there was really no differenc in a diabetic vs. the healthy control. They also concluded that diabetics with a lower HbA1c (more controlled – 7.2%) had the same survival rate as the healthy controls. These 4 things show that diabetics do have a lower implant success rate. Thus, we want to see if these patients that have more glycemic control are able to have better success with implants. The article defined HbA1c levels to distinguish whether they are considered good to poorly controlled diabetics – this differed in several articles. HbA1c of 6-8% is good, 8-10% is moderate, and anything above 10% is poorly controlled. While four of these studies concluded better implant survival and less peri-implant complications in the well-controlled group, three of the others showed no difference. Concerning supportive therapy, they found that implants placed with antibiotic in diabetic patient is 10.5% higher while those that aren’t diabetic it is only 4.5% higher survival. Overall, they found that patients with poorly controlled diabetes have a delay in osteointegration – although after a year there is no difference. The long term effects of peri-implantitis increase in diabetic patients, therefore, recall to avoid serious infection. They recommend supportive therapy such as prophylactic antibiotics and chlorhexidine mouth rinses.** |
| **Levels of Evidence:** (For Therapy/Prevention, Etiology/Harm)  See <http://www.cebm.net/index.aspx?o=1025>  **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)  **1b** – Individual RCT  **2a** – Systematic Review of Cohort Studies  **2b** – Individual Cohort Study  **3** – Cross-sectional Studies, Ecologic Studies, “Outcomes” Research  **4a** – Systematic Review of Case Control Studies  **4b** – Individual Case Control Study  **5** – Case Series, Case Reports  **6** – Expert Opinion without explicit critical appraisal, Narrative Review  **7** – Animal Research  **8** – In Vitro Research |
| **Strength of Recommendation Taxonomy (SORT) For Guidelines and Systematic Reviews**  See article **J Evid Base Dent Pract 2007;147-150**  **A** – Consistent, good quality patient oriented evidence  **B** – Inconsistent or limited quality patient oriented evidence  **C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening |
| **Conclusion(s):** |
| **\*\*Above boxes won’t check off – Level of Evidence = 4a. Systematic Review of Case Control and Strength of Recommendation Taxonomy = B. Inconsistent or limited quality patient oriented evidence.**  **Overall, patients that have better glycemic control tend to have less severity of peri-implantitis. It has also been found that good oral hygiene, perio- maintenance, antiseptic mouthrinses, and prophylactic antibiotics will help in the success of the dental implants in patients with diabetes. It is important, that in our groups case, that the D4 keeps up with periodontal recall to make sure that the progression of gingivitis is limited in the diabetic patient to ensure no perio-infections occur. Additionally, the patient should continue to keep their HbA1c level under control.** |