

Recent Evidence on Dental Implant in Type 2 Diabetes Mellitus Patients

Sunil K Mishra¹, Ramesh Chowdhary²

International Journal of Prosthodontics and Restorative Dentistry (2019); 10.5005/jp-journals-10019-1221

Diabetes mellitus (DM) is a metabolic disorder, chronic in nature, causes hyperglycemia, and leads to various complications due to macro and microangiopathy. According to the data made available by the World Health Organization (WHO), currently, there are seven million adults having DM. Today, a major health-related issue is due to type 2 diabetes mellitus (T2DM), which is very common and accounts for more than 90% of DM. The T2DM is a complex endocrine disorder that impairs the function of insulin and results in the inability of glucose uptake by cells, leading to chronic hyperglycemia. Developing countries show a high disease burden due to T2DM in adults. Patients suffering from DM have increased the frequency of tooth loss due to periodontitis, impaired response to infection, and delayed wound healing. Successful osseointegration of the dental implant in DM patients is a challenge and matter research since long.^{1,2}

Al Zahrani and Al Mutairi^{1,3} evaluated stability and peri-implant bone loss (PIBL) around non-submerged and submerged dental implants in patients with and without T2DM. Increased PIBL was found around non-submerged implant-supported restorations in T2DM patients. The T2DM has been found to be related to the genesis and acquisition of advanced glycation end products (AGEs). Glycation end products induce further production of receptors of AGEs from periodontal and peri-implant gingival fibroblasts. This leads to the exhibition of proinflammatory cytokines, such as, collagenases and interleukin (IL)-6, which causes inflammation and destruction leading to abnormal periodontal wound healing.³ Arabiah et al.⁴ studied the levels of AGEs and radiographic and clinical peri-implant parameters in non-diabetic, prediabetic, and T2DM patients. Levels of AGEs were found to be increased in peri-implant sulcular fluid, and radiographic and clinical peri-implant parameters were found to be worse in prediabetes and T2DM individuals. Increased level of AGEs had an important task in periimplantitis in prediabetes and T2DM.⁴

The most reliable means to evaluate chronic glycemia is the glycosylated hemoglobin A1c (HbA1c). In a well-controlled T2DM individual, HbA1c value is $\leq 6.0\%$, and in a poorly controlled T2DM, it is $>10.0\%$.¹ Ormianer et al.⁵ assessed whether moderately controlled T2DM population had similar bone loss and implant survival rates as that of non-diabetic population. One hundred and sixty-nine moderately controlled T2DM patients with 1,112 implants, having glucose level below 150 mg/dL and HbA1c up to 8% were evaluated. In a mean follow-up time of 8.7 years, 67 implants failed with an overall implant survival rate of 94% and overall mean bone loss (MBL) of 1.98 (± 1.81) mm surrounding the implants. No statistical significance was found in the survival rate between diabetic and nondiabetic population. Less bone loss was found in delayed insertion protocol with an implant placed in the posterior region.⁵ In another study by Alasqah et al.⁶ with 6 years follow-up,

^{1,2}Professor

¹Department of Prosthodontics, People's College of Dental Sciences and Research Centre, Bhopal, Madhya Pradesh, India

²Department of Prosthodontics, RajaRajeswari Dental College and Hospital, Bengaluru, Karnataka, India

Corresponding Author: Sunil K Mishra, Professor, Department of Prosthodontics, People's College of Dental Sciences and Research Centre, Bhopal, Madhya Pradesh, India, e-mail: sunilmr200@yahoo.co.in

How to cite this article: Mishra SK, Chowdhary R. Recent Evidence on Dental Implant in Type 2 Diabetes Mellitus Patients. *Int J Prosthodont Restor Dent* 2019;9(1):1-2.

Source of support: Nil

they compared the crestal bone loss (CBL) and peri-implant soft tissue status around the adjacent implants placed in nondiabetic and T2DM (HbA1c levels below 5.5%) patients. Implants remained functionally and esthetically stable in T2DM patients in a similar manner to that of healthy individuals. Maintaining glycemic levels with antihyperglycemic medications, strict dietary control, and regular exercise reduces microvascular complications. This helps in improving the function of osteoblasts and reduces bone loss around natural teeth and implants.⁶

Type 2 diabetes mellitus, which is poorly controlled, is usually considered as a contraindication for dental implant placement. In non-diabetic individuals, peri-implant plaque index (PI), bleeding on probing (BOP), pocket depth (PD), MBL, and whole salivary IL-1 β and IL-6 levels are higher in patients with peri-implantitis when compared to patients without peri-implantitis. In case of patients with T2DM, the above parameters are mainly influenced by the glycemic status of the patient rather than by peri-implantitis.⁷ Mokeem et al.⁸ evaluated the radiographic and clinical bone level around short dental implants in non-diabetic, prediabetic, and T2DM patients. Clinical parameters like peri-implant PI, BOP, PD, and radiographic analysis with specialized software and image analyzer are compromised around short dental implants in T2DM patients. Obesity and overweight have an effect on peri-implant variables and patients with high body mass index are more prone to peri-implantitis and crestal bone loss. Obesity induces oxidative stress and may lead to higher peri-implantitis in diabetic patients.⁸

Zhang et al.⁹ had evaluated the influence of T2DM on the healing of postextraction socket followed by first-stage implant surgery. Type 2 diabetes mellitus delays first-stage implant surgery as there was delayed healing of the postextraction socket due to the decrease in osteogenic differentiation of MSCs in the sockets. In the case of T2DM patients, for early intervention of postextraction, alveolar ridge preservation surgery is recommended.⁹ Liu et al.²

found that miR204 misexpression accounted for the deficient osseointegration in DM. In T2DM patients, better osseointegration can be obtained by poly (lactic-co-glycolic acid) (PLGA) sheets which aid in the release of gold nanoparticles (AuNP-antagomiR204), and helps in the functionalization of the titanium implant surface and overcome the poor bone-implant contact in T2DM.²

Recent researches had provided promising results, and it is recommended that dental implants can be placed in patients if glycemic levels are under control in T2DM patients. Delayed implant insertion protocol must be followed in T2DM patients and glycemic levels must be controlled with strict dietary control and regular exercise along with antihyperglycemic medications.

REFERENCES

1. Al Zahrani S, Al Mutairi AA. Crestal bone loss around submerged and non-submerged dental implants in individuals with type-2 diabetes mellitus: a 7-year prospective clinical study. *Med Princ Pract*. 2019;28:75-81.
2. Liu X, Tan N, Zhou Y, et al. Delivery of antagomiR204-conjugated gold nanoparticles from PLGA sheets and its implication in promoting osseointegration of titanium implant in type 2 diabetes mellitus. *Int J Nanomedicine*. 2017;12:7089-7101.
3. Al Zahrani S, Al Mutairi AA. Stability and bone loss around submerged and non-submerged implants in diabetic and non-diabetic patients: a 7-year follow-up. *Braz Oral Res*. 2018;32:e57.
4. Alrabiah M, Al-Aali KA, Al-Sowygh ZH, et al. Association of advanced glycation end products with peri-implant inflammation in prediabetes and type 2 diabetes mellitus patients. *Clin Implant Dent Relat Res*. 2018;20(4):535-540.
5. Ormianer Z, Block J, Matalon S, et al. The effect of moderately controlled type 2 diabetes on dental implant survival and peri-implant bone loss: a long-term retrospective study. *Int J Oral Maxillofac Implants*. 2018;33(2):389-394.
6. Alasqah MN, Alrabiah M, Al-Aali KA, et al. Adjacent implants can remain esthetically and functionally stable in type 2 diabetic patients in a manner similar to healthy individuals provided glycemic levels are strictly controlled and maintained. *Clin Implant Dent Relat Res*. 2018;20(4):562-568.
7. Al-Askar M, Ajlan S, Alomar N, Al-Daghri NM. Clinical and radiographic peri-implant parameters and whole salivary interleukin-1 β and interleukin-6 levels among type-2 diabetic and nondiabetic patients with and without peri-implantitis. *Med Princ Pract* 2018;27: 133-138.
8. Mokeem S, Alfadda SA, Al-Shibani N, et al. Clinical and radiographic peri-implant variables around short dental implants in type 2 diabetic, prediabetic, and non-diabetic patients. *Clin Implant Dent Relat Res*. 2019;21(1):60-65.
9. Zhang S, Song S, Wang S, et al. Type 2 diabetes affects postextraction socket healing and influences first-stage implant surgery: a study based on clinical and animal evidence. *Clin Implant Dent Relat Res*. 2019: 1-10.