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Adverse Effect of Diabetes on Dental Implant

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INTRODUCTION

Now a days, dental implant is an ideal prosthetic replacement to a natural tooth compare to other alternatives like fixed or removable partial denture [1]. This is possible due to increase in success rate of dental implant. The success of dental implant depend upona various factors such as improvement of dental implant materials, design, techniques, skills, improvement of associated materials like bone grafts and guided tissue regeneration membrane etc. One of the high success rates of dental implant depends mainly on Osseo integration, which makes implant stability for longer duration [2]. Certain conditions can affect Osseo integration of dental implant or negatively affect the maintenance of peri implant health. Diabetes is one of these factors and is diagnosed by hyperglycemia (increase glycated hemoglobin, HbA1c level), resulting from a deficiency in insulin secretion, its mechanism of action, or both. Diabetes can be classified broadly as type 1 (insulin dependent), type 2 (non-insulin dependent, a defect in secretion of pancreatic insulin and/or an insensitivity of target tissues to its action), or gestational diabetes [3].

Recently, prevalence of diabetes, especially type 2 diabetes increases around world. Most important changes in uncontrolled diabetes are the reduction in defense mechanism and the increased susceptibility to infections, which ultimately leads to destruction of periodontal tissue or peri-implant tissue (peri-implantitis) which is a plaque induced conditions as similar to periodontitis [4]. It is also found that there may be change in microflora environment due to increase glucose level in gingival fluid, leading to qualitative change in bacteria, results severity of peri-implantitis. It is also found that the function of polymorphonuclear leukocytes and monocytes/macrophages is impaired. As a result, the primary defense mechanism against pathogen is reduced, for which bacterial proliferation is likely to increase and results in increase in chance of peri-implantitis. It is also found that chronic hyperglycemia impairs collagen structure and function, which may directly impact the integrity of the peri-implant tissue.

DESCRIPTION

In the hyperglycemic state, numerous proteins matrix molecules undergo a non-enzymatic glycosylation, resulting in Accumulated Glycation End Products (AGEs), which is excess formation in uncontrolled diabetes. Theses AGEs cross-linked with collagen and makes it less soluble, repaired and replaced. For this reason, collagen present in the tissue is older and more prone to pathogenic breakdown (*i.e.* less resistant to destruction by periodontal infections). One of the diabetes complication is micro vascular complication, for which there is a delay in the tissue healing process. This is due to lower cell concentration at the surgical site and subsequently lower release of growth factors and cytokines and reduced collagen synthesis. It is also found that chronic hyperglycemia can affect the synthesis of osteoblasts and stimulate increased osteoclast function. There is also found alteration of calcium and phosphate metabolism in chronic hyperglycemia. For these reasons, there will be decreased bone formation during the healing phase, which ultimately explains the higher rate of dental implant failure in poorly controlled diabetes [5]. Another aspect, peri-implantitis is also associated with poor oral hygiene and periodontitis. Peri-implant tissue shows a more pronounced inflammatory response to the plaque when compared with periodontal tissue. There is also presence of susceptibility and severity of periodontitis in the mucosal tissue and bone around the implant. Some study found that there is a 3 to 4 fold higher risk of peri-implantitis in diabetic subject than non-diabetic subjects [6]. On the other hand, diabetic patients who

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maintain control of their glycemic level (HbA1c<7%), may have higher success rate of dental implant compared to uncontrolled one and may be similar to those of systemic healthy individuals.

CONCLUSION

Naturally, there is highly risk of dental implant failure if the subject has uncontrolled blood glucose level. There is also a relationship between glycated hemoglobin (HbA1c) level and chronic periodontitis or peri-implantitis. So it is better to control HbA1c level in diabetic subjects prior to put dental implant with decreasing failure rate. As the cumulative effects of altered cellular response to local factors, impaired tissue integrity, and altered collagen metabolism undoubtedly play a significant role in the susceptibility of diabetic patients to infections and destructive periodontal disease, which ultimately results in failure of the implant.

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