

References

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Position Paper on Interrelationship of Diabetes Mellitus and Periodontal Disease

Convened by:



Softcopies of the position paper and education leaflet are available at the following websites:

Diabetes Hongkong (www.diabetes-hk.org)

Hong Kong Society of Periodontology and Implant Dentistry (www.hkspid.org)

Position paper on interrelationship of diabetes mellitus and periodontal disease

Executive Summary

1. Diabetes mellitus and periodontal disease are chronic conditions prevalent in Hong Kong and evidence suggested that a bi-directional relationship could exist between the two diseases.
2. Both DM and periodontitis can elicit inflammatory responses that mediate the damage on tooth supporting tissues and adversely affect the general health of the patients with diabetes.
3. DM increases the risk and severity of periodontal disease and could compromise the response to periodontal treatment especially when glucose control is poor.
4. Control of periodontal infection could potentially improve diabetic control and hence attenuate the development of diabetes complications.

Introduction

Both diabetes mellitus (DM) and periodontal disease are chronic diseases prevalent in most populations.

The prevalence of Type 2 DM in Hong Kong is about 10%(1). Patients with diabetes may have no symptoms at the beginning, however, as the disease progresses, they may feel thirsty all the time, have to urinate very frequently, or have unexplained weight loss. Poor control or chronicity of DM may lead to impairment of general health and numerous complications like retinopathy, nephropathy, neuropathy, macrovascular diseases, altered wound healing and periodontitis.

Periodontitis is a chronic oral infection that results in loss of periodontal attachment, bone destruction and eventually the loss of teeth. Features of periodontal disease may include swollen and bleeding gums, gum recession, gum pocket formation, bad breath and loose teeth. Survey in Hong Kong showed that 46% of the adult population had suffered from moderate to severe periodontal attachment destruction(2).

DM is a widely accepted major risk factor for periodontal disease and it was showed that patients with diabetes will have approximately three-fold increased risk in developing periodontal disease(3). A significant increase in prevalence of periodontitis has been reported in patients with type 2 DM when compared to non-diabetic controls (50% versus 36%) (4). Periodontitis is therefore regarded as the sixth complication of diabetes(5).

Conversely, periodontitis may worsen the glucose control in patients with diabetes and growing evidences suggested that the relationship between DM and periodontal diseases could be bi-directional(6). However, the underlying mechanisms that link the two diseases are not fully understood.

Potential Mechanism

Inflammation is an important component in the pathogenesis of both diabetes and periodontitis.

It has been shown that DM aggravates periodontal disease process. It is associated with elevated levels of systemic inflammatory markers, increased oxidative stress and apoptosis(7), contributing to microvascular and macrovascular complications and the destruction of tooth supporting structures.

Reciprocally, periodontitis has been shown to increase the risk for diabetes complications and adversely affect the glucose control in patients with diabetes(8). Periodontitis is characterized by a dysregulated inflammatory reaction of the susceptible host to oral bacterial challenges, producing elevated level of inflammatory mediators and cytokines, leading to tissue destruction and hence tooth loss. The integrated area of inflamed periodontal epithelial lining can be as large as the size of a palm in patients with severe periodontitis. Periodontitis may increase insulin resistance and compromise glucose control in patients with diabetes(9). The interplay of the co-existed inflammatory component of both disease entities may explain the hypothesized bi-directional relationship between the two chronic diseases.

Effects of diabetes on periodontal disease

DM is a risk factor for gingivitis and periodontitis and contributes to increase in prevalence, severity and progression of periodontal disease(10). Study on young patients (age below 18 years) with type 1 DM showed that around 14% of them had increased periodontal attachment loss and jaw bone loss as compared with 3% of non-diabetic controls(11). Another study on low-income, middle-aged to elderly Hong Kong Chinese showed that patients with type 2 diabetes experienced greater loss of periodontal attachment and tooth loss compared with non-

diabetic controls(4). Furthermore, the level of glucose control appears to be an important determinant in periodontal disease severity.

Patients with poorly controlled diabetes may have:-

1. higher risk for severe periodontal disease with odds ratio (OR) of 2.9 (for poor glucose control), OR of 1.5 (for better glucose control), when comparing with non-diabetic controls(12).
2. more severe gingival bleeding and higher level of gingival inflammation than those with well controlled diabetes or non-diabetics controls (13, 14)
3. more advanced alveolar bone loss and periodontal destruction(15, 16)
4. worse outcome following periodontal treatment (17)
5. more recurrent periodontal infection and less favorable long term prognosis (18)

On the other hand, patients with improvement in glucose control may be associated with decrease in gingival bleeding and inflammation(19, 20). A study showed that patients with well-controlled diabetes had better outcome following non-surgical periodontal therapy when compared to those with poorly controlled diabetes(21). Evidence showed that for patients with well-controlled diabetes, the response to periodontal therapy appeared to be similar to that of non-diabetic controls(22).

Effects of periodontal disease on diabetes

Periodontal infection could exacerbate the diabetic condition. Patients with diabetes having severe periodontitis are also more prone to diabetic complications and have a higher mortality, when compared with those without severe periodontitis(23). Periodontal treatment has been shown to lower serum levels of inflammatory markers, such as TNF- α and CRP(24). Moreover, effective periodontal treatment appears to improve the diabetic control. Patients with type 2 DM receiving comprehensive dental treatment resulted in improvement of their glucose control with reduction of 0.9% in HbA1c when compared to those without treatment(25). The finding is supported by a systematic review reporting that patients with diabetes who had received conventional periodontal treatment have an average reductions of HbA1c

by 0.4%(26). Provided the HbA1c reduction could be sustained, it would translate into a reduction of diabetic complications and mortality(27).

Recommendations

1. Health care providers should understand the effects of diabetes on periodontal tissues and the possible impact of periodontal disease in patients with diabetes.
2. Dentists should facilitate the identification and referral of un-recognized cases of DM in dental offices. They should also control oral infection in all patients with diabetes especially those with severe periodontitis so as to reduce the inflammatory burden experienced.
3. Physicians should recognize the clinical presentations of periodontitis, enquire on its symptoms and consider oral inspection so that patients with diabetes who developed oral complications could be promptly referred to dentists for treatment.
4. Medical and dental professions should collaborate in arranging proper management of patients with diabetes in particular those with periodontitis.
5. Patients with diabetes should maintain good oral health and optimal glucose control and seek regular dental check up to minimize the adverse impact of the chronic diseases on general health.
6. Government should provide adequate resources in promoting oral health and awareness of periodontal disease in patients with diabetes; support future researches on the interrelation of both chronic diseases; and provide a platform to facilitate cross-referral between medical and dental professions for the provision of comprehensive diabetes and periodontal care.

Abbreviations

1. TNF- α : Tumor necrosis factor-alpha
2. CRP: C-reactive protein