

Influence of Diabetes Mellitus on Chronic Periodontitis from Recent Studies

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Abstract

Diabetes mellitus (DM) and chronic periodontitis have been medical and social crucial problem. The standard guideline on DM and periodontitis is from European Federation of periodontology (EFP) and International Diabetes Federation (IDF). Compared with DM without periodontitis, DM with periodontitis showed higher clinical risks. Odds ratio (OR) were neuropathy 3.2-6.6, retinopathy 2.8-8.7, nephropathy 1.9-8.5, cardiovascular complications 1.3-17.7 and mortality 2.3-8.5. By proper treatment of periodontitis, estimated HbA1c decrease would be 0.27-0.48% for a few months. As to educational, protective and treatment strategies, authors propose the use of soft interdental brush for DM patients by medical professionals such as nurses.

Keywords: Diabetes Mellitus (DM); Periodontitis; European Federation of Periodontology (EFP); International Diabetes Federation (IDF); Soft interdental brush

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Commentary

Type 2 diabetes mellitus (DM) and chronic periodontitis have been prevalent worldwide [1]. This medical and social problem is crucial for developing and developed countries [2]. Regarding the combined situation, periodontitis is evaluated to be 6th diabetic complications [3]. Authors have continued research and treatment in both of dental and internal medicine departments [4]. These problems have brought vicious cycle each other, and adequate management would be required [5]. Several recent statistic evidences from larger studies are introduced in this article.

The recommended multidisciplinary management for periodontitis and DM has been observed [6]. The fundamental perspective was found by some guidelines. The Consensus report and guidelines on periodontitis and diabetes were from European Federation of periodontology (EFP) and International Diabetes Federation (IDF) [7]. It was presented in the Perio-Diabetes workshop of EFP/IDF, and its important proposal was for the professional dentist and physician [8]. Among them, some important clinical aspects were clarified in the light of psychology, psychiatry and neurology. Several recent investigations were observed concerning periodontitis and DM. A meta-analysis was conducted about the relationship of periodontitis and nephropathy/retinopathy [2]. From 8 studies, patients with T2DM were analyzed. They included 1734 cases with periodontitis and 1207 cases with diabetic microvascular complications. The results revealed that odds ratio (OR) for periodontitis was 1.96 compared with baseline value with microvascular complications. By subgroup analysis in detail, the correlation was present among periodontitis, nephropathy and retinopathy for North American (OR 1.42) and Asian people (OR

2.33). A systematic review was found about the relationship of diabetic complications and periodontitis [3]. Among them, 14 studies were included and the mutual association of periodontitis and micro-/ macrovascular diabetic complications were analyzed. In comparison with DM without periodontitis, diabetic patients with periodontitis showed higher clinical risks. The overall results of complications and odds ratio (OR) showed that neuropathy 3.2-6.6, retinopathy 2.8-8.7, nephropathy 1.9-8.5, cardiovascular complications 1.3-17.7 and mortality 2.3-8.5.

Comparative study was found for undiagnosed diabetes mellitus (UDM) [9]. Dentists actually conducted chairside screening test for UDM. The subjects included 7343 cases, and UDM meant no diabetic history and/or no more than 126 mg/dL of fasting glucose, no more than 200 mg/dL of post-prandial glucose. The definition of periodontitis was positive history. The results showed that the prevalence was UCD 5.6%, obesity and periodontitis 12.2%, obesity and edentulous status (toothless jaw) 12.6%.

From dental point of view, association of periodontitis and glucose control was investigated with 182 patients [10]. The protocol included several markers such as HbA1c, fasting blood glucose, remaining teeth number, bleeding on probing (BoP), probing depth (PD), clinical attachment level (CAL), and so on. The study had two groups with HbA1c $\geq 7\%$ and HbA1c $< 7\%$, in which there were significant difference in remaining teeth as 18.5 and 20.4, PD as 3.78 and 3.42mm and CAL as 4.5 vs 4.1mm, respectively. Thus, periodontitis development was observed more in DM with worse glycaemic control compared with stable control [10].

In the light of basic science, the infectious condition of

periodontitis means a chronic inflammatory situation of gum supporting the teeth. Periodontitis has been involved in biofilm accumulation from usual lifestyle of improper oral hygiene. Biofilm has been known to consist of more than 1000 types of microorganism species. They have taken the role of the trigger factors and brought the perpetuation of periodontitis including *Porphyromonas gingivalis* and *Tannerella forsythia* [11,12]. Periodontitis may form some small pockets between teeth and gums, associated with reduced supportive function of bone and periodontal tissue. It may cause clinical attachment loss, which would lead to unstable teeth stability and future requirement for extraction of the teeth.

Investigation of periodontal microbiome revealed that relationship between changed glucose metabolism and altered periodontal microbiome may exist [13]. Along to this progress, increased glucose levels would enhance the expression of the pathogen receptors, which cause to strengthen host response. Hyperglycemia can exacerbate pro-inflammatory responses for the AGE pathway [13]. Since periodontal pathogen may produce certain cytokines against acute phase proteins, the function and sensitivity of the insulin may be impaired [14].

For the combined therapy of periodontitis and diabetes, a recent study presented the comparison of HbA1c changes. The treatment was full-mouth scaling and scaling root planing (SRP) for 3 months. As a result, reduced values of HbA1c and inflammatory markers were found [14]. According to the guideline of EFP/IDF, the adequate therapy for periodontitis showed clinical effect for diabetic cases [7]. Usual HbA1c reduction by proper treatment for a few months would be around 0.27-0.48% due to meta-analysis method [15]. In the authors' report, 57-year-old man with chronic periapical periodontitis, diabetes, only 4 teeth and impaired mastication has recovered with satisfactory result [4]. He showed 10 kg weight reduction and HbA1c was relieved from 7.8% to 5.4% in a few months.

From mentioned above, proper therapy for periodontitis and DM will bring the reduction of HbA1c. Diabetic case would receive the benefit by periodontal treatment. In the matter of fact, however, medical professionals have rarely explained the both link or recommended the dental check-up. Especially, hospitalized diabetic patients should have dental check-up, which is not usually included [16]. Furthermore, healthcare professionals will always keep in mind for the education of dental care. Authors provide soft interdental brush to diabetic patients (Figure 1). The role of nurses will be more emphasized for practicing appropriate advice [6]. This article will be hopefully useful for future management for diabetes and periodontitis.



Figure 1: Soft interdental brush.

It is convenient disposal brush made of soft plastic matter, which costs 1 USD for 15 pieces.

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