فاعلية علاج التهاب الأنسجة الداعمة الحول السنية فى تحسن مستوى جلوكوز الدم فى النوع الثانى من مرضى السكرى

رسالة مقدمة من

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درجة الماجستير فى طب الفم و علاج اللثة

كلية طب الفم و الأسنان

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Aim of the study

The aim of this study was to evaluate the efficacy of periodontal therapy in improving glycemic state of poorly controlled diabetic patients type 2 by measuring fasting blood glucose level and glycosylated hemoglobin before and after non surgical periodontal therapy with or without antimicrobial agents.

Conclusions

- Non-surgical periodontal treatment is associated with improved glycemic control in type 2 patients and could be undertaken along with the standard measures for the diabetic patient care.

- Non surgical periodontal therapy and adjunctive systemic doxycycline have a role in improvement of glycemic state of diabetic patients type 2.

The relationship between diabetes and periodontal disease has been extensively researched, and various authors have attempted to establish a relationship between diabetes and more severe periodontal destruction **(Faria –Almeida et al. 2006).**

Several studies showed that diabetic patients have a two-fold higher risk of developing periodontal disease compare to non-diabetics **(Papapanou, 1996).**

Moreover, there is an abundance of evidence that diabetes mellitus plays an important etiological role and is considered as a risk factor in periodontal disease. In addition, periodontal disease has powerful and multiple influences on the occurrence and severity of systemic conditions and diseases, such as diabetes mellitus, cardiovascular disease, respiratory disease and pregnancy complications **(Meng, 2007).**

Diabetes is a group of metabolic diseases characterized by hyperglycemia and results from either a deficiency in the secretion of insulin and/or reduced insulin action. In type 1 diabetes, there is an absolute deficiency of insulin. In type 2 diabetes, there is the involvement of resistance to insulin and an inability of the pancreas to compensate for this resistance. Severe hyperglycemia can cause numerous symptoms, including polyuria, polyphagia, polydipsia, weight loss and blurred vision **(Almas et al. 2003).**

There is peripheral vascular insufficiency, causing scarring disorders and physiological changes that reduce the immunological capacity, thereby increasing the susceptibility to infection. A greater glucose and calcium content in the saliva favors an increase in the amount of calculus and irritating factors to oral tissues, leading to

periodontal disease, which is the most common dental manifestation in the oral cavity among diabetic patients (75%) **(Patricia et al. 2008).**

Chronic periodontal disease and diabetes mellitus are common chronic conditions in adults throughout the world. Severe periodontal disease often coexists with diabetes and is considered the sixth most common complication of the disease **(Loe et al. 1993 and Patricia et al. 2008).**

A number of studies have demonstrated that poor blood sugar control may contribute to poor periodontal health and that such individuals have a 2.8-fold greater chance of developing destructive periodontal disease as well as a 4.2-fold greater chance of having progressive alveolar bone loss **(Taylor et al. 1998).**

The interrelationship between periodontal disease and diabetes provides an example of a systemic disease predisposing individuals to oral infection and, once the infection is installed, it exacerbates the systemic disease **(Kiran et al. 2005).**

The interrelationship between diabetes and periodontal disease is established through a number of pathways and is bidirectional. Diabetes is a risk factor for gingivitis and periodontitis. Blood sugar control is an important variable in the relationship between diabetes and periodontal disease **(Tan et al. 2006).**

Individuals who have poor control over glycemia have a greater prevalence and severity of gingival and periodontal inflammation. It has been suggested that hyperglycemia promotes periodontitis and its progression **(Taylor, 2003).**

One of the mechanisms to explain the relationship between diabetes mellitus and periodontal disease suggests that the presence of periodontal disease may induce or perpetuate a state of chronic systemic inflammation, as demonstrated by the

increase in the C-reactive protein, interleukin-6 (IL- 6) and fibrinogen levels found in individuals with periodontitis **(D'Aiuto et al. 2004).**

Periodontal infection may elevate the state of systemic inflammation and exacerbate the resistance to insulin, as the inflammatory process induces this resistance. Furthermore, it may induce increased levels of IL-6 and TNF-α, which is similar to obesity inducing or exacerbating the resistance to insulin **(Mealey and Ocampo, 2007).**

The synergism between diabetes and periodontal disease has been demonstrated in a number of studies. It has been made clear that effective periodontal treatment can improve some complications of diabetes, especially hyperglycemia, and that severe periodontitis is associated to poor blood sugar control. Periodontal treatment improves blood sugar control, especially in individuals with type 2 diabetes, and its association to low glycated hemoglobin levels has been demonstrated **(Iacopino, 2001).**

A number of studies have found that non-surgical periodontal treatment improves the metabolic control of diabetic patients, thereby influencing a reduction in glycated and glycemic hemoglobin levels **(Faria et al. 2006).**

Patients with diabetes have a good response to periodontal treatment, whether in the short or long term, and this response is similar to that observed in non-diabetic patients. However, if the diabetes is not well controlled, the recurrence of periodontal disease is more frequent and more difficult to control.

The influence of diabetes over periodontal disease is well established, but the effect of periodontitis and its treatment over the control of diabetes remains unclear **(Llambes et al. 2005).**

In **(2003), Rodrigues et al.** assessed 30 individuals with type 2 diabetes mellitus and periodontitis. The authors divided the patients into two groups – one group underwent mechanical periodontal treatment and the other group underwent that treatment associated to the use of amoxicillin and clavulanic acid. Glycated hemoglobin levels, glycemia and clinical periodontal parameters were assessed at baseline and three months following therapy. The authors concluded that non-surgical periodontal therapy improved blood sugar control in both groups and the reduction of glycated hemoglobin was only statistically significant in the group that did not make use of antibiotics.

To assess the effect of the sub-gingival administration of doxycycline as an auxiliary aid in periodontal treatment among patients with type 1 diabetes, **Martorelli de Lima et al. (2004)** treated 11 individuals, who were required to present two siteswith probing depths ≥ 5 mm and bleeding or suppuration upon probing. For one group, the treatment consisted of scaling and root planing therapy associated to the sub-gingival administration of a 10% doxycycline hyclate gel, whereas the other group received scaling and root planing associated to a placebo gel. The authors concluded that the use of doxycycline produced additional favorable effects over the scaling and root planing alone.

Souza et al. (2006) studied the effect of periodontal therapy on glycated hemoglobin levels in non-insulin-dependent diabetic adults, who were divided into four groups: Group 1 – healthy controls; Group 2 – diabetics with no periodontal disease; Group 3 – diabetics with periodontitis submitted to periodontal therapy; and Group 4 – diabetics with periodontitis submitted to periodontal therapy associated to the administration of systemic doxycycline. The authors found no statistically

significant difference in blood sugar control following periodontal therapy with or without the use of systemic antibiotics.

Current evidence is insufficient to determine whether periodontal treatment, whether associated to antibiotic therapy or not, is effective in controlling glycated hemoglobin and blood sugar levels in patients with diabetes.

This study has been performed to see if treatment of periodontal disease in uncontrolled diabetic patients would contribute to glycemic control management. This has been monitored by studying the clinical response as well as by measuring the fasting blood glucose level and glycated hemoglobin before and after periodontal therapy.

In our study we assessed the effect of periodontal therapy (scaling and root planing) on glycated hemoglobin levels, treated 20 patients with uncontrolled type 2 diabetes. One group was treated with doxycycline and mechanical therapy and the other group was treated with mechanical therapy alone.

This study was carried on 20 patients from 35 to 50 years old with uncontrolled type 2 diabetes, without any other systemic disease, suffering from chronic periodontitis with atleast one site with probing depth more than 5 mm and 2 teeth with attachment loss more than 6 mm **(O'Connell et al. 2008).**

In the present study, in all selected patients fasting plasma glucose levels (FPG) was performed and only patients with a level more than 200 mg/dl were included in the study **(O'Connell et al. 2008).** The FPG was selected because it is more reproducible than the oral glucose tolerance test or the 2hr post parandial glucose test

(PPG) and is easier to perform in a clinical setting **(American Diabetes Association, 2001).**

On the other hand, the metabolic assessment at baseline was based on blood levels of glycated hemoglobin (HbA1c) as it yields data on the glucose in blood over a period of approximately three months before the test because glucose in blood is irreversible bound to hemoglobin. HbA1c was also measured after 3 months (the end of the therapeutic intervention) to give an idea about the glycemic control during the whole study period.

In this study, the glycated hemoglobin of the selected patients was greater than 8% considered uncontrolled diabetic patients following the national diabetes institute and depending on the recommendations of the **American Diabetes Association, 2001.**

The diabetic patient is considered to be at high risk for infections due to vascular alterations and a deficient healing response. In the present study full mouth scaling and root planning was performed in 2 sessions within 24-36 hours which helped minimize possible reinfection of the treated areas. This increases the benefits of periodontal treatment and reduces bacterial load, which is responsible for maintain high levels of proinflammatory cytokines as recommended by **Iacopino and Cutler, 2000.**

In the present study, systemic Doxycycline antibiotic was used as adjunctive therapy to SRP with group II. Doxycycline is a broad spectrum antibiotic that is effective against most periodontal pathogens, and it reaches high concentration in the gingival fluid than in the serum, providing an important adjunct for the reduction of periodontal pathogens. In addition it is a potent modulator of the host response in diabetic patients as well as being a metalloproteinase inhibitor. It also inhibits non

enzymatic glycation of extracellular proteins and it may have similar effect on glycation of hemoglobin **(Lavada et al. 2004).**

Doxycycline was preferred as adjunctive antibiotic therapy than amoxicillin with clavulanic acid as no additional effect on the HbA1c levels was observed as stated by **Rodrigues et al. (2003).**

After treatment, there were improvements in all of the monitored clinical parameters. These improvements were reflected at the systemic level as a reduction in glycated hemoglobin.

In this study, we observed a (11.3%) reduction in PD after SRP; however, the association of SRP with systemic Doxycycline provided a better result (28.75%) reduction in PD. While for CAL, there was a significant reduction by (7.1%) in group I and by (14.3%) in group II. This superior result can be explained by the antimicrobial and additional anti inflammatory effects of the drug **(Grossi, 2001).**

The improvement in CAL in the present study was in agreement with **Kiran et al. 2005** who showed a mean CAL gain of 0.7mm as compared to the gain in our study which was 0.48mm for group I and 0.98 mm for group II.

Significant changes in PI and GI were evident throughout the study, there was overall mean improvements for both groups. The reductions in PI represented improvement of (23.16%) for group I and (44.86%) for group II. Other studies showed similar results, PI reductions were (25% to 35%) **(Grossi, 2001).**

For GI, the improvements were (27.9%) for group I and (36.7%) for group II. Other studies showed similar studies, GI reductions were (35%to 44%) **(Rodrigues et al 2003).**