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**EFFECTS OF NON-SURGICAL PERIODONTAL
THERAPY WITHOUT THE USE OF
CHEMOTHERAPEUTICS ON PROTEIN GLYCATION**

*Dedication
To My Late Father*

**A THESIS PRESENTED
BY
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Abstract

The extent and severity of periodontal disease and general health remains a contentious issue. Based on previous studies on the effects of focal infection and its influence on general health, it is clear that further studies are required to ascertain the role of periodontal disease on general health. It is also necessary to ascertain whether the control of periodontal disease can effectively reduce the risk of systemic diseases. Diabetes mellitus has been associated with an increased risk of oral diseases, especially periodontitis. However, recent studies have emphasized the critical role mediated by the host immune system in periodontal infections. Moreover, the deterioration of diabetes status in chronic periodontitis has also been suspected. Previous studies have demonstrated an unfavourable metabolic control with an exaggerated gingival inflammation in patients with chronic periodontitis. Further, it has been reported that an improvement in metabolic control occurs due to management of chronic periodontitis using doxycycline as an adjunctive therapy.

The present study focused generally on the effects of chronic periodontitis on diabetic complications. More specifically the current study explored the effects of non-surgical periodontal therapy without the use of chemotherapeutics on the glycation of two selected proteins; glycated haemoglobin (HbA_{1c}) and glycated low density lipoprotein (Gly-LDL).

A total of 33 chronic periodontitis cases (male= 13, female= 20) were selected as a random sample. Out of these, eleven were non-insulin dependant diabetes mellitus (NIDDM) cases, the rest were otherwise healthy. All cases were followed up for a six month period from the date of selection. The six months period was made of, three

months of non-treatment period followed by six weeks of non-surgical treatment with an additional six weeks for epithelial reattachment. The effects of natural disease progression were evaluated during the first three months of non-treatment period. The non-surgical periodontal treatment was carried out in four phases; (1) comprehensive clinical assessment and diagnosis, (2) oral hygiene education and habit intervention, (3) elimination of disease aetiology and local risk factors (4) short and long term reviews to monitor disease progression and patient compliance to treatment.

A marginal increase ($p>0.05$) in haemoglobin glycation was observed with the progression of chronic periodontitis in both diabetics and non-diabetics. With successful management of chronic periodontitis by means of non-surgical periodontal therapy, a significant ($p<0.05$) reduction in the level of glycated haemoglobin was observed. This reduction was evident in both diabetics (mean HbA_{1C} reduction = 0.794 ± 0.93) and non-diabetics (mean HbA_{1C} reduction = 1.77 ± 2.4) who had HbA_{1C} values above the normal reference value (HbA_{1C}>7%), at time of selection. On the other hand, the reduction in fasting blood glucose was not significant ($p>0.05$) in both groups in response to the non-surgical periodontal management. This indicates a weak relationship between the fasting level of blood glucose and the degree of haemoglobin glycation.

The qualitative and quantitative changes of the Low Density Lipoproteins (LDL) fraction due to non-surgical periodontal management were examined by (1) serum agarose gel (0.6% w/v) electrophoresis, and (2) LDL precipitation with phosphotungstic acid / MgCl₂. In diabetics, the net LDL migration was significantly reduced (mean R_f difference = 0.042 ± 0.03 , $p<0.05$) with the periodontal treatment. On the other hand, the LDL precipitation in diabetics was weak with phosphotungstic acid / MgCl₂. However, it was

not possible to give an exact reason for weaker LDL precipitation, molecular changes of LDL due to glycation was suspected as a valid reason.

A significant ($p < 0.05$) systemic host immune modulation was indicated by total serum globulin reduction in both diabetic (mean reduction = 6.28 ± 3.53 mg/dl) and non-diabetic (mean reduction = 8.42 ± 4.95 mg/dl) patients who were under treatment. Higher occupancy of receptor for advanced glycated end-products (RAGE) was suspected in diabetics due to their persistent higher globulin levels compared with the levels in non-diabetics.

This study suggests that the non-surgical periodontal management is beneficial for the control of protein glycation and thereby reducing the risk of chronic complications, among diabetics with chronic periodontitis.



In health, a balance exists between the challenge to the tissues from microorganisms in dental plaque and the local host defense (figure 1.1). Disturbances in this host-parasitic