



PERIODONTAL DISEASE AS A POTENTIAL RISK FACTOR FOR THE DEVELOPMENT OF TYPE 2 DIABETES AND OBESITY.

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ABSTRACT

Background- Literature gap exists for relationship between lipid profile and oral glucose tolerance test (OGTT) with periodontal health status, in both healthy and diabetic patients.

Aim- To analyze the association among lipid profile, oral glucose tolerance test with periodontal health/disease dependent variables in healthy, diabetic and impaired glucose tolerance subjects.

Methods- Blood and periodontal examination was done for 100 patients. Subjects having community periodontal index (CPI) score of 2 or more and CPI loss of attachment score of 0 and above, were included for this study. All these patients underwent biochemical tests for OGTT and Lipid profile analysis.

Results- Out of total 100 study subjects, 25 patients were found to be periodontally healthy and 75 periodontally diseased; 40 subjects had IGT, and 13 had diabetes and the rest of the subjects that is, 47 had NGT. LDL levels in patients with NGT and IGT were found within normal range, while it was higher than normal in patients with diabetes. Mean total cholesterol and mean HDL values were within normal range for all OGTT patient types.

Conclusion- This study observed that as the periodontal condition and OGTT scores worsen, the TG levels and LDL levels also follow the same trend. Suspected cases should be screened for diabetes and deranged lipid profile in dental practice.

KEYWORDS : type 2 diabetes, risk factor, periodontal disease, obesity

INTRODUCTION

The association between obesity and periodontitis was consistent with a compelling pattern of increased risk of periodontitis in overweight or obese individuals.¹ Although the underlying pathophysiological mechanism remains unclear, it has been pointed out that the development of insulin resistance as a consequence of a chronic inflammatory state and oxidative stress could be implicated in the association between obesity and periodontitis.^{2,3}

Obesity is now recognized as a chronic disease with a multifactorial etiology.⁴ Besides being a risk factor for cardiovascular disease, obesity has also been suggested to be a risk factor for periodontitis. Investigation from the United States, using the large NHANES III database, supported association between body fat and periodontal disease.^{5,6} There are many studies that demonstrate an association between diabetes and an increased susceptibility to oral infections including periodontal disease.⁷ Periodontitis also progresses more rapidly in poorly controlled diabetics, and early age of onset of the disease is seen as a risk factor for more severe diseases.⁸ Conversely, most well-controlled diabetic patients can maintain periodontal health and will respond favorably to periodontal therapy.⁹

After thorough literature search we could not find much studies on exploring relationship between lipid profile and oral glucose tolerance test (OGTT) with periodontal health status, in both healthy and diabetic patients. Thus, this study was planned with an objective to test the association among lipid profile, oral glucose tolerance test with periodontal health/disease dependent variables in healthy, diabetic and impaired glucose tolerance subjects.

METHODS

The study was conducted at Department of Periodontics of a tertiary care dental teaching hospital of northern India in collaboration with Department of Biochemistry. Subjects visiting the department for some reason were asked about their diabetic/ Lipid profile status. Any subject disclosing the current, past or family history about their diabetic/ Lipid profile status was included in sampling frame. Purposive sampling technique was used in this study. Of them, a group of 100 patients who were willing to form a

part of the study were finally selected and were sent for blood and periodontal examination. Subjects having community periodontal index (CPI) score of 2 or more and CPI loss of attachment score of 0 and above, were included for this study.

For the biochemical analyses, WHO criteria will be used to diagnose diabetes. OGTT and lipid profile tests were analyzed by these standards that is, normal glucose tolerance (NGT; fasting and 2 h postchallenge plasma glucose levels <110 mg/dl and <140 mg/dl, respectively), diabetes (fasting or 2 h post challenge plasma glucose levels ≥ 126 mg/dl or ≥ 200 mg/dl, respectively) and IGT (IGT; all others with some glucose tolerance impairment including Impaired Fasting Glucose (IFG), that is, with one of the two glucose tolerance levels between normal and diabetic values and the other below the diabetic level).¹⁰ Venous blood samples were taken in the fasting state for OGTT and lipid profile analysis. Immediately after, 75 g glucose dissolved in 300 ml water was given to be ingested in about 5 min and sample of blood was again collected at an interval of 30 min for a period of 3 h for Glucose Tolerance Test (GTT) analysis.

Written and informed consent was obtained from study subjects. Permission of ethical committee was obtained from the Institutional Ethics Committee. All the questionnaires were manually checked and edited for completeness and consistency and were then coded for computer entry. After compilation of collected data, analysis was done using Statistical Package for Social Sciences (SPSS), version 21 (IBM, Chicago, USA). The results were expressed using appropriate statistical variables.

RESULTS

Out of total 100 study subjects, 25 patients were found to be periodontally healthy and 75 periodontally diseased; 40 subjects had IGT, and 13 had diabetes and the rest of the subjects that is, 47 had NGT.

LDL levels in patients with NGT and IGT were found within normal range, while it was higher than normal in patients with diabetes. Mean total cholesterol and mean HDL values were within normal range for all OGTT patient types. (Table 1)

Table 1: Association of participants' diabetic status OGTT and lipid profile tests

Variables	Normal glucose tolerance (Mean±SD)	Impaired glucose tolerance (Mean±SD)	Diabetes (Mean±SD)
TG (mg/dl)	118±75	116±66	190±86
Total cholesterol (mg/dl)	130±22	183±27	192±40
HDL cholesterol (mg/dl)	38±13	36±9	37±8
LDL cholesterol (mg/dl)	90±14	109±18	173±25
Normal values (mg/dl): TG=75-175, total cholesterol=150-240, HDL=30-60, LDL=50-150			

Out of total 75 periodontally diseased patients 30 (40%) showed abnormal fasting blood sugar levels and 56 (74.67%) showed abnormal post prandial blood sugar levels. 71 (94.67%) patients showed abnormal total serum cholesterol level, 60 (80%) showed abnormal LDL cholesterol level and 66 (88%) showed abnormal TG levels. (Table 2)

Table 2: Relation between periodontally healthy and diseased with various biochemical parameters

Tests		Periodontally healthy	Periodontally diseased
Fasting blood sugar	Normal	20	45
	Abnormal	5 (20%)	30 (40%)
Postprandial sugar	Normal	7	19
	Abnormal	18 (72%)	56 (74.67%)
Total serum cholesterol	Normal	23	4
	Abnormal	02 (8%)	71 (94.67%)
HDL cholesterol	Normal	18	10
	Abnormal	7 (28%)	65 (86.67%)
LDL cholesterol	Normal	20	15
	Abnormal	5 (20%)	60 (80%)
TG	Normal	18	9
	Abnormal	7 (28%)	66 (88%)

DISCUSSION

One of the important oral signs of diabetes is gingivitis and periodontitis. Patients with undiagnosed or poorly controlled diabetes mellitus type 1 or type 2 are at higher risk for periodontal disease. There are many studies that demonstrate an association between diabetes and an increased susceptibility to oral infections including periodontal disease.¹¹ Periodontitis also progresses more rapidly in poorly controlled diabetics, and early age of onset of the disease is seen as a risk factor for more severe diseases. Conversely, most well-controlled diabetic patients can maintain periodontal health and will respond favorably to periodontal therapy.¹²

In this study, LDL levels in patients with NGT and IGT were found within normal range, while it was higher than normal in patients with diabetes. Mean total cholesterol and mean HDL values were within normal range for all OGTT patient types. It is also clear that as the periodontal condition and OGTT scores worsen, the TG levels and LDL levels also follow the same trend. It has been shown that diabetes is one of the predisposing factors for the development of periodontal disease. There is a vicious cycle. In this there exists a relationship between periodontitis and diabetes, systemic disease predisposing to oral infection, and once that infection is established, oral infection exacerbates the systemic disease.

It is a proven fact that diabetic patients are prone to elevated LDL cholesterol and TGs even when blood glucose levels were well controlled.¹³ This study also observed that hyperlipidemia may be one of the factors associated with periodontitis. The results of the study suggest that periodontitis itself may lead to elevated LDL/TG levels. This can be said that periodontitis may cause elevated serum lipids and potentially to systemic disease arising from chronic hyperlipidemia. Another study by Xiong X et al. observed that

periodontal disease was associated with later development of impaired glucose metabolism with a prior history of gestational diabetes.¹⁴

We observed that out of total 75 periodontally diseased patients 30 (40%) showed abnormal fasting blood sugar levels and 56 (74.67%) showed abnormal post prandial blood sugar levels. 71 (94.67%) patients showed abnormal total serum cholesterol level, 60 (80%) showed abnormal LDL cholesterol level and 66 (88%) showed abnormal TG levels.

Managing periodontal disease may in addition to improving the diabetic status of the patient may also help in betterment of lipid profile. Thus treating periodontal disease may also have a significant impact on improving the systemic health of the patient as both diabetes and a deranged lipid profile are known risk factors for several life-threatening diseases and conditions. Patients with well-controlled diabetes who have good oral hygiene and who are on a regular periodontal maintenance schedule have the same risk of severe periodontitis as nondiabetic subjects. As shown in this study, the lipid profile can be a determinant of diabetes and periodontitis and vice versa, the treating doctor must keep these factors in mind. Suspected cases should be screened for diabetes and deranged lipid profile in dental practice for the same reason.

CONCLUSION

This study observed that as the periodontal condition and OGTT scores worsen, the TG levels and LDL levels also follow the same trend. There exists a relationship between periodontitis and diabetes, systemic disease predisposing to oral infection, and once that infection is established, oral infection exacerbates the systemic disease. Suspected cases should be screened for diabetes and deranged lipid profile in dental practice.

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