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ORIGINAL RESEARCH

Assessment of serum interleukin- 10 levels in chronic periodontitis and type II diabetes mellitus patients

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ABSTRACT:

Background: Chronic periodontal disease is an infectious inflammatory disease and type 2 diabetes mellitus is a metabolic disease due to disrupted insulin action. The present study was conducted to assess serum interleukin- 10 levels in chronic periodontitis and type II diabetes mellitus patients. **Materials & Methods:** The present study was conducted on 84 patients divided into 4 groups of 21 each: Group I (healthy controls), group II (CPD only) were nondiabetic and systemically healthy and diagnosed with periodontal disease; group III (T2DM with CPD) were diagnosed as type 2 diabetes with periodontal disease and group IV (T2DM without CPD) were diagnosed as type 2 diabetes with no evidence of CPD. Parameters such as plaque index (PII), gingival index (GI), PPDs, clinical attachment loss (CAL), bleeding on probing (BoP), BMI, radiographic evidence of bone loss, glycated hemoglobin (HbA1c) levels, serum IL-10 and random blood sugar levels was assessed. **Results:** The mean PI in group I patients was 0.21, in group II was 1.64, in group III was 1.82 and in group IV was 0.20. Gingival index was 2.2 in group II, 2.48 in group III, bleeding on probing (BOP) was 0.30 in group I, 2.70 in group II, 2.90 in group III and 2.32 in group IV, PPD was 1.04 in group I, 5.72 in group II, 5.82 in group III and 0.98 in group IV and AL was 1.82 in group II and 2.56 in group III. The mean HbA1C value in group I was 4.82, in group II was 5.72, in group III was 8.92 and in group IV was 7.91, random blood sugar was 112.8 in group I, 104.6 in group II, 224.6 in group III and 212.6 in group IV. IL- 10 level was 15.6 in group I, 10.2 in group II, 11.4 in group III and 12.6 in group IV. The difference was significant (P< 0.05). **Conclusion:** Authors found that low IL-10 level is associated with high HbA1c. Serum IL-10 levels may be one of the predictors of glycemia.

Key words: Bleeding on probing, Diabetes mellitus, Periodontal disease

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INTRODUCTION

Chronic periodontal disease (CPD) is an infectious inflammatory disease and type 2 diabetes mellitus (T2DM) is a metabolic disease due to disrupted insulin action. Diabetes and periodontitis are complex chronic

diseases with an established bidirectional relationship.¹ Both have similar pathobiologic mechanisms and factors such as obesity and insulin resistance are important predecessors with inflammation being crucial in this association.² Nonresolving chronic inflammation

has an impact on diabetes control, beta cell function, insulin resistance and the development of T2DM and its complications. CPD may serve as an initiator or propagator of insulin resistance in a way similar to obesity.³

Type 2 DM is a heterogeneous group of disorders characterized by variable degrees of insulin resistance, impaired insulin secretion and increased glucose production. Distinct genetic and metabolic defects in insulin action and/or secretion give rise to the common phenotype of hyperglycemia in type 2 DM. Type 2 DM is preceded by a period of abnormal glucose homeostasis classified as impaired fasting glucose (IFG) or impaired glucose tolerance (IGT). Incidence of type I DM is 10% and that of type II DM is 90%.⁴

Interleukin-10 (IL-10) is essential in regulating this balance and has gained interest recently as a modulator of the response to infection at the Janus Kinase-Signal Transducers and Activators of Transcription (JAK-STAT) signaling axis of host responses. IL-10 was first identified by its ability to stop the immune response by inhibiting the production of a number of cytokines.⁵ IL-10 has been recognized to have potent and broad-spectrum anti-inflammatory activity, which has been unequivocally established in various models of infection, inflammation, and even in cancer.⁶ The present study was conducted to assess serum interleukin- 10 level in chronic periodontitis and type II diabetes mellitus patients.

RESULTS

Table I Assessment of periodontal parameters

Parameters	Group I	Group II	Group III	Group IV	P value
Plaque index	0.21	1.64	1.82	0.20	0.05
Gingival index	0	2.2	2.48	0	0.01
Bleeding on probing (BOP)	0.30	2.70	2.90	2.32	0.14
PPD	1.04	5.72	5.82	0.98	0.01
AL	0	1.82	2.56	0	0.01

Table I, graph I shows that mean PI in group I patients was 0.21, in group II was 1.64, in group III was 1.82 and in group IV was 0.20. Gingival index was 2.2 in group II, 2.48 in group III, bleeding on probing (BOP) was 0.30 in group I, 2.70 in group II, 2.90 in group III and 2.32 in group IV, PPD was 1.04 in group I, 5.72 in group II, 5.82 in group III and 0.98 in group IV and AL was 1.82 in group II and 2.56 in group III. The difference was significant (P< 0.05).

Table II Assessment of other parameters

Parameters	Group I	Group II	Group III	Group IV	P value
HbA1C	4.82	5.74	8.92	7.91	0.04
RBS	112.8	104.6	224.6	212.6	0.01
IL- 10	15.6	10.2	11.4	12.6	0.05

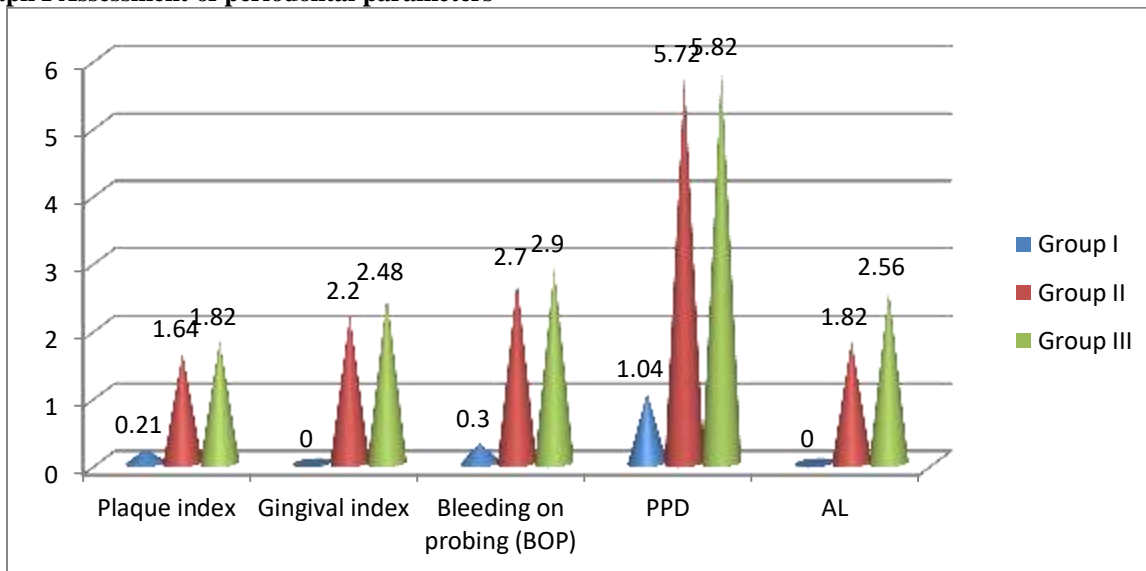
Table II, graph II shows that mean HbA1C value in group I was 4.82, in group II was 5.72, in group III was 8.92 and in group IV was 7.91, random blood sugar was 112.8 in group I, 104.6 in group II, 224.6 in group III and 212.6 in group IV. IL- 10 level was 15.6 in group I, 10.2 in group II, 11.4 in group III and 12.6 in group IV. The difference was significant (P< 0.05).

MATERIALS & METHODS

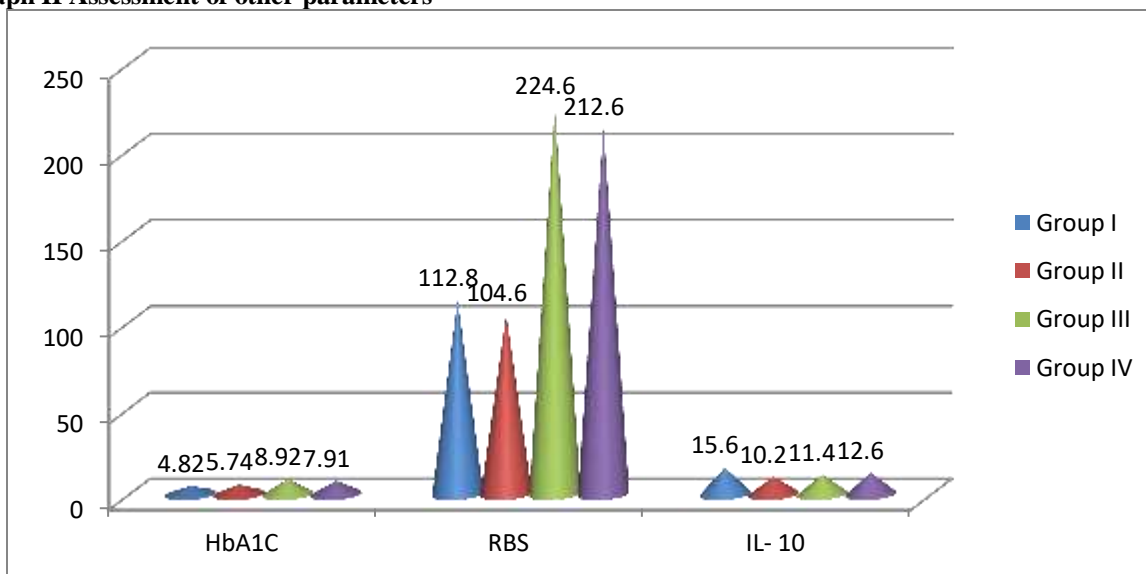
The present study was conducted in the department of Periodontics & general Medicine. The study comprised of 84 patients of both genders. The study was started after obtaining institutional ethical clearance and consent of the patients.

Demographic profile of all patients was recorded. Parameters such as plaque index (PI), gingival index (GI), PPDs, clinical attachment loss (CAL), bleeding on probing (BoP), BMI, radiographic evidence of bone loss, total cholesterol, TG, LDL, HDL, glycated hemoglobin (HbA1c) levels and random blood sugar (RBS) levels was assessed. Patients were divided into 4 groups of 21 each: Group II (healthy controls) included individuals who were nondiabetic, systemically and periodontally healthy; Group II (CPD only) were nondiabetic and systemically healthy and diagnosed with periodontal disease; Group III (T2DM with CPD) were diagnosed as type 2 diabetes with periodontal disease and Group IV (T2DM without CPD) were diagnosed as type 2 diabetes with no evidence of CPD. Blood samples were drawn from all participants and serum IL-10 was measured using a commercially available ELISA kit. Results were tabulated and subjected to statistical analysis. P value less than 0.05 was considered significant.

Graph I Assessment of periodontal parameters



Graph II Assessment of other parameters



DISCUSSION

DM is a systemic disease commonly associated with periodontal diseases. This close relationship has been demonstrated in a number of clinical and epidemiological studies.⁷ The relationship between these two diseases is not totally clear. This may be due to the complex nature of both the diseases. Several investigators have reported a higher incidence and severity of periodontal disease in type 2 (NIDDM) diabetic patients as compared with non-diabetic controls.⁸ The present study was conducted to assess serum interleukin 10 level in chronic periodontitis and type II diabetes mellitus patients.

In present study, patients were divided into 4 groups of 21 each: Group I (healthy controls), group II (CPD

only) were nondiabetic and systemically healthy and diagnosed with periodontal disease; group III (T2DM with CPD) were diagnosed as type 2 diabetes with periodontal disease and group IV (T2DM without CPD) were diagnosed as type 2 diabetes with no evidence of CPD. Almas et al⁹ in 2001 at the King Saud University, College of Dentistry, 40 subjects were examined, 20 in each group of healthy and diabetic subjects, with ages ranging from 20 to 70 years. It was observed that the severity of periodontal disease increased with the increase in the blood glucose level. There was a steady increase in blood glucose level with increase in CPITN scores.

We found that mean PI in group I patients was 0.21, in group II was 1.64, in group III was 1.82 and in group

IV was 0.20. Gingival index was 2.2 in group II, 2.48 in group III, bleeding on probing (BOP) was 0.30 in group I, 2.70 in group II, 2.90 in group III and 2.32 in group IV, PPD was 1.04 in group I, 5.72 in group II, 5.82 in group III and 0.98 in group IV and AL was 1.82 in group II and 2.56 in group III. Van Exel et al¹⁰ proposed that high IL-10 levels prevent the development of T2DM and metabolic syndrome by limiting the effects of the inflammatory response that is, by counter regulating the effects of pro-inflammatory cytokines such as TNF- α and IL-6. They further proposed that IL-10 at least partly represents the effect of an AIR on T2DM and metabolic syndrome, based on another study that suggests IL-10 to be a key regulator and powerful suppressor of the immune response.

Acharya et al¹¹ involved 60 patients divided into 4 groups comprising 15 participants each: group 1 (healthy controls), group 2 (CPD patients), group 3 (T2DM patients with CPD) and group 4 (T2DM patients). Plaque index, gingival index, probing pocket depths (PPD), clinical attachment loss, bleeding on probing, random blood sugar, glycosylated hemoglobin (HbA1c), and serum IL-10 was measured. Interleukin-10 was detected in all four groups. Statistically significant ($P < 0.05$) differences were observed in most of the variables in all groups. IL-10 correlated significantly with PPD in group 1 and with HbA1c in group 4. IL-10 regressed with PPD in group 1 and with HbA1c in group 4. IL-10 levels were lower in group 3 when compared with group 4 and was lowest in group 2.

Apporva et al¹² found that the mean CPI score and the number of missing teeth was higher in diabetics compared with non-diabetics, and was statistically significant indicating that prevalence and extent of periodontal disease was more frequent and more severe in diabetic patients. The risk factors like glycated hemoglobin, duration of diabetes, fasting blood sugar, personal habits and oral hygiene habits showed a positive correlation with periodontal destruction, whereas mode of anti-diabetic therapy showed a negative correlation according to the multiple regression analysis. The odds ratio of a diabetic showing periodontal destruction in comparison with a non-diabetic was 1.97, 2.10 and 2.42 in well, moderately and poorly controlled diabetics, respectively.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that low IL-10 level is associated with high HbA1c. Serum IL-10 levels may be one of the predictors of glycemia.

REFERENCES

1. Mealey BL, Oates TW. American Academy of Periodontology. Diabetes mellitus and periodontal diseases. *J Periodontol.* 2006;77:1289–303.
2. Passoja A, Puijola I, Knuutila M, Niemelä O, Karttunen R, Raunio T, et al. Serum levels of interleukin-10 and tumour necrosis factor- α in chronic periodontitis. *J Clin Periodontol.* 2010;37:881–7.
3. Loos BG. Systemic markers of inflammation in periodontitis. *J Periodontol.* 2005;76(11 Suppl):2106–15.
4. Genco RJ, Grossi SG, Ho A, Nishimura F, Murayama Y. A proposed model linking inflammation to obesity, diabetes, and periodontal infections. *J Periodontol.* 2005;76(11 Suppl):2075–84.
5. Lakschevitz F, Aboodi G, Tenenbaum H, Glogauer M. Diabetes and periodontal diseases: Interplay and links. *Curr Diabetes Rev.* 2011;7:433–9.
6. Savage A, Eaton KA, Moles DR, Needleman I. A systematic review of definitions of periodontitis and methods that have been used to identify this disease. *J Clin Periodontol.* 2009;36:458–67.
7. Moore KW, de Waal Malefyt R, Coffman RL, O'Garra A. Interleukin-10 and the interleukin-10 receptor. *Annu Rev Immunol.* 2001;19:683–765.
8. Mosser DM, Zhang X. Interleukin-10: New perspectives on an old cytokine. *Immunol Rev.* 2008;226:205–18.
9. Almas K, Al-Qahtani M, Al-Yami M, Khan N. The Relationship between Periodontal Disease and Blood Glucose Level among Type 2 Diabetic Patients. *J Contemp Dent Pract.* 2001;4:18–25.
10. Van Exel E, Gussekloo J, de Craen AJ, Frölich M, Bootsma-Van Der Wiel A, Westendorp RG Leiden Plus Study. Low production capacity of interleukin-10 associates with the metabolic syndrome and type 2 diabetes: The Leiden 85-Plus Study. *Diabetes.* 2002;51:1088–92.
11. Acharya AB, Thakur S, Muddapur MV. Evaluation of serum interleukin-10 levels as a predictor of glycemic alteration in chronic periodontitis and type 2 diabetes mellitus. *Journal of Indian Society of Periodontology.* 2015 Jul;19(4):388.
12. Apoorva SM, Sridhar N, Suchetha A. Prevalence and severity of periodontal disease in type 2 diabetes mellitus (non-insulin-dependent diabetes mellitus) patients in Bangalore city: An epidemiological study. *Journal of Indian Society of Periodontology.* 2013 Jan;17(1):25.