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Original Research

Assessment of serum and salivary alkaline phosphatase in type-2 diabetes mellitus with periodontal pathology

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ABSTRACT:
Background: Chronic periodontitis is a multifactorial disease resulting in the inflammation and destruction of the supporting structures around the teeth. The present study was conducted to assess level of serum and salivary alkaline phosphatase in type-2 diabetes mellitus with periodontal pathology. **Materials & Methods:** 60chronic generalized periodontitis of both genders were put in group I and healthy controls in group II. Parameters such as simplified oral hygiene index (OHI-S), gingival index, probing depth, and clinical attachment loss (CAL) were measured. 5 ml of venous blood and saliva sample collection was done and measurement of ALP levels by spectrometry was performed. **Results:** Group I had 30 males and 30 females and group II had 28 males and 32 females. The mean OHI- S at baseline was 3.24 and at 1 month was 0.97, GI was 1.96 at baseline and 0.65 at 1 month, PD was 3.60 mm at baseline and 1.92 at 1 month and CAL was 4.21 mm at baseline and 2.38 at 1 month. The difference was significant (P< 0.05). The mean salivary ALP in group I was 24.2 IU, in group II at baseline was 81.2 IU and at 1 month was 48.6 IU. The mean serum ALP in group I was 74.6 IU, in group II at baseline was 96.2 IU and at 1 month was 85.4 IU. The difference was significant (P< 0.05). **Conclusion:** ALP levels in saliva can beassessed for the diagnosis of the active phase of the periodontal disease and also a prognostic indicator for the evaluation of treatment outcomes following Phase I periodontal therapy.
Key words: Alkaline phosphatase, Chronic periodontitis, Diabetes

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INTRODUCTION

Chronic periodontitis is a multifactorial disease resulting in the inflammation and destruction of the supporting structures around the teeth, leading to tooth mobility and subsequent loss of tooth. Metabolic disorders, such as diabetes mellitus, play a crucial role in the progression of periodontal inflammatory conditions.[1]

Although periodontitis is an infectious disease of gingival tissue origin, changes that occur in the bone are crucial as the alveolar bone destruction is responsible for tooth loss.[2] The most common cause of alveolar bone destruction in periodontitis is the extension of inflammation from the marginal gingiva to the underlying periodontal tissues.Salivary constituents for diagnosing periodontal disease include enzymes and immunoglobulins, hormones of host origin, bacteria and bacterial products, ions, and volatile compounds.[3]

Alkaline phosphatase (ALP) enzyme plays a key role in gingival inflammation and bone resorption.It plays a key role in gingival inflammation and bone homeostasis. The main source of alkaline phosphatase is liver, kidney, bone, intestine and placenta as also it is found in many cells of the periodontium including neutrophils, osteoblasts, fibroblasts.[4] It is mainly released from polymorphonuclear neutrophils during their migration to the site of infection, from osteoblast during bone formation and from fibroblast in periodontal ligament during periodontal regeneration.[5]The present study was conducted to

assess level of serum and salivary alkaline phosphatase in type-2 diabetes mellitus with periodontal pathology.

MATERIALS & METHODS

The present study comprised of 60chronic generalized periodontitis of both genders. The consent was obtained from all enrolled patients.

Data such as name, age, gender etc. was recorded. Patients were put in group I and healthy controls in group II. A thorough oral examination was carried and parameters such as simplified oral hygiene index (OHI-S), gingival index, probing depth, and clinical attachment loss (CAL) were measured. 5 ml of venous blood and saliva sample collection was done and measurement of ALP levels by spectrometry was performed. The clinical parameters along with saliva and serum ALP levels were redetermined after 30 days following Phase I periodontal therapy.Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Number	CGP	healthy controls
M:F	30:30	28:32

Table I shows that group I had 30 males and 30 females and group II had 28 males and 32 females.

Table II Assessment of clinical parameters at baseline and 1 month in group I

Parameters	Baseline	At 1 month	P value
OHI-S	3.24	0.97	0.01
GI	1.96	0.65	0.05
PD (mm)	3.60	1.92	0.03
CAL (mm)	4.21	2.38	0.04

Table II, graph I shows that mean OHI- S at baseline was 3.24 and at 1 month was 0.97, GI was 1.96 at baseline and 0.65 at 1 month, PD was 3.60 mm at baseline and 1.92 at 1 month and CAL was 4.21 mm at baseline and 2.38 at 1 month. The difference was significant (P< 0.05).

Graph I Assessment of clinical parameters at baseline and 1 month in group I

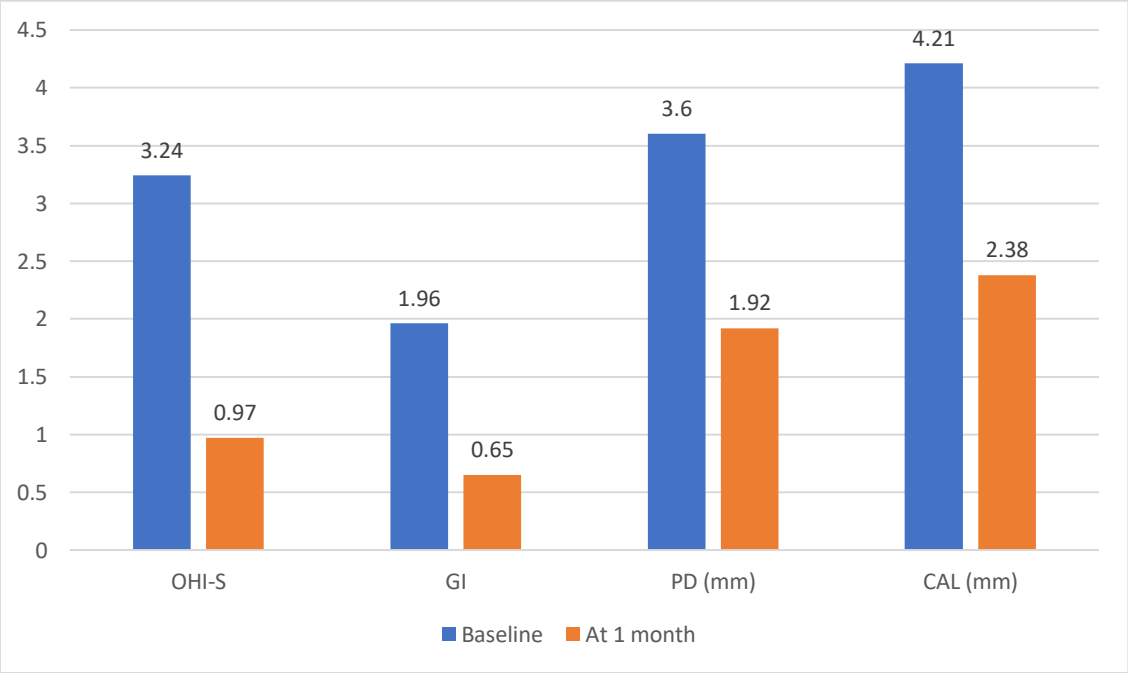

Table III Assessment of salivary and serum alkaline phosphatase levels

Parameters	Group I	Group II (baseline)	Group II (at 1 month)	P value
Salivary ALP (IU)	24.2	81.2	48.6	0.02
Serum ALP (IU)	74.6	96.2	85.4	0.05

Table III shows that mean salivary ALP in group I was 24.2 IU, in group II at baseline was 81.2 IU and at 1 month was 48.6 IU. The mean serum ALP in group I was 74.6 IU, in group II at baseline was 96.2 IU and at 1 month was 85.4 IU. The difference was significant (P< 0.05).

DISCUSSION

Of the various illnesses that affect teeth, periodontitis is a common disease results in the destruction of supporting structures of the teeth, ultimately which cause tooth loss.Periodontal pathogens and their products in the dental plaque are the primary cause of periodontal disease. Along with direct destructive effects of periodontal pathogens, inflammatory and immune responses in host cause most of the tissue destruction.[6] Current clinical diagnostic methods are not precisely accurate and only allow retrospective diagnosis of attachment loss. Conventional diagnostic methods of periodontitis are based on the measurement of clinical attachment loss and radiographic evaluation of alveolar bone loss.The term biomarkers refer to a measurable indicator of some biological state or condition, which evaluates normal biological mechanisms, pathogenic process or pharmacological therapeutic interventions.[7] Biomarkers can play an important role in life sciences and have begun to assume a greater role in diagnosis, monitoring of therapy outcome and drug discovery.[8,9]The present study was conducted to assess level of serum and salivary alkaline phosphatase in type-2 diabetes mellitus with periodontal pathology.

We found that group I had 30 males and 30 females and group II had 28 males and 32 females. De A et al[10]compares the serum and salivary alkaline phosphatase levels in chronic periodontitis patients with or without type-2 diabetes mellitus.A total of 45 individuals were included in the study and divided into three groups: Group I (healthy individual), Group II (Chronic periodontitis without diabetes mellitus type-2) and Group III (Chronic periodontitis with type-2 diabetes mellitus) on the basis of clinical, radiographic and blood sugar examination. The serum and unstimulated saliva were collected from all patients in aseptic condition and samples were analyzed for alkaline phosphatase level. The result showed that the concentration of serum and salivary alkaline phosphatase increases significantly in patients with chronic periodontitis with type-2 diabetes mellitus than chronic periodontitis without diabetes mellitus and healthy patients.

We observed that mean OHI- S at baseline was 3.24 and at 1 month was 0.97, GI was 1.96 at baseline and 0.65 at 1 month, PD was 3.60 mm at baseline and 1.92 at 1 month and CAL was 4.21 mm at baseline and 2.38 at 1 month. Jayasree et al[11]aimed at comparing the quantitative levels of alkaline phosphatase (ALP) in saliva and serum before and after scaling and root planing in patients with chronic generalized periodontitis.A total number of 50 participants (40 with chronic generalized periodontitis and 10 periodontally healthy volunteers) of 30–50 years were included in the study. Clinical parameters such as simplified oral hygiene index (OHI-S), gingival index, probing depth, and clinical attachment loss (CAL) were measured, and then, saliva and blood sample collection was done and analyzed for ALP levels by spectrometry. The clinical parameters along with saliva and serum ALP levels were re-evaluated after 30 days following Phase I periodontal therapy. The saliva and serum ALP levels were significantly increased in patients with chronic generalized periodontitis with an increase in clinical parameters such as OHI-S, gingival index, probing depth, and CAL when compared with periodontally healthy individuals. The saliva and serum ALP levels were significantly decreased following Phase I periodontal, therapy along with improvement in clinical parameters.

We found that mean salivary ALP in group I was 24.2 IU, in group II at baseline was 81.2 IU and at 1 month was 48.6 IU. The mean serum ALP in group I was 74.6 IU, in group II at baseline was 96.2 IU and at 1 month was 85.4 IU. Miglani et al[12] revealed the relationship between periodontal disease and ALP levels in saliva was the first study in the Indian population, correlating the periodontal disease status with salivary ALP levels.

The limitation the study is small sample size.

CONCLUSION

Authors found that ALP levels in saliva can beassessed for the diagnosis of the active phase of the periodontal disease and also a prognostic indicator for the evaluation of treatment outcomes following Phase I periodontal therapy.

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