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ASSESSMENT OF SALIVARY AND SERUM ALKALINE PHOSPHATASE LEVEL IN TYPE-2 DIABETES MELLITUS WITH PERIODONTITIS PATIENTS.

Dental Science

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ABSTRACT

Background: Oral health and general health are interdependent and of the classic example of this symbiotic relationship is that of Periodontal health and the Diabetes mellitus. Diabetes mellitus, play a crucial role in the progression of periodontal inflammatory conditions. Alkaline phosphatase (ALP) enzyme plays a significant role in gingival inflammation and bone resorption.

Aim: To compare the serum and salivary alkaline phosphatase levels in chronic periodontitis patients with or without type-2 diabetes mellitus.

Materials and Methods: The study consisted of a total of 45 individuals which were allocated to 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). The serum and unstimulated saliva were collected from all patients in aseptic condition and samples were analyzed for alkaline phosphatase level using AVANTOR™ Benesphera ALP Kit by fully automated analyzer.

Results: The concentration of serum and salivary alkaline phosphatase were significantly high in patients with chronic periodontitis with type-2 diabetes mellitus.

Conclusion: Alkaline phosphatase can prove a valuable clinical diagnostic biomarker in periodontal diseases.

KEYWORDS

Alkaline phosphatase, chronic periodontitis, type II diabetes mellitus, alveolar bone loss, biomarker, saliva

INTRODUCTION:

Diabetes mellitus is a metabolic disorder of carbohydrate, protein and lipid metabolism that causes a chain reaction for the development of multiple chronic conditions. Retinopathy, nephropathy, neuropathy, microvascular disease, and impaired wound healing are the common complications with diabetes mellitus. Periodontitis is expressed to be the sixth complication of diabetes.[1]

Current clinical diagnostic methods are not precisely accurate to determine the relationship between diabetes mellitus and the periodontitis.[2]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. 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.[3]

Saliva a body fluid secreted by major and minor salivary glands contains locally and systemically derived biomarkers of periodontal disease,[4] thus, may offer the basis for a precise clinical diagnostics test for periodontitis. Various enzymes are released from host cells during the initiation and progression of periodontal disease.[5] Alkaline phosphatase is a host derived, hydrolytic enzyme.[6]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.[7] 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.[8]

With this background, the present study aims to estimate alkaline phosphatase levels in saliva and serum of type II diabetes mellitus patients with and without periodontitis and healthy controls.

MATERIALS AND METHOD:

Study participants:

A total 45 patients were selected from the OPD of Khyber hospital, Srinagar. The study participants were allocated to three groups.

Group 1: Healthy controls

Group 2: Chronic periodontitis without diabetes mellitus

Group 3: Chronic periodontitis co affected by diabetes mellitus.

Clinical assessment of subjects:

Basic periodontal examination of all the study participants was done by one examiner. The clinical parameters recorded were: (a)Silness and Loe, 1964 Plaque Index.[9] (b) Loe and Silness 1963 Gingival Index.[10](c) Probing pocket depth ≥5 mm using a graduated periodontal probe. Patients were also subjected to blood sugar analysis and a radiographic evaluation through orthopantomogram.

Biochemical analysis:

After taking informed written consent, 5 ml of blood was collected by venipuncture using 20G needle and immediately transferred to the laboratory. Then, 1 ml of unstimulated whole saliva sample was collected in a sterile disposable plastic container. Samples were stored at 4°C. The blood samples were centrifuged at 3000 rpm for 5 min. All serum samples were subjected to Auto Analyzer (BeneSphera) for analysis, and all saliva samples were sent to Semi Autoanalyzer . Human AVANTOR Benesphera alkaline phosphatase (ALP) Kit was used to estimate the alkaline phosphatase concentration in saliva and serum.

Statistics:

Statistical analysis was done using "Analysis of variance (ANOVA) to compare multiple means. $P < 0.05$ was considered as statistically significant.

RESULTS:

Table 1 shows the mean salivary alkaline phosphatase levels were significantly higher among to be chronic periodontitis patients and highest in chronic periodontitis patients with type II diabetes mellitus patients when compared to healthy controls ($P < 0.05$).

As shown in Table 2 serum alkaline phosphatase levels were significantly higher in chronic periodontitis patients and highest in chronic periodontitis patients with type II diabetes mellitus patients than the control group ($P < 0.05$).

DISCUSSION:

The inadequate management and or control of diabetes mellitus predispose patients to a number of complications. One such complication is periodontitis. The present cross-sectional observational study attempted to focus on the changes in the total alkaline phosphate level based on the changes in the bone caused due to chronic periodontitis and type 2 diabetes mellitus. Salivary and serum ALP level showed a significant rise in both the groups i.e., in patients with periodontitis (Group 2) and in patients with periodontitis coaffected by type 2 diabetes mellitus (Group 3) when compared to the healthy controls. Similar results were echoed in studies by Armitage in 1992[11], Shaheen *et al*. in 2009[6], De A et al in 2018[5]. However, studies conducted by the Pushpa Rani DS et al in 2012 [12] and Stahl SS, et al in 1952[13] reported no such association. The increase in levels of alkaline

phosphatase in diabetic individuals could be attributed to the sustained raised blood glycemic levels which render the patient highly susceptible to infection due to compromised immune status.

CONCLUSION:

A highly significant correlation of increased levels of serum and salivary ALP in chronic periodontitis with or without type 2 diabetes mellitus was observed as compared to healthy individuals. Thus it could be concluded that the alkaline phosphatase levels can be used as a pro-inflammatory biomarker for monitoring periodontal diseases.

Table 1: Salivary Alkaline Phosphatse levels in the control healthy individuals (group 1); Type 2 diabetes mellitus without periodontitis (group 2); Type 2 diabetes mellitus with periodontitis (group 3)

Variables	Group 1(15)	Group 2(15)	Group 3(15)
Gender (M/F)	10/5	9/6	11/4
Age	38.58±7.86	41.81±6.95	40.81±6.95
ALP (IU/L)	20.974±5.330	99.090±20.394 *	100.076±19.869 *

*P<0.05.

Table 2: Serum Alkaline Phosphatase levels in the control healthy individuals (group 1); Type 2 diabetes mellitus without periodontitis (group 2); Type 2 diabetes mellitus with periodontitis (group 3)

Variables	**Group 1(15)**	**Group 2(15)**	**Group 3(15)**
Gender (M/F)	10/5	9/6	11/4
Age	38.58±7.86	41.81±6.95	40.81±6.95
ALP (IU/L)	117.393±15.567	200.383±17.161*	235.5037±43.911*

*P<0.05.

REFERENCES:

1. Loe H. Periodontal disease. The sixth complication of diabetes mellitus. Diabetes Care 1993;16:329-34.
2. Anil S, Baiju FM Current research in diagnostic methods for assessing periodontal disease. Indian J Dent Res. 1998;9:120-3.
3. Mandel ID: Markers of periodontal disease susceptibility and activity derived from saliva. In johnson NW: Risk Markers of Oral Disease 1991;3:228-53.
4. Kaufman E, Lamster IB. Analysis of saliva for periodontal diagnosis – A review. J Clin Periodontol 2000;27:453-65.
5. De A, Puttannavar R, Rahman F, Adak A, Sahoo R, Prakash BS. Estimation of salivary and serum alkaline phosphatase level as a diagnostic marker in type 2 diabetes mellitus with periodontal health and disease: A clinico biochemical study. J Oral Maxillofac Pathol 2018;22:445.
6. Shaheen A, Khattak S, Khattak AM, Kamal A, Jaffari SA, Sher A. Serum alkaline phosphatase level in patients with type 2 diabetes mellitus and its relation with periodontitis. KUST Med J 2009;1:51-4.
7. Renggli HH: Phagocytosis and killing by cervicular neutrophils. In Lehner T , editor. Periodontal disease and diabetes mellitus. New York, Grune and Stratton; 1977.
8. Safkon-Seppala B, Ainamo J. Periodontal condition in insulin dependent diabetes mellitus. J Clinical periodontal 1992;19:24-9.
9. Silness J, Loe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condtion. Acta Odontol Scand 1964;22:121 35.
10. Loe H, Silness J. Periodontal disease in pregnancy. I Prevalence and severity, Acta Odont Scand 1963;21:533-51.
11. Armitag G. Diagnostic tests for periodontal diseases. J Curr Opinion Dent 1992;2:53.
12. Pushpa Rani DS, Anandan SN. A clinical study of serum alkaline phosphatase and calcium level in type 2 diabetes mellitus with periodontitis among the south Indian population. SRM J Res Dent Sci 2012;3:175-9.
13. Stahl SS, Wisan JM, Miller SC. The influence of systemic disease on alveolar bone. J Am Dent Assoc 1952;45:277-83.