Research Paper Medical Science

Serum Total Alkaline Phosphatase Enzyme Levels in Chronic Periodontitis Patients Among Tamilnadu Population.

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ABSTRACT

Serum alkaline phosphatase enzymemeasurementsareused as a diagnostic assay for chronic periodontitis.The present study was carried out to compare the serum total alkaline phosphatase level among healthy individuals and chronic periodontitis patientsin Tamilnadu and evaluate racial behavior in enzyme level.Serum samples were obtained from 31healthy individuals and 36 chronic periodontitis patients. The serumwas thenassayed for total alkaline activity (ALP) level using a fully automated analyzer.The data were tabulated and statistically analysed.Comparison of the total alkaline phosphatase activity between the healthy and chronic periodontitis groups showed an increase in total alkaline phosphatase activity among chronic periodontitis.The results were similar to other studies suggestive of using serum alkaline phosphatase measurement as a reliable assay for chronic periodontitis and there is no racial or ethnic differences.

KEYWORDS Serum Alkaline phosphatase enzyme; Total Alkaline phosphatase enzyme; chronic periodontitis.

Chronic periodontitis is a multifactorial disease resulting in the inflammation and destruction of the supporting structure. There is evidence that the periodontal disease progresses in a randomised and unpredictable manner[1].This clearly renders existing clinical methods of periodontal diagnosis as outdated, as they only provide information about disease presence after its onset. More advanced or reliable diagnostic investigations are being developed based on identification, evaluation and or estimation of various mediators involved in the immunological or host response events to elucidate the state of disease like initiation, progression or state of remission.

One such is the host derived enzyme, total Alkaline phosphatase (ALP), a non specific enzyme that hydrolysis organic phosphate ester linkages plays a key role in bone homeostasis. It is present in liver, kidney, bone, intestine and placenta. It is also found in many cells of periodontium including neutrophils, osteoblasts and fibroblasts. ALP is released from polymorphonuclear neutrophils during inflammation, osteoblasts during bone formation and periodontal ligament fibroblasts during periodontal regeneration. Thus it has dual involvement in the process of periodontal inflammation and healing/regeneration. The potential sample sources through which the ALP can be identified and estimated include GCF, Saliva and Serum.

There are enough studies available in the literature, correlating the levels of these enzymes in GCF with the severity of periodontal disease.[2,3] However, there are inherent problems in collecting GCF in a routine dental practice. The sampling technique is not easy as a long time is required for sample collection and it only reflects gingival inflammation at each specific site sampled. Thus, GCF is not suitable for community practice or in public health practices.[4] Saliva, even though it is faster and more convenient to collect, the sensitivity of the ALP in saliva is found to be inadequate when compared to its presence in GCF. The ratio of GCF ALP levels to those of saliva within individuals was 530:1.[5]Hence serum as sample source was considered based on its convenience, high reliability and on the finding that alveolar bone loss could be reflected at the serum level.[6]

The purpose of this study wereto

1. Estimate the serum total alkaline phosphatase enzymelevels in healthy individuals and chronic periodontitis patients in Tamilnadu.
2. Compare the levels of serum total alkaline phosphatase enzyme activity between healthy and chronic periodontitis patients in Tamilnadu.
3. Evaluate for any racial or ethnic difference in serum alkaline phosphatase level with respect to other published studies.

Materials and methods:

This study was done in division of Periodontics, RMDC & H, Annamalai University after ethical committee approval.The subjects for this study were selected randomly from the patients who visited the division of Periodontics. Based on the results obtained from the pilot study using power and sample size software,31 individuals in control group and 36 patients in experimental groups of age 30– 55 years were selected with the criteria's listed below and are grouped as

Group A: Control group –
healthy individuals (CAL of 0 mm) and

GroupB: Experimental groups –
Chronic periodontitis patients (CAL ≥ 1mm)

Selection criteria:

Subjects of age group 30 - 55 diagnosed as healthy or chronic periodontitis were included in this study.Smokers, malnourished, anemic, subjects taking medicines known to affect periodontal conditions or gingival secretion, having cardiac

disease, hepatobiliary disease, diabetes, thyroid and parathyroid abnormalities, Viral, fungal or bacterial infection, history of recent trauma or tooth extractions, pregnant or lactating women, women on oral contraceptives, history of systemic antibiotic therapy within 6 months were excluded from the study.

Clinical examinations:
Brief and precise medical and dental history were recorded after informed consent followed by clinical examination. The clinical indices and parameters like OHI – S, Probing pocket depth level (PPD) and Clinical attachment loss (CAL) were recorded.

Sample & Evaluation:
5ml of fasting blood samples were collected from each individuals and are allowed to clot in a test tube placed slantingly. After an hour, the supernatant serum was extracted and transferred to the nearby biochemical laboratory for assay. Total ALP levels were evaluated using fully automated analyzer and the results expressed in U/L. The values obtained were tabulated and subjected for statistical analysis of data.

Data Analysis:
Results were tabulated; Sample's mean and standard deviation for the results were determined. Between each study groups, the results were compared using Student's t – test for the determination of statistical significance. All statistical analysis was performed using standard statistical software. P <0.05 was considered as statistically significant.

Results:
Table 1: Total Alkaline phosphatase level:

	Group	N	Mean	S.D	t-value	p-value
ALP (U/L)	Healthy	31	140.7	3.03	11.10	0.001(S)
	Chronic	36	155.6	6.92		

Table 1 compares the total alkaline phosphatase enzyme level in serum of healthy and chronic periodontitis patients. Average mean total alkaline phosphatase level for control (group A) was found to be 140.70 with a standard deviation of 3.03. Similarly for the chronic periodontitis group (group B), the average total alkaline phosphatase activity was found to be 155.60 with a standard deviation of 6.92.

Comparison of the above mean values were done statistically using student's "t" test. It was found to be significant at 1% ("P" value ≤ 0.001). These values show that there is an increase in the total alkaline phosphatase activity among chronic periodontitis patients as compared to healthy individuals.

Table 2: Probing pocket depth (PPD) in mm:

	Group	N	Mean	S.D	t-value	p-value
PPD (mm)	Healthy	31	1.77	0.67	7.58	0.001(S)
	Chronic	36	4.47	1.87		

Table 3: Clinical attachment loss (CAL) in mm:

	Group	N	Mean	S.D	t-value	p-value
CAL (mm)	Healthy	31	0	0	8.54	0.001(S)
	Chronic	36	3.26	2.12		

Tables 2 & 3 shows the mean probing pocket depth values and the clinical attachment loss values measured in healthy and chronic periodontitis patients.

Discussion:
Traditionally, total serum alkaline phosphatase activity has been used as a biochemical marker for bone pathology. Main source for alkaline phosphatase in serum are bone, liver, kidney and intestine. The present study was focused on the changes in the total ALP value based on the changes in the bone caused due to periodontitis as the individuals in experimental group are otherwise systemically healthy.The results showed an increase in total ALP level among chronic periodontitis patients. This result is in accordance with the study done by Shaheen et al in 2009.[7] They have shown a similar result of increased serum ALP levels in chronic periodontitis patients with and without type 2 diabetes.

In a study of serum ALP as a potential marker in progression of periodontal disease in cirrhosis patient by Jaiswal et al in 2011[8], there existed an increased ALP levels with increase in CAL values. Similar results were obtained in our study which revealed an increase in ALP level as with increased CAL and PPD values. Various other studies done using gingival crevicular fluid and saliva has shown similar increased levels of ALP in chronic periodontitis.

Hence, the results are suggestive, but not conclusive, about the use of serum ALP level as a reliable biochemical assay. Further studies are needed to confirm the use of serum alkaline phosphatase as a confirmatory diagnostic assay for chronic periodontitis by standardization of various other influencing factors like age, gender, blood group type, nutrition and severity of periodontal conditions.

Conclusion:
Theresults of this study is in accordance with all othersimilar studies done in human population in different countries, races and ethnic groups.Thisalso corroborates that there is no influence of genetic, geographic or environmental conditions on the total ALP enzyme levelsin chronic periodontitis patients.

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