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Assessment of salivary alkaline phosphatase levels in patients with periodontal diseases

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Abstract

Background: Periodontitis is a chronic inflammatory disease of periodontium, which destroys the connective tissue and bone that supports teeth. Alkaline phosphatase (ALP) it is produced by PMNs, osteoblasts, macrophages and fibroblasts.

Hence: the present study was conducted for assessing the salivary alkaline phosphatase levels in patients with periodontal diseases.

Materials & methods: 50 patients with chronic periodontitis as study group and 50 healthy controls as control group were analysed. Unstimulated salivary samples were obtained from all the patients in sterile test tubes and were sent to pathology laboratory. In the laboratory, auto-analyser was used for evaluating the salivary alkaline phosphatase levels. All the results were recorded in Microsoft excel sheet.

Results: Mean salivary alkaline phosphatase levels among the patients of the study group and the control group was 71.62 IU and 21.22 IU respectively. While analysing statistically, it was seen that mean salivary alkaline phosphatase levels among the patients of the study group was higher in comparison to the patients of the control group.

Conclusion: Salivary alkaline phosphatase levels are significantly raised in periodontitis patients. Hence; role of salivary alkaline phosphatase levels in pathogenesis needs to be further explored.

Keywords: Alkaline phosphatase

Introduction

Periodontitis is a chronic inflammatory disease of periodontium, which destroys the connective tissue and bone that supports teeth. Periodontal disease is generally occurs due to an imbalance between pathogenic microbes and the local and systemic host responses. However, chronic periodontitis is known to vary by race, gender, and socioeconomic status, suggesting that factors related to the social environment may also have major role in terms of disease development. Alkaline phosphatase (ALP) it is produced by PMNs, osteoblasts, macrophages and fibroblasts [1-3]. It is a membrane-bound glycoprotein that exerts its action in the gingival area and may be useful as a potential bone turnover marker to establish the diagnosis and prognosis of periodontal disease. Their activities can be used to detect the early changes in the periodontal tissues and also to evaluate the efficacy of the treatment [4]. As the fluid traverses the inflamed tissue, it is thought to pick up enzymes and other molecules that participate in the destructive process as well as products of cell and tissue degradation. A few of the choice contenders found in GCF are products of polymorphonuclear leukocytes (PMNs), macrophages and plasma cells [5-7].

Hence: the present study was conducted for assessing the salivary alkaline phosphatase levels in patients with periodontal diseases

Materials and Methods

The present study was conducted with the aim of assessing the alkaline phosphatase levels in the saliva of patients with periodontal diseases.

Sample Size: 50 patients with chronic periodontitis as study group and 50 healthy controls as control group. Complete demographic and clinical details of all the patients were recorded. All the patients were called in the morning and clinical examination was carried out.

American association of periodontology's criteria was used for defining patients with chronic periodontitis. Unstimulated salivary samples were obtained from all the patients in sterile test tubes and were sent to pathology laboratory. In the laboratory, auto-analyser was used for evaluating the salivary alkaline phosphatase levels. All the results were recorded in Microsoft excel sheet. SPSS software was used for assessment. Student t test and Chi-square test were used for evaluation of level of significance.

Results

In the present study, a total of 50 patients with chronic periodontitis and 50 healthy controls were enrolled. Mean age of the patients of the study group and the control group was 46.8 years and 49.3 years respectively. There were 29 males and 21 females in the study group while there were 33 males and 17 females in the control group. In the present study, mean salivary alkaline phosphatase levels among the patients of the study group and the control group was 71.62 IU and 21.22 IU respectively. While analysing statistically, it was seen that mean salivary alkaline phosphatase levels among the patients of the study group was higher in comparison to the patients of the control group.

Table 1: Comparison of salivary alkaline phosphatase levels

Salivary alkaline phosphatase levels (IU)	Control group	Study group	p- value
Mean	21.22	71.62	0.00
SD	6.18	23.74	(Significant)

Discussion

Periodontitis is an inflammatory disorder that results from the host response to sub-gingival plaque microorganisms. As a result, the normal histological architecture of the periodontium is disturbed, with persistent inflammation associated with the irreversible loss of mineralized and non-mineralized tissues. Periodontal disease is a common inflammatory disease caused by the interaction between certain Gram-negative bacterial species and components of the host immune response that affect the connective tissue attachment and supporting bone around the teeth. It can be considered among the prevalent and important global health problems in terms of quality of life. The most common cause of alveolar bone destruction in periodontitis is the extension of inflammation from the marginal gingiva to the underlying periodontal tissues^[8-10].

ALP is a membrane bound glycoprotein found on cell membrane. It is released from poly-morphonuclear neutrophils during inflammation, osteoblast during bone formation and periodontal ligament fibroblast during periodontal regeneration. The fluid offers great potential as a source of inflammatory and immune markers, tissue breakdown products, enzymes of bacterial origin, host-derived enzymes and their inhibitors. The biochemical markers in GCF have been related to gingivitis, periodontitis and, most recently, to periodontal disease activity. Analysis of GCF therefore represents the most practical approach for the biochemical analysis of the host response in periodontal disease. A meaningful host parameter that can be measured in a quantitative and reproducible manner should provide an even earlier look at tissue destruction^[11]

Hence: the present study was conducted for assessing the gingival crevicular fluid (GCF) alkaline phosphatase levels in patients with periodontal diseases.

In the present study, a total of 50 patients with chronic periodontitis and 50 healthy controls were enrolled. Mean age of the patients of the study group and the control group was 46.8 years and 49.3 years respectively. There were 29 males and 21 females in the study group while there were 33 males and 17 females in the control group. Jeyasree RM *et al.* 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 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. ALP levels in saliva can be used for the diagnosis of active phase of periodontal disease and also for evaluation of the treatment outcomes following Phase I periodontal therapy^[10].

In the present study, mean salivary alkaline phosphatase levels among the patients of the study group and the control group was 71.62 IU and 21.22 IU respectively. While analysing statistically, it was seen that mean salivary alkaline phosphatase levels among the patients of the study group was higher in comparison to the patients of the control group. Malhotra R *et al.* assessed the total activity of ALP in the GCF collected from healthy sites, sites with gingivitis and with chronic adult periodontitis. A total of 18 patients were divided into three groups: *viz.*, healthy sites, Group I; gingivitis, Group II; chronic periodontitis, Group III. Clinical parameters like plaque index, bleeding index, gingival index and probing depth were recorded. Total enzyme activity of ALP was significantly higher in periodontitis as compared with that in healthy and gingivitis sites, and was significantly and positively correlated with probing depth. ALP can be considered as a periodontal disease marker as it can distinguish between healthy and inflamed sites^[11]. De A *et al.* compared 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 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. They concluded that alkaline phosphatase can be used as a key inflammatory diagnostic biomarker in periodontal diseases^[12].

Conclusion

From the above results, the authors conclude that salivary alkaline phosphatase levels are significantly raised in periodontitis patients. Hence; role of salivary alkaline phosphatase levels in pathogenesis needs to be further explored.

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