

# Estimation Of Alkaline Phosphatase In Gcf (Gingival Crevicular Fluid) Among Chronic Periodontitis Patients With Smoking Habit

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## Abstract

**Background:** To evaluate the levels of alkaline phosphatase in gingival crevicular fluid among smokers in chronic periodontitis patients.

**Materials & methods:** A total of 40 patients were enrolled. The age group included was 30 to 70 years. All the subjects were smokers associated with generalized chronic periodontitis. For clinical examination, a minimum of 18 teeth in each subject were examined. PPD, gingival index (GI), plaque index (PI), and CAL were recorded at four sites of each tooth of all teeth using William's periodontal probe. The data was collected.

**Results:** The mean value of serum ALP in smokers with chronic periodontitis was 99.652 micro/mL. The p-value was 0.001 and was significant.

**Conclusion:** Serum ALP levels were increased in smokers with chronic periodontitis.

**Keywords:** smoking, chronic periodontitis, gingival crevicular fluid.

## Introduction

Periodontitis is a chronic inflammatory disease characterized by gingival inflammation, periodontal ligament destruction, and alveolar bone resorption. <sup>1</sup>A diagnosis of periodontal disease is made after analyzing the information collected from a periodontal examination. <sup>2</sup>Traditional periodontal diagnostic parameters used clinically include probing depths, bleeding on probing, clinical attachment levels, Plaque index and radiographs assessing alveolar bone level. <sup>3</sup>

Periodontitis is a chronic low-grade inflammatory disease affecting the teeth-supporting structures and ultimately leading to tooth loss. <sup>4</sup>Periodontal disease severity and progression are determined by numerous factors, including genetic, epigenetic, environmental factors (smoking, stress, and diet), aging, systemic diseases including diabetes, and immunological factors. <sup>5</sup>Smoking is the established risk factor for periodontal disease, with increased odds of disease progression in voluntary and involuntary smokers. <sup>6</sup>Several researchers have found an association between smoking habits and risk for the development of periodontitis. <sup>6-8</sup>Periodontal disease diagnosis is mainly based on assessing clinical parameters like probing pocket depth (PPD), bleeding on probing, clinical attachment level (CAL), and radiographic bone levels. These clinical parameters are currently the only available indicators

for current disease status and severity. However, they provide insights into past periodontium destruction and do not provide any information regarding the current status and future risk of attachment loss.<sup>8,9</sup> Furthermore, clinical measurements are subjective and have low specificity and sensitivity with a standard error of judgment of around + 1 mm. Thus, there is a constant search for biomarkers that will objectively and quantitatively assess periodontal disease extent and severity.<sup>8,9</sup>

Alkaline phosphatase (ALP) is a hydrolase intracellular enzyme that plays a key role in cellular metabolism. ALP is a glycoprotein produced within the periodontium and gingival crevice.<sup>10,11</sup> ALP is secreted by polymorphonuclear neutrophils, osteoblast, and periodontal ligament fibroblast at the time of inflammation, bone formation, and periodontal regeneration, respectively.<sup>12</sup> Hence, this study was conducted to evaluate the levels of alkaline phosphatase in gingival crevicular fluid among smokers in chronic periodontitis patients.

## Materials & methods

A total of 40 patients were enrolled. The age group included was 30 to 70 years. All the subjects were smokers associated with generalized chronic periodontitis. For clinical examination, a minimum of 18 teeth in each subject were examined. PPD, gingival index (GI), plaque index (PI), and CAL were recorded at four sites of each tooth of all teeth using William's periodontal probe. The data was collected. The statistical significance has been tested with Student's paired t-test. The results were analysed using SPSS software.

## Results

A total of 40 patients were enrolled. The mean value of GI scores in smokers with chronic periodontitis was 1.502. It was found to be statistically significant ( $p < 0.001$ ). The mean value of CAL scores in patients was 3.52mm. It was also found to be statistically significant ( $p < 0.001$ ).

Table 1: comparing indices in smokers with chronic periodontitis

	Plaque index	Gingival index	Clinical attachment level
Mean	1.63	1.502	3.52
p- value	0.001*	0.001*	0.001*

\*: significant

Table 2: alkaline phosphatase (ALP) in smokers with chronic periodontitis

	Serum ALP
Mean	99.652
p-value	0.001*

\*: significant

The mean value of serum ALP in smokers with chronic periodontitis was 99.652 micro/mL. The p- value was 0.001 and was significant.

## Discussion

Periodontal diseases are chronic inflammatory conditions with prevalence rates ranging from 5.5% to 85.1% adult population.<sup>13</sup> Subsequent activation of the patient's host response leads to the release of various metabolic byproducts at the tooth and periodontal pocket interfaces, such as destructive cellular enzymes, cytokines, chemokines, and other pro-inflammatory mediators of tissue destruction. Multiple markers in GCF, saliva, and serum have been evaluated as a diagnostic tool for periodontal diseases with high specificity and sensitivity. However, the presence of a single standalone biomarker in periodontitis is unlikely due to its complex mechanism. Thus, there is a constant search for different combinations of biomarkers in periodontal research.<sup>14</sup> Hence, this study was conducted to evaluate the levels of alkaline phosphatase in gingival crevicular fluid among smokers in chronic periodontitis patients.

In the present study, a total of 40 patients were enrolled. The mean value of GI scores in smokers with chronic periodontitis was 1.502. It was found to be statistically significant ( $p < 0.001$ ). The mean value of CAL scores in patients was 3.52mm. It was also found to be statistically significant ( $p < 0.001$ ). A study by Lalkota H et al, showed that alkaline phosphatase (ALP), an enzyme found in various cells of the periodontium, is considered to cause the destruction of the periodontium. The study aimed to compare the serum albumin and serum ALP levels in smokers and non-smokers with generalized chronic periodontitis. They included a total of 60 subjects. Subjects were divided into two groups, which included non-smokers with generalized chronic periodontitis (NS+P) and smokers with generalized chronic periodontitis (S+P). Clinical parameters analyzed were plaque index, gingival index, probing pocket depth, and clinical attachment level. The serum ALP levels were higher in the S+P group compared to the NS+P group. Conversely, the serum albumin levels were lower in the S+P group compared to the NS+P group.<sup>15</sup>

In the present study, the mean value of serum ALP in smokers with chronic periodontitis was 99.652 micro/mL. The p-value was 0.001 and was significant. Another study by Sanikop S et al, showed that Alkaline phosphatase (ALP) enzyme is involved in the destruction of the human periodontium. They studied to determine the presence and levels of ALP activity in gingival crevicular fluid (GCF) in periodontal health, gingivitis, and chronic periodontitis. Difference in the mean ALP levels between healthy and gingivitis groups was found to be nonsignificant ( $P > 0.05$ ) and that between the chronic periodontitis group and healthy as well as gingivitis groups was found to be highly significant ( $P < 0.001$ ). Significant correlations existed between ALP levels and gingival index, probing depths, as well as clinical attachment levels.<sup>16</sup> Kibayashi et al. attributed a decrease in ALP activity to impaired neutrophil function in smokers leading to impairment of an inflammatory response in the development of periodontitis due to current smoke exposure.<sup>17</sup>

## Conclusion

Serum ALP levels were increased in smokers with chronic periodontitis.

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