

# Comparative Study on the Relationship Between Serum Albumin & Periodontal Disease

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### Abstract

Periodontitis is a chronic inflammatory disease caused by bacterial infection of the supporting tissues around the teeth. Serum albumin levels might be the practical marker of general health status. Albumin concentration is associated with nutrition and inflammation.

**Aim:** The aim of the study is to evaluate the relationship between serum albumin and periodontal disease.

**Materials and Methods:** A total number of 40 patients of both genders with age range of 35–70 years were included in the study. Patients were divided into two groups. Group I; clinically healthy subjects and Group II; patients with chronic periodontitis. The biochemical parameter serum albumin was correlated with periodontal status.

### Introduction

Periodontitis is a chronic inflammatory disease caused by bacterial infection of the supporting tissues around the teeth.<sup>1</sup> As serum albumin levels describe the severity of an underlying disease and mortality in elderly, its levels might be the marker of general health status.<sup>2</sup> Periodontitis has been implicated as a risk factor for medical diseases such as coronary heart disease and diabetes.<sup>3,9</sup> It has been suggested that impaired dentition status, such as tooth loss owing to periodontal infection, may affect individuals by causing dietary restrictions through difficulty in chewing, possibly compromising their nutritional status and well-being.<sup>4</sup> Malnutrition can also be monitored through serum albumin levels.<sup>5</sup> Serum albumin is the main protein synthesized by the liver.<sup>6</sup> Both inflammation and malnutrition reduces serum albumin levels by decreasing its rate of synthesis. In chronic diseases inflammation is present which releases inflammatory cytokines such as IL-1, IL-6 and TNF- $\alpha$  which decreases serum albumin level.<sup>7</sup> Albumin concentration is associated with nutrition and inflammation.<sup>8</sup> During periodontal

diseases, bacteria trigger inflammatory host responses that cause destruction of the alveolar bone and periodontal connective tissue. The individual characteristics that diminish the efficiency of host response may include medical factors such as malnutrition, which consistently impairs the innate and adaptive defences of the host, including phagocytic function, cell mediated immunity, complement system, secretory antibody and cytokine production and function.<sup>10</sup>

According to these studies, malnutrition might intensify the severity of periodontal diseases. It is very important to study the association between periodontal disease and serum albumin levels, which reflect the general health status, in the elderly, who may be at a higher risk of developing inflammatory conditions or disorders.<sup>6</sup> So the aim of the study was to evaluate the relationship between periodontal disease and serum albumin concentrations.

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### Materials & Methods

A total of 40 patients of both genders with age range of 35-70 years were included in this study. Patients were selected from the Out Patient Department of Periodontology Hi-Tech Dental College and Hospital, Bhubaneswar.

#### Inclusion criteria for this study were:

- Group I (subjects with clinically healthy gingiva)
- Group II (patients with periodontitis, i.e., loss of attachment  $\geq 5$ mm)

#### Exclusion criteria for this study were:

- Hospitalized or institutionalized patients.
- Patients with a history of systemic disease.

Prior to the study, the purpose and design of the study was explained to patients and informed consent was signed by every patient.

#### For biochemical tests

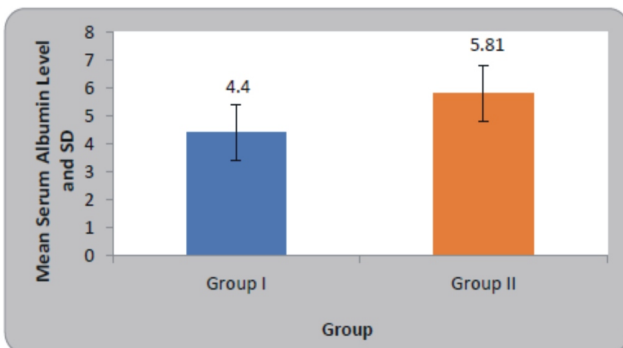
1 ml blood was drawn from antecubital vein and was centrifuged at 2,500 rpm for 10 minutes. Biochemical value of serum albumin level was measured by bromocresol green albumin method. Analysis was done using fully automated biochemical analyser. The recorded data were collected and compiled.

#### Statistical Analysis

Statistical analysis was done by using chi square and student's unpaired 't' test between clinically healthy subjects and chronic periodontitis patients for serum albumin level.

### Results

Group	N	Mean	Std. Deviation	Std. Error Mean	t-value	p-value
Group I	20	4.40	0.60	0.13	10.14	0.0001 S.p<0.05
Group II	20	5.81	0.14	0.03		



The mean serum albumin levels for Group I was  $4.40 \pm 0.60$  with standard deviation of (SD) 0.60. Similarly, the mean serum albumin levels for Group II was  $5.81 \pm 0.14$  with standard deviation of (SD) 0.14. On comparison of both the values using the Students' unpaired 't' test, the differences between the serum albumin levels in Group I and Group II were found to be statistically significant. (p-value = 0.0001)

### Discussion

In this clinical trial, a statistically significant association was observed between the serum albumin levels of clinically healthy subjects and chronic periodontitis patients. In this trial, 20 patients of chronic periodontitis had a periodontal loss of attachment which was  $\geq 5$  mm; the results showed an inverse independent relationship between periodontal disease and serum albumin concentrations. Similar findings have been reported in the study conducted by **Ogawa et al.**<sup>14</sup> However, periodontal disease susceptibility can also be increased by risk factors such as diabetes, hypertension, obesity and metabolic syndrome, stress, and genetic factors.<sup>11</sup> The possibility of these factors in influencing the results of this study has been reduced by including only systemically healthy patients in the study.

The number of bacteria ranges from  $1 \times 10^3$  in healthy shallow crevices to  $>1 \times 10^8$  in periodontal pockets. These bacteria attract monocytes into the gingival crevicular space, and numerous cytokines are found within this space. Furthermore, they are able to invade the host. Individuals with significant periodontitis have recurrent episodes of low level bacteraemia. Porphyromonas gingivalis, one of the major periodontal pathogens, has been demonstrated to invade coronary and aortic endothelial cells. Hepatic acute phase reactants respond both to the secretion of local cytokines and to systemic bacteraemia. Acute phase proteins, defined as those whose plasma concentrations increase (positive acute phase proteins) or decrease (negative acute phase proteins, i.e., serum albumin) by at least 25% during an episode of inflammation, are measurable indicators of active inflammation.<sup>12</sup>

In elderly individuals, impaired dentition status and a lean lifestyle along with the possibility of compromised systemic health status would reflect within the values of serum albumin concentration.<sup>13</sup> According to **Hermann et al. (1992)**, many conditions, such as inflammatory states, liver diseases, and renal diseases, have been indicated to reduce serum albumin levels.<sup>5</sup>

Serum albumin is a negative acute phase protein supports the contention that serum albumin is a marker of inflammation.<sup>5</sup> Chronic diseases are associated with inflammation and the release of inflammatory cytokines such as interleukin 1, interleukin 6, and tumor necrosis factor- $\alpha$ , which cause a decrease in serum albumin (Schalk et al. 2004).<sup>6</sup> Moreover, malnutrition may also be monitored by means of serum albumin concentration (Don and Kaysen 2004).<sup>14</sup> Therefore, albumin concentration is associated with nutrition and inflammation (Kaysen et al. 2002).<sup>6</sup>

Several studies have demonstrated that serum albumin concentrations are associated with general health status among elderly.<sup>15</sup> Therefore, it becomes difficult to conclude whether serum albumin concentrations are affected by an inflammatory component of chronic periodontitis or the compromised nutritional status, owing to the general health status of the individual. This possibility of general health/nutritional status in any way affecting the serum albumin concentrations was somewhat eliminated in this clinical trial, as the subjects included in this clinical trial were physically fit without any systemic diseases. Thus, it can be concluded that the lower serum albumin concentrations were solely affected by an inflammatory component of chronic periodontitis.

In order to explore the actual relationship, further prospective studies and clinical trials with larger sample size would be necessary.

### Conclusion

The findings of the present study suggest a statistically significant inverse association between serum albumin concentration and chronic periodontal disease. There was a significant reduction in serum albumin concentration and an increase in loss of attachment. Therefore, serum albumin levels can be used to monitor the severity of periodontal disease.

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