

**Original article:**

## **Serum proteins and Alkaline Phosphatase in Psoriasis: A case-control study**

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### **Abstract:**

**Introduction:** Psoriasis has been considered as a challenging dermatological disease with various systemic events. Multiple factors have been implicated in the pathogenesis of psoriasis backed up by numerous studies. It is associated with many biochemical abnormalities which have been implicated in the pathogenesis of the disease.

**Objectives:** The purpose of this study was to compare the levels of various biochemical parameters such as serum albumin, globulin and alkaline phosphatase in psoriasis patients and a group of healthy controls. Correlation between these parameters in groups of psoriasis divided based on severity of the disease was also looked into.

**Materials and Methods:** We performed a retrospective study on 80 psoriasis patients and 73 healthy age and sex matched controls.

**Results:** The serum levels of alkaline phosphatase was more in the cases than controls, whereas the serum levels of albumin and globulin were more in the controls than the cases. It was found that the serum levels alkaline phosphatase and globulin were more in patients with severe disease, whereas the serum levels of albumin were more in patients with mild to moderate disease.

**Conclusion:** Serum albumin and serum alkaline phosphatase may have a role in etiology of psoriasis. Further studies are recommended to draw a conclusion.

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### **Introduction:**

Psoriasis is a chronic inflammatory, immune mediated, genetically determined dermatological disorder which affects skin, nails, joints and also has various systemic associations. The prevalence of psoriasis varies from 0.6% to 4.8%. Both sexes are equally affected by the disease, but females are

said to have an earlier onset.<sup>1,2</sup> All aspects of the disease have been extensively studied and there is no dearth of information regarding it. The pathogenesis of psoriasis is believed to be multifactorial with numerous biomarkers being implicated. A recent study implicated the role of albumin in the pathogenesis of psoriasis. It also

suggested that the disease process may elevate serum globulins in psoriasis patients<sup>3</sup>. Another study suggested that alkaline phosphatase may be involved in the pathogenesis of psoriasis<sup>4</sup>. This study aims to investigate the possible role of these biochemical parameters in psoriasis.

**Aims & Objectives:**

1. To study the serum levels of albumin, globulin and alkaline phosphatase in psoriasis patients and healthy controls
2. To study the correlation between disease severity and serum levels of serum albumin, serum globulin and serum alkaline phosphatase

**Material & Methods:**

This was a retrospective hospital-based study involving 80 cases of psoriasis aged 18 years and above. Any patient having a concomitant disease or condition known to alter the levels of serum proteins, or alkaline phosphatase or receiving any systemic treatment for psoriasis were excluded. The cases comprised psoriasis patients attending the inpatient and outpatient departments of a dermatology department at a tertiary care hospital between July 2014 and July 2015. Psoriasis area severity index (PASI) was used to grade the severity of the disease. Data of PASI, serum proteins and serum alkaline phosphatase was obtained by referring to hospital records. Seventy three healthy age and sex matched controls were taken and their serum proteins and serum alkaline phosphatase was estimated. The levels of each

biomarker between case group and control group were compared using the unpaired student t-test.

The psoriasis patients were further divided into two groups of mild to moderate disease (PASI  $\leq$ 12) and severe disease ( $>$ 12) and the levels of serum albumin, globulin and alkaline phosphatase was compared using the unpaired student t-test. Serum albumin, globulin and alkaline phosphatase were measured by enzymatic methods using Vitros J&J analyser

The statistical analysis of the data was performed using the GraphPad inc. statistical software. The measurements were expressed as mean  $\pm$  standard deviation (SD).  $P < 0.05$  was considered to be statistically significant.

**Observations & results:**

Concerning the serum levels of albumin, globulin and alkaline phosphatase, there were statistically significant differences between the cases and controls. The serum levels of alkaline phosphatase was more in the cases than controls, whereas the serum levels of albumin and globulin were more in the controls than the cases. [Table 1]

When the serum levels of albumin, globulin and alkaline phosphatase were compared between patients with mild to moderate disease and severe disease, it was found that the serum levels alkaline phosphatase and globulin were more in patients with severe disease, whereas the serum levels of albumin were more in patients with mild to moderate disease. [Table 2]

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Table 1: Comparison of biochemical parameters between cases and control group

Parameters	Cases (mean±SD)	Controls (mean±SD)	P value
Serum Albumin (g/dl)	3.92±0.46	4.25±0.35	<0.0001*
Serum Globulin (g/dl)	3.26±0.55	3.44±0.43	0.04*
Serum Alkaline Phosphatase (IU/L)	86.5±39.37	70.60±14.83	0.0006*

\* p value <0.05 considered significant

Table 2: Comparison of biochemical parameters between mild to moderate psoriasis and severe psoriasis groups

Parameters	PASI* ≤12 Mild to Moderate (mean±SD)	PASI* >12 Severe (mean±SD)	P value
Serum Albumin (g/dl)	4.05±0.38	3.84±0.48	0.042**
Serum Globulin (g/dl)	3.30±0.41	3.30±0.41	1
Serum Alkaline Phosphatase (IU/L)	82.45±18.5	90.61±46.21	0.35

\*Psoriasis Area Severity Index, \*\* p value <0.05 considered significant

### Discussion:

The pathogenesis of psoriasis is multifactorial and poorly understood. Though the etiology of psoriasis remains obscure, it has been implied that oxidative stress plays a major role in its pathogenesis. It has been postulated that, neutrophils, keratinocytes, and fibroblasts generate the reactive oxygen species (ROS) which may cause activation of neutrophils. The activated neutrophils play an important role in the pathogenesis of psoriasis<sup>5-7</sup>. Superoxide dismutase plays a pivotal role in limiting the harmful effects of ROS, thus also limiting neutrophil activation..

In our study there was a statistically significant reduction of serum albumin levels in psoriasis patients. This was similar to the results in a study by Sheikh G et al .<sup>3</sup> who also suggested that reduced levels of albumin due to various reasons, leads to decreased levels of zinc and albumin bound copper, which in turn leads to the reduced superoxide dismutase activity. This results in an increased state of oxidative stress which leads to psoriatic flare.<sup>3</sup> Reduced albumin in psoriasis patients has been suggested to be due to decreased albumin synthesis or the increased rate of cell turnover<sup>8</sup>. Hypoalbuminemia in psoriasis patients was also suggested to be due to an increased

endogenous catabolism of albumin without significant loss through urine, stools or skin.<sup>9</sup> Another study suggested decreased serum albumin to be the result of an increased uptake of albumin by liver and splenic macrophages<sup>10</sup>.

Our study showed elevated serum alkaline phosphatase levels in psoriasis patients. These findings were consistent with the findings of Bhatnagar M et al.<sup>4</sup> who also found a higher level of serum alkaline phosphatase in their psoriasis patient group. Quantification of alkaline phosphatase in psoriatic and uninvolved skin of psoriatic patients was done by Van de Kerkhof et al.<sup>11</sup>. They found grossly elevated levels of the enzyme in the skin of psoriatic patients. A study suggested the involvement of the enzyme in angiogenesis in psoriatic skin<sup>4</sup>.

Muller-Sutter et al. reported a tendency for  $\alpha_2$ -globulins to drop in psoriasis<sup>12</sup>. Tickner and Mier

noticed that with the progression of psoriasis in a patient, there was drop in the levels of  $\beta$ -globulin. This may explain the drop in serum globulin levels in the psoriasis group found in our study.

In addition, we also found that serum albumin levels decreased with increase in disease severity in psoriasis patients. However, there was no such correlation between disease severity and levels of serum globulin and alkaline phosphatase.

#### **Conclusion:**

Results of this study suggest that serum albumin and serum alkaline phosphatase may have a role in etiology of psoriasis. Reduced albumin may lead to oxidative stress and elevated alkaline phosphatase may have a role in angiogenesis in psoriatic skin<sup>3,4</sup>. Further studies are however recommended to draw conclusive evidences.

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