

## Prevalence of Hypoalbuminemia in Hospitalized Patients

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**Abstract****Introduction:** Hypoalbuminemia is a common and vexing problem in hospitalized individuals. Serum albumin levels fall, often dramatically from early in the course of critical illness and will not increase again until the recovery phase of the illness. Increased risk of morbidity and mortality are correlated with lower serum albumin levels.**Objective:** This study was done to find out the prevalence of hypoalbuminemia in hospitalized patients.**Materials and Methods:** The study was a retrospective observational study which was carried out on 1071 patients. Serum total protein and serum albumin were measured.**Results:** 165 patients had hypoalbuminemia which accounts for a prevalence of 15%. Patients from burns ward accounted for 44.8%, those from medical wards accounted for 34.5% and from surgical wards for 20.1%. Mean±S.D of serum albumin was 2.5±0.42 g/dl in both burn and medical wards patients and 2.4±0.38 g/dl for those admitted in surgical wards.**Conclusion:** Hypoalbuminemia results from decreased production, defective synthesis, deficient intake or increased losses of albumin. Measuring serum albumin concentration can serve as a prognostic marker for predicting morbidity and mortality. The prevalence of hypoalbuminemia was high in patients admitted in burns ward in our study.**Key Words:** Albumin, Total Proteins, Hypoalbuminemia, Morbidity, Mortality.

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**Introduction**

Hypoalbuminemia characterized by low serum albumin levels is a common and vexing problem in hospitalized patients. Albumin distribution between intravascular and extravascular compartments is altered in critical illness.<sup>(1)</sup> In critical care acute hypoalbuminemia is sufficiently common and is a well known risk factor in APACHE index.<sup>(2)</sup> The concentration of albumin in serum decreases noticeably from early in the course and there is no raise in the level until the recovery phase of illness.<sup>(1)</sup> This is responsible for delayed ambulation, vascular inaccessibility and needless treatment with diuretic of patients.<sup>(3)</sup>

Hypoalbuminemia reflects a combination of decreased synthesis and increased losses, either internally (in the interstitium as a result of increased capillary permeability) or externally (through blood losses or exudates or increased proteolysis and clearance).<sup>(4)</sup> This alteration in distribution in critical illness is related to an increased capillary leakage.<sup>(5)</sup> There is perhaps an appreciable change in the rate of synthesis of albumin<sup>6</sup> and catabolism. The gene

transcription rate for acute phase reactants like C-reactive protein is increased and for albumin is decreased in response to trauma, inflammation or sepsis.<sup>(7)</sup> There is a possibility of vascular endothelium to have a role in degradation of albumin.<sup>(8)</sup> The risk of morbidity and mortality increases in hospitalized individuals having lower levels of serum albumin.

The present study was done to find out the prevalence of hypoalbuminemia in inpatients of Osmania General Hospital, to understand the pathophysiology and the utility of measuring the serum albumin levels in patients admitted in surgical and burns wards.

**Materials and Methods**

The study was a retrospective observational study carried out in the Department of Biochemistry at Osmania General Hospital. A total of 1071 patients admitted during the period of November and December 2015 between 20-50 years of age were included in this study. Conditions which would directly alter albumin levels like, the patients who were on treatment with corticosteroids or immunosuppressors, who were undergoing radiotherapy or chemotherapy, those who underwent an emergency operation, who recently received blood transfusion were excluded from the study.

Serum Total Protein and Serum Albumin concentrations were measured in these patients. Serum Total Protein was estimated by Biuret method with biological reference range taken as 6 to 8 g/dl and Serum

Albumin by Bromocresol Green dye binding method with biological reference range taken as 3.5 to 5.5 g/dl.

## Results

Among the 1071 patients whose serum protein and serum albumin were measured, only 165 patients had hypoproteinemia and hypoalbuminemia which made it to 15% of the total. These 165 patients were divided into 3 groups based on the ward in which they were admitted. Group 1, 2 and 3 included patients from burns ward, surgical ward and medical ward respectively. It was found that 44.8% (74 patients) were from burns ward, 20.1% (34 patients) were from surgical wards and 34% (57 patients) were from medical wards. (Table 1).

The Mean  $\pm$  S.D was calculated for the three groups which is shown in (Table 2).

**Table 1: Shows the number and percentage (%) of patients in each group**

Group	Group 1	Group 2	Group 3
No. of patients	74	34	57
Percentage (%)	44.8	20.1	34.5

**Table 2: Mean $\pm$ SD of Serum of Total Proteins and Albumin of the three groups**

Mean $\pm$ SD	Group 1	Group 2	Group 3
Serum Total Proteins	4.6 $\pm$ 0.50	4.9 $\pm$ 0.59	4.9 $\pm$ 0.50
Serum Albumin	2.5 $\pm$ 0.42	2.4 $\pm$ 0.38	2.5 $\pm$ 0.42

## Discussion

The processes which are responsible for maintaining serum albumin levels are the rate at which it is synthesised, the amount secreted by hepatocyte, its body fluid distribution, and the level at which it undergoes degradation.<sup>(9)</sup>

In this study the number of patients with hypoalbuminemia were maximum from the group 1 followed by group 2 and group 3 patients. However, the Mean $\pm$ SD of serum albumin was same in patients in group 1 and 3 while that of group 2 was lower.

Decreased production, liver cell damage causing defective synthesis, less intake of amino acids, greater losses by gastrointestinal or renal processes and acute or chronic inflammation can result in hypoalbuminemia.<sup>(9)</sup>

Following major traumas which also include surgical trauma there is systemic and tissue inflammation, responsible for mobilization of large amounts of fluid to the interstitial and intravascular space. This reaction to trauma is accompanied by a lowering of serum albumin concentration.<sup>(10,11)</sup>

In this study we tried to highlight the plausible causes that could result in hypoalbuminemia in patients admitted in burns and surgical ward.

In patients with burn wounds the higher vascular permeability causes exudation resulting in important reduction in albumin level.<sup>(12)</sup> The acute phase response of plasma protein synthesis in liver that occurs with small proportion of burnt skin also produces a decrease to about 80% of normal albumin and prealbumin levels.<sup>(13)</sup> Patients with burns are different from other ICU patients as the hypoalbuminemia is not only due to decreased synthesis of albumin in response to trauma, but mainly a result of great protein loss in tissue edema and exudates.<sup>(14)</sup>

There is a 30% reduction in albumin with major surgery when the total circulating and exchangeable albumin pools were measured<sup>(15)</sup>, this is consistent with sequestration of albumin into non-exchangeable sites such as wounds, the intestine and extra abdominal sites.<sup>(16)</sup> Hypoalbuminemia present preoperatively perpetuates postoperative edema, this is strongly linked with acute renal failure, sepsis syndrome, respiratory dysfunction and coma. Preoperative and surgically induced hypoalbuminemia is only a feature of patients who develop capillary leak syndrome. But, measuring urine microalbumin prior to and post surgery provides a better and sensitive way of predicting this complication.<sup>(17)</sup>

Hypoalbuminemia can result partly due to alteration in vascular permeability and due to the effect of dilution caused by saline and glucose infusion during and after surgery.<sup>(18)</sup>

Study by Vanek et al,<sup>(19)</sup> Showed that serum albumin is a poor nutritional marker, but a good prognostic marker correlating with morbidity and mortality in hospitalized patients. It is possibly this rationale for lowered levels of albumin which leads to increased mortality and prolonged duration of stay in intensive care unit.<sup>(20)</sup>

## Conclusion

The levels of serum albumin are significantly altered in hospitalized patients. The measurement of serum albumin can serve as a prognostic marker in the patients with respect to mortality and morbidity but, it cannot serve a purpose as a nutritional marker. In our hospital the prevalence of hypoalbuminemia was more in patients admitted in burns ward.

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