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## Albumin as prognostic value in hospitalised patients

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### Abstract

Serum albumin is generally used to assess the nutritional status, severity of disease, disease progression and prognosis. In the hospital setting, many reports have related serum albumin level to in-hospital mortality, length of stay (LOS), and nosocomial infection. Serum albumin has also been described as an independent prognosticator of survival in various diseases of lung, pancreatic, gastric, colorectal and breast. Low serum albumin has also been shown to be an independent indicator for prognosis in patients. However, these studies differ from each other with regard to population studied, study design, sample size, definition of low serum albumin used and factors adjusted for in the analyses.

**Keywords:** Albumin, prognosis, Hospitalized, Patients.

### Introduction

Malnutrition and cachexia in patients are significant problems due to a variety of mechanisms involving the disease, the host response to the pathologies, and their therapies [1]. Malnutrition has been associated with a number of clinical consequences, including deteriorated quality of life, decreased response to treatment, increased risk of chemotherapy-induced toxicity and a reduction in disease survival [2]. There are various methods of assessing nutritional status in various pathologies, each with its own advantages and disadvantages [3]. Among the most commonly used tools to measure nutritional status are subjective global assessment (SGA) [4-6], bioelectrical impedance analysis (BIA) [7], and laboratory measurements of serum albumin [8], prealbumin, and transferrin [9, 10]. Others include anthropometric parameters [11, 12, 123] such as weight loss, arm muscle circumference, skin-fold thickness [14], and presence of edema and ascites [15]. Though SGA is easy-to-use, inexpensive, and noninvasive, it is subjectively assessed and hence can be affected by inter-observer variation. Similarly, though BIA is easy-to-use, noninvasive, and reproducible, it relies on regression models derived in restricted samples of human subjects, which thus limits the usefulness of the derived model in other patients who differ from the original sample [16].

Serum albumin provides a simple method of estimating visceral protein function. Malnutrition and inflammation suppress albumin synthesis [17]. In an adult the normal range of serum albumin is defined as 3.5-5.0 g/dL and levels <3.5 g/dL is called hypoalbuminemia [2, 3]. The inverse correlation between body weight index and albumin synthesis in patients supports the possibility of a compensatory enhanced albumin synthesis in these metabolically affected patients. In the later stages of disease, malnutrition and inflammation suppress albumin synthesis [18]. As part of the systemic inflammatory response to the various pathologies, proinflammatory cytokines and growth factors are released [19] and have a profound catabolic effect on host metabolism. Interleukin-6, produced by the disease, stimulates liver production of acute-phase reaction proteins (such as C-reactive protein (CRP) and fibrinogen) in both the fasted and fed states. This increases the demand for certain amino acids, which if limited in the diet, may be obtained from breakdown of skeletal muscle. The lower serum albumin concentration may be due to the production of cytokines such as IL-6, which modulate the production of albumin by hepatocytes [20].

Serum albumin is generally used to assess the nutritional status, severity of disease, disease progression and prognosis. In the hospital setting, many reports have related serum albumin level to in-hospital mortality, length of stay (LOS), and nosocomial infection. Serum albumin has also been described as an independent prognosticator of survival in various diseases of lung, pancreatic, gastric, colorectal and breast. Low serum albumin has also been

shown to be an independent indicator for prognosis in patients. However, these studies differ from each other with regard to population studied, study design, sample size, definition of low serum albumin used and factors adjusted for in the analyses.

**Aims and Objectives**

1. To estimate the mean serum albumin levels in hospitalised patients.
2. To correlate the serum albumin levels and the prognosis of the patient.

**Methods**

The present study was conducted in the Department of General Medicine, Azeezia Institute of Medical Sciences and research, Kollam, Kerala.

120 patients were chosen for the study who were confirmed cases of Dengue.

The study was done from July 2017 to March 2019.

The study is a cross – sectional study. The study is also double blinded and randomised. The study is a multi - level study. The sample size included one hundred patients. One hundred and twenty patients were identified in the department of Medicine. The patients were either chronically ill who were hospitalised for more than three weeks.

The serum albumin levels were estimated. In chronically hospitalised patients the patients were divided into three groups

1. Serum levels less than 2 gm / Dl
2. Serum levels between 2 g/ dl and 5 gm / Dl
3. Serum levels more than 5 gm / Dl

The serum albumin levels were again estimated and the prognosis was checked in the form of non - wound healing, pain, worsening of symptoms, intra surgical complications, post -operative sepsis and death.

In each group the necessary treatment was given in the form of nutrition supplementation and was observed for the prognosis.

The serum albumin levels were again estimated and the prognosis was checked in the form of non - wound healing, pain, worsening of symptoms and death.

**Inclusion criteria**

1. The patients were aged between 20 to 50 years. This was done in order to minimize the age related bias.

2. The patients who were chronically hospitalised were taken for the study.

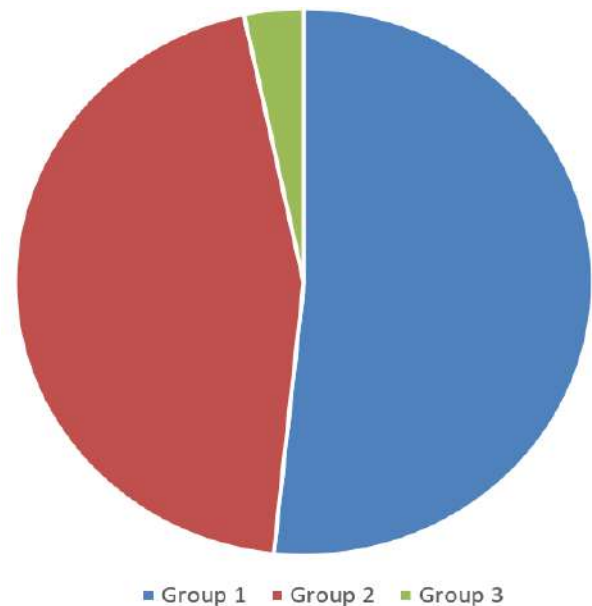
**Exclusion criteria**

1. Pateints who were on drugs which were known to cause low serum albumin.
2. Chronic liver disease.
3. < 20 years and more than > 50 years.

**Results**

**Table 1:** Frequency of patients in each of the divided groups.

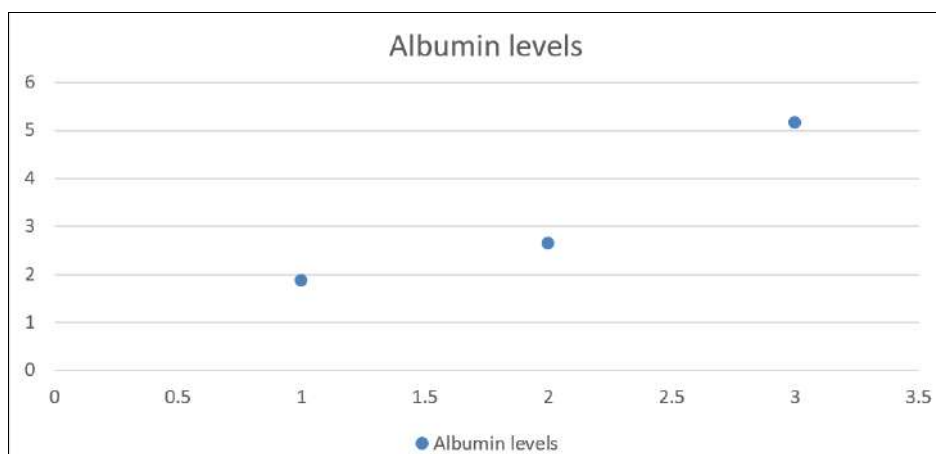
Serum Albumin Level	Number of Patients
Group 1 (<2 gm / Dl)	62
Group 2 (2 - 5 gm / Dl)	54
Group 3 (> 5 gm / Dl)	04



**Fig 1:** Frequency of patients in each of the divided groups.

**Table 2:** Mean Serum Albumin Level in each of the divided groups.

Serum Albumin Level	Mean Serum Albumin Level
Group 1 (<2 gm / Dl )	1.88 gm / Dl
Group 2 (2 - 5 gm / Dl )	2.64 gm / Dl
Group 3 (> 5 gm / Dl )	5.17 gm / Dl



**Fig 2:** Mean Serum Albmin Levels.

**Table 3:** Prognosis table correlation to the serum albumin levels.

Serum Albumin Level	Prognosis
Group 1 (<2 gm / Dl )	Resistant Signs and symptoms: 41 Pain: 10 Worsening of symptoms: 09 Death: 01
Group 2 (2 - 5 gm / Dl )	Resistant Signs and symptoms: 04 Pain: 1 Worsening of symptoms: NIL Death: NIL
Group 3 (> 5 gm / Dl )	Resistant Signs and symptoms: NIL Pain: NIL Worsening of symptoms: NIL Death: NIL

**Table 4:** Serum Albumin levels in Post corrected patients after fifteen days of treatment.

Serum Albumin Level	Mean Serum Albumin Level
Group 1 (<2 gm / Dl )	2.94 gm / Dl
Group 2 (2 - 5 gm / Dl )	5.12 gm / Dl

**Table 5:** Prognosis in post corrected patients

Serum Albumin Level	Prognosis
Group 1 (<2 gm / Dl )	Signs and symptoms: NIL Pain: 01 Worsening of symptoms: NIL Death: Nil
Group 2 (2 - 5 gm / Dl )	Signs and symptoms: NIL Pain: NIL Worsening of symptoms: NIL Death: NIL

**Table 6:** Table of Significance.

Serum Albumin Level	Significance
Group 1 (<2 gm / Dl )	Signs and symptoms: Significant (<0.05 2 tailed) Pain: 05 (<0.05 2 tailed) Worsening of symptoms: 02 (<0.05 2 tailed) Death: Nil (<0.05 2 tailed)
Group 2 (2 - 5 gm / Dl )	Signs and symptoms: Nil (<0.05 2 tailed) Pain: 01 (<0.05 2 tailed) Worsening of symptoms: Nil (<0.05 2 tailed) Death: Nil (Not Significant).

**Discussion**

The Human liver produces around fifteen grams of albumin per day under normal conditions. The human body is known to degrade about 0.5 to 0.6 grams of total body albumin in a normal adult human being. Around fifty six percent of the total protein in the body is albumin. Before further discussion of the albumin levels in a human body which is under a lot of stress and strain due to pathophysiological processes which has been mentioned in a handful of articles the albumin as a biochemical agent should be checked in brief. Albumin by far is the most abundant protein in the human body and as explained earlier majority of them is produced in the liver. Albumin is a simple protein as it contains only amino – acids and do not contain anything else like metals which influences the function of some proteins. The half - life of the protein albumin is around twenty one days that means around half of the total produced albumin in liver in a single day will be degraded in twenty one days. It has a lot of important physiological

functions. Biochemically the albumin coagulates on heating, it is easily soluble in water and it contains a net negative charge. Due to these properties there are many physiological functions that are carried out by this amazing protein. The normal serum level that is found in the normal adult is around three to five grams per decilitre. Anything below two grams per decilitre is considered to be low. In cases of a pathological state there might be a low formation of the albumin in liver or high degradation of the albumin. In either of the ways the serum albumin will be lowered.<sup>1</sup> Stress and strain is also known to cause hypoalbuminemia i.e low serum level of albumin <sup>[2, 3]</sup>. Since albumin is a protein it has to be transcribed rom the genes and studies have shown that TNF - alpha supresses this transcription process <sup>[4, 5, 6]</sup>. The TNF – alpha is known to increase in any inflammation and thus a forms a cascade. In case of hospitalised patients the stress and strain in pre surgical patients and chronically hospitalised patients the serum albumin levels are known to be less than normal. In chronically hospitalised patients the nutritional cause can also be taken into consideration for lower serum albumin levels. Early detection of these low levels of serum albumin levels helps the surgeons and the physicians to intervene and thus cut off the progression of the disease. <sup>7 - 11</sup> A sincere effort has been made in this study to understand the relations of the serum albumin level and its effects on the prognosis of the disease. This study is intended to help the physician, surgeon and general practitioners to understand and intervene in the event and thus help the patient to recover earlier and in a better way.

**Conclusion:**

In the present study there is a significant difference in the prognosis of the patients when the serum albumin level increases in the serum.

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