

# A Study of Correlation of Serum Albumin with Dengue Severity

Pankaj Kumar Rai, Mahesh Kumar Mehrotra

**Abstract:** ***Background:** Dengue viruses belong to the genus flavivirus, which include four serotypes 1, 2, 3 and 4. Clinical manifestations of dengue virus infection range from asymptomatic infection to severe dengue with shock. It is one of the most rapidly spreading vector borne disease in the world. Approximately 50 million dengue infections occur annually and an estimated 2.5 billion people live in dengue endemic countries. The objective of this study is to find out the severity of Dengue illness by correlating it with serum albumin levels. **Methods:** An observational cross-sectional study was done on 150 IPD patients in SRMS, Bareilly, a tertiary care hospital. Patients with Dengue NS1 Ag or IgM positive are incorporated in this study after fulfilling inclusion and exclusion criteria. Complete Blood count, serum albumin levels are calculated at the time of admission. **Results:** Study involved 150 patients with confirmed Dengue virus infection being admitted in the hospital between July 2019 and December 2019. Blood samples were taken within 24 hours of admission and were used for biochemical tests. Out of 150 patients, 36 developed Severe Dengue. Patients with Severe Dengue had low levels of serum albumin. Multivariate analysis showed that out of 36 patients with severe dengue, 3 patients i.e. 92.7% had low albumin of <3gm/dl. **Conclusions:** Therefore, early changes in serum albumin can predict Severe Dengue in patients with Dengue febrile illness.*

**Keywords:** Serum albumin, Dengue fever, Severe Dengue

## 1. Introduction

Dengue is one of the most rapidly spreading mosquito borne viral diseases in the world. Incidence of Dengue has increased 30-fold in the last 50 years with geographic expansion to new continents and countries and, and at this point in time, from urban to rural settings. Approximately 50 million dengue infections occur every year and an estimated 2.5 billion people live in dengue endemic countries.<sup>1</sup> Dengue fever is an acute febrile illness characterized by 3 to 5 days of fever, headache, nausea, vomiting, retroorbital pain, myalgia, anorexia and rash.

Severe dengue is characterized by thrombocytopenia, bleeding diathesis, spontaneous hemorrhages, and gradual plasma leakage leading to third space loss, that can lead to shock.<sup>2,4</sup> Cases of dengue fever involving heart, liver and nervous system causing myocarditis, hepatitis and encephalitis have been reported. Thus, acute dengue infection often remains unrecognized until the onset of the more severe forms of the illness. This variation in clinical manifestation often leads to inadequate or delay in treatment of a potentially fatal medical condition. Many studies have found the co-relation between severe dengue and albumin levels.<sup>5,6</sup>

## 2. Methods

An observational cross-sectional study of 150 serologically diagnosed dengue patients admitted at SRMS, Bareilly was done between the period of July 2019 and December 2019.

### Inclusion criteria

- Patients who are more than 18 years of age
- Dengue IgM or NS1 positive
- Patients who are willing to give consent

### Exclusion criteria

- Patients with preexisting liver disease
- Alcoholics

### Method of collection of data

Informed and written consent is taken from the patient.

The following laboratory investigations are done in all cases: Hemoglobin (Hb%), Packed cell volume (PCV), platelet count, serum albumin, and Dengue serology NS1 Ag & IgM.

## 3. Results

In this study 150 patients who satisfied the inclusion criteria were enrolled into the study. Statistical analysis was done, and results are as follows.

- Age
- Sex
- Platelet count
- Serum albumin

### Age

Most of the patients (48%) were in the age group of 18-30 years in our study. (Table 1).

### Gender

Most of the patients (78%) were males in our study (Figure 1).

### Serum albumin

Serum albumin was calculated in all cases. Out of 150 patients, 50 (33%) patients had serum albumin <3gm/dl. Out of 50 patients that had serum albumin of <3gm/dl, 32 (64%) had plasma leakage and potential third space loss in the form of Ascites or Pleural effusion while 4 (3.9%) patients out of 100 with Serum albumin of >3gm/dl had statistically significant plasma leakage.

### Platelet count

Platelet count was <50,000/mm<sup>3</sup> in 99 patients, and out of these 99 patients, 29 had Plasma leakage. In contrast, 8 patients with platelet count >50,000/mm<sup>3</sup> had statistically significant plasma leakage (Figure 2).

**4. Discussion**

In our study, higher incidence of severe Dengue was observed in patients with albuminemia <3g/dl. Normal values of albuminemia reflect the integrity of the vascular endothelium, whereas serum albumin levels less than 3 g/dl may be an early indicator of increased vascular permeability. This parameter thus becomes an early indicator of plasma leakage and an important prognostic marker.<sup>9</sup> Many factors, like inflammation, have been observed to affect serum protein markers. <sup>10</sup> Serum proteins are affected by impaired capillary permeability, impaired liver function, drugs and inflammation.<sup>9,10</sup> Serum proteins are also involved in repair and maintenance of our immune system. Albumin is an well established marker of morbidity and mortality.<sup>11,12</sup>

**5. Conclusion**

Hepatic involvement in dengue fever can vary from patient being asymptomatic with only biochemical involvement to severe acute liver cell injury. Low levels of albumin may be a marker severe forms of the disease.

Plasma leakage, signifying that dengue causes hypoalbuminemia, is a marker of severity.

*Funding: No funding sources*

*Conflict of interest: None declared*

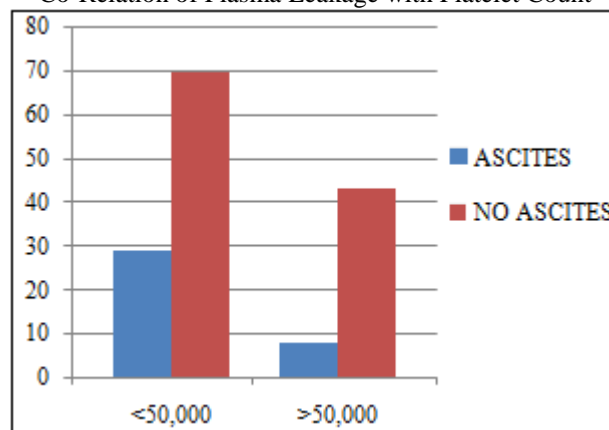
*Ethical approval: The study was approved by the Institutional Ethics Committee*

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Co-Relation of Plasma Leakage with Platelet Count



Age Distribution among Cases

Age	Number	Percentage
<30	72	48%
31-45	46	31%
>60	20	13%
	12	08%

