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**Original Research Article**

# A study of correlation of serum albumin with dengue severity

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## ABSTRACT

**Background:** Dengue viruses are flavivirus, which include four serotypes 1, 2, 3 and 4. Clinical expression of dengue virus infection vary from asymptomatic infection to severe dengue with shock. It is the most rapidly spreading vector borne disease in the world. An estimated 50 million dengue infections occur annually and approximately 2.5 billion people live in dengue endemic countries. The objective of this study was to predict the severity of Dengue illness by correlating the serum albumin levels.
**Methods:** An observational cross-sectional study done on patients admitted in Basaveshwara Medical College and Research Institute, Chitradurga, Karnataka, a tertiary care Hospital. Patients with Dengue NS1 Ag or IgM positive are included in the study after meeting inclusion and exclusion criteria. Complete Blood count, serum albumin levels are estimated at the time of admission.
**Results:** Study enrolled 100 patients with confirmed Dengue virus infection who were admitted to the hospital between July 2017 and December 2018. Serum samples taken within 24 hours of admission was used for biochemical tests. Out of 100 patients, 24 developed Severe Dengue. Cases of Severe Dengue had low levels of serum albumin. Multivariate analysis showed that early alterations of albumin i.e. out of 24 patients who developed severe dengue, 21 patients i.e. 92.7% had low albumin of <3gm/dl
**Conclusions:** Early changes in biochemical parameter, serum albumin can predict Severe Dengue in patients with Dengue febrile illness.

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

## INTRODUCTION

Dengue is the most rapidly spreading mosquito borne viral disease in the world. Incidence has increased 30-fold in the last 50 years with increasing geographic expansion to new countries and, in the present decade, from urban to rural settings. An estimated 50 million dengue infections occur annually and approximately 2.5 billion people live in dengue endemic countries.[1] Dengue fever is an acute febrile disease characterized by fever of 3 to 5 days, headache, retroorbital pain, myalgia, anorexia, rash, nausea and vomiting.

Severe dengue is characterized by thrombocytopenia, spontaneous haemorrhages, and gradual plasma leakage that can lead to shock.[2-4] There have been reports of dengue fever involving heart, nervous system and liver causing myocarditis, encephalitis and hepatitis. Thus, acute dengue infection is often unrecognized until the appearance of the more severe forms of the disease. This variation in clinical presentation leads to inadequate or delay in treatment of a potentially lethal medical condition. Many studies have found relation between severe dengue and albumin levels.[5,6]

## METHODS

An observational cross-sectional analysis of 100 serologically proven dengue patients admitted at

Basaveshwara medical college and research institute, Chitradurga from June 2017 to May 2018.

***Inclusion criteria***

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

***Exclusion criteria***

- Patients with preexisting liver disease
- Alcoholics

***Method of collection of data***

Informed and written consent is obtained from the patient

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

## RESULTS

In this study 100 patients who met with inclusion criteria were enrolled into the study. Statistical analysis was done, and results are presented as follows.

- Age
- Sex
- Platelet count
- Serum albumin

**Table 1: Age distribution among cases.**

| Age in Years | Number | Percentage |
|---|---|---|
| <30 | 48 | 48% |
| 31-45 | 31 | 31% |
| 46-60 | 13 | 13% |
| >60 | 08 | 08% |

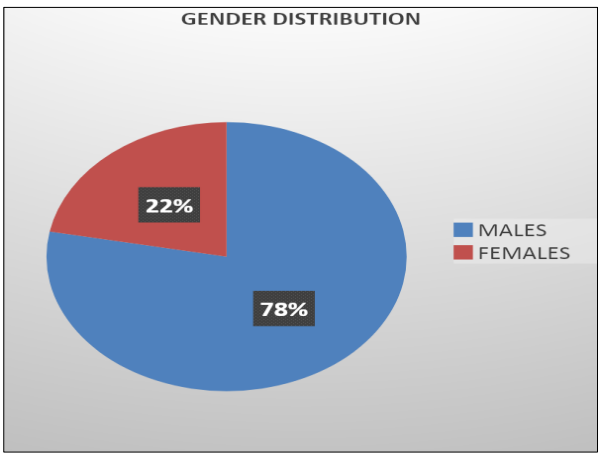


**Figure 1: Gender distribution among cases.**

***Age***

Majority of patients (48%) were in the age group of 18-30 years in our study. Children and elderly people were found to be infected more with dengue infection as compared to young adults in a previous study. While in our study the affected patients were mainly young adults of 18-30 years of age (Table 1).

***Gender***

Majority of patients were males comprising 78% in our study (Figure 1).

***Serum albumin***

Serum albumin was measured in all cases. Out of 100 patients 33 (33%) patients had serum albumin <3gm/dl.

Out of 33 patients with serum albumin of <3gm/dl, 21 (64%) had plasma leakage in the form of Ascites or Pleural effusion whereas 3 (3.9%) patients out of 77 with Serum albumin of >3gm/dl had plasma leakage which was statistically significant.

***Platelet count***

Platelet count was <50,000/mm$^3$ in 66 patients, out of which 19 had Plasma leakage as compared to 5 patients with platelet count >50,000/mm$^3$ (Figure 2).

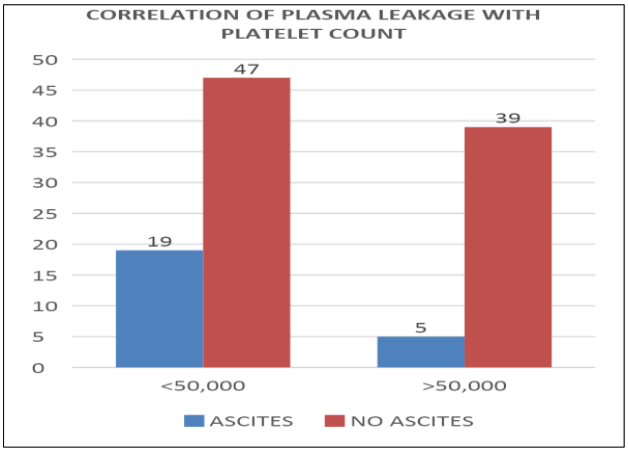


**Figure 2: Capillary leakage with correlation to platelet count.**

## DISCUSSION

In our study, albuminemia <3 g/dl was associated with higher incidence of severe Dengue. Usually high values of albuminemia may reflect the integrity of the vascular endothelium, whereas albumin levels less than 3 g/dl may be an early indicator of vascular permeability alteration. This parameter may be an early indicator of plasma leakage and a useful prognostic marker.[9] Many variables, like inflammation, are known to affect serum protein

markers.[10] Serum proteins are affected by capillary permeability, drugs, impaired liver function and inflammation.[9,10.] Serum proteins are involved in repair and maintenance of immune system along with other body tissues. Albumin is an established indicator of morbidity and mortality.[11,12]

## CONCLUSION

The spectrum of hepatic involvement in dengue fever can vary from asymptomatic biochemical involvement to severe acute liver cell injury. Low albumin levels may be present and may be a marker of the critical phase of the disease.

Plasma leakage, which indicates that dengue causes hypoalbuminemia, is an indicator of severity.

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