



HYPOALBUMINEMIA ON ADMISSION IS ASSOCIATED WITH INCREASED MORTALITY IN HOSPITALIZED PATIENTS PRESENTING WITH SEPSIS

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Article Received on 04/09/2017

Article Revised on 25/09/2017

Article Accepted on 16/10/2017

ABSTRACT

Background: Hypoalbuminemia has been associated with worse clinical outcomes in a variety of conditions including kidney diseases, heart failure, trauma patients and sepsis. This study was carried out to evaluate admission hypoalbuminemia as a predictor of mortality in patients hospitalized with sepsis. **Methods:** All patients admitted with sepsis were enrolled in the study after the inclusion and exclusion criteria were met. Admission and serial albumin levels were done in all patients. Patients were followed and outcomes were measured in terms of patients either discharged or dying during hospital stay. **Results:** A total of 110 patients were enrolled in the study with a mean age of 42 years and a slight male predominance (53.6%). Baseline serum albumin was below the reference range in most of our patients with a mean serum albumin of 3.06 mg/dl. Hypoalbuminemia was associated with a prolonged hospital stay. Patients who died had a mean serum albumin levels significantly lower than those who were discharged.

KEYWORDS: hypoalbuminemia, sepsis, mortality.

INTRODUCTION

Sepsis is among the leading causes of morbidity and mortality worldwide especially in developing countries like Pakistan. Majority of the hospital admissions and more importantly intensive care admissions in developing countries are because of sepsis. The incidence of sepsis worldwide in intensive care units varies between 24% and 50%.^[1] Various mortality prediction models are currently being used to stratify patients into various groups based on the severity of their diseases. These prediction models are mainly practiced in intensive care setups.

Albumin has long been studied as one of the important factors contributing to mortality in patients with a variety of conditions including heart failure, chronic and acute kidney diseases and surgical patients. Reduced dietary intake of proteins, malabsorption, decreased synthesis in liver diseases and renal losses can all lead to hypoalbuminemia. Apart from these chronic conditions albumin levels acutely drop in patients with inflammatory diseases. Inflammation induces anorexia leading to decreased oral intake of essential nutrients, decreases hepatic albumin production, increases leakage

of albumin into interstitial space and increases the catabolic rate all leading acutely to hypoalbuminemia. This was studied in a large cohort of patients who had community acquired bacteremia. Owing to the relatively long half-life of albumin (about 20 days), hypoalbuminemia developing in these patients reflected acute rather than a chronic condition.^[2] Hence hypoalbuminemia has also been labelled as a negative acute phase reactant.^[3]

Since infections and sepsis is a major burden in Pakistani hospitals, we conducted this study to find any association of hypoalbuminemia on the outcome of patients hospitalized due to sepsis so as to stratify high risk patients.

METHODS

This was a prospective descriptive study to evaluate the association of low serum albumin levels on admission and mortality. All patients between the ages of 12 to 75 years with the provisional diagnosis of sepsis were enrolled. Those patients who did not fulfill the criteria for sepsis as elaborated in the table 1 were excluded from the study. All patients had serum albumin levels done on

admission. Serial albumin levels were done on day 3, 6, 14 and 28 days. The last albumin value available before discharge or death was taken to calculate the mean difference in albumin value. All data was analyzed via SPSS version 16. Admission albumin levels and change in albumin levels during the hospital stay were analyzed for any significant association on the duration of stay and mortality during the same admission.

Table 1: sepsis criteria.

1. All patients with a confirmed diagnosis of infection (infective endocarditis, meningitis, encephalitis, pneumonia, cholecystitis, ascending cholangitis, hepatitis, pyelonephritis, cystitis, cellulitis or gastroenteritis etc.) for which the patient is on specific treatment.
2. All patients with a temperature of >100.4F or less than 96F and bacteremia (positive blood culture).
3. All patients with no obvious source of infection but fulfill the following criteria and have been receiving treatment for an infective etiology.
<ul style="list-style-type: none"> • At least two of the following <ol style="list-style-type: none"> a. Temperature of > 100.4F or less than 96 F b. Heart rate of >90/min c. RR > 20/min d. GCS < 15 e. Edema • Plus at least two of the following <ol style="list-style-type: none"> a. TLC of >12000/ul or <4000/ul b. Percentage of Neutrophils > 80% c. ESR > 50 mm/hr d. CRP: positive • Plus at least one of the following <ol style="list-style-type: none"> 1. Systolic BP <90 2. MAP <70 3. P:F < 300 4. Creatinine > 0.5 mg/dl increase 5. INR >1.5 6. APTT > 60 sec 7. Platelets < 100000/ul 8. Bilirubin > 4mg/dl
4. All patients with no obvious source of infection but fulfills any six of the above criteria and have been receiving treatment for an infective etiology.

RESULTS

A total of 110 patients with the admission diagnosis of sepsis were enrolled in the study. 21 (19.1%) of the total patients had marked hypoalbuminemia i.e. less than 2.5 mg/dl, 64 (58.2%) had albumin levels between 2.5 and

3.5 mg/dl while only 25 (22.7%) had albumin values of greater than 3.5 mg/dl. During the hospital stay there was a mean drop in albumin of 1.827 +/- 0.48 with values ranging from -1.20 to +2.0.

Patients with admission albumin levels of <3 gm/dl had a mean duration of hospital stay of 7.8 days while those with admission albumin levels had a mean hospital stay of 5.2 days P value of 0.01 95% CI.

Mean albumin values of patients who died were significantly lower than those who were discharged, 2.87 +/- 0.63 versus 3.13 +/- 0.70 P value of 0.05 95% CI

Table 2: Demographics and general statistics of the study.

Total number of patients	110	
Age range	12 to 75 years (mean age 42.74 +/-14.9)	
Gender	Males	59 (53.6%)
	Females	51 (46.4%)
Albumin range	1.3 – 4.5 mg/dl (mean 3.06 +/- 0.69)	
Albumin less than 3.5 mg/dl	85 (77.3%)	
Albumin changes during admission	Dropped from baseline	56.4%
	No change	24.5%
	increase	19.1%
Duration of stay	Range 1-40 days (mean 6.32 +/- 5.08)	
Mortality	32 (29.1%) died	

DISCUSSION

This prospective study was carried out in hospitalized patients with sepsis. Majority of the patients were young. The mean age of the patients in our study was 42 years with a slight male predominance. Normal albumin values range from 3.5 mg/dl to 5 mg/dl. The mean albumin value in our patients was below the lower limit of normal i.e. 3 mg/dl. 41.8% of the patients had serum albumin of less than 3 mg/dl on admission. In a large cohort of patients with community acquired bacteremia, hypoalbuminemia was documented in almost half of the patients i.e. 48.6%.^[2] In a study by Marotti et al 22% of patients with acute intracerebral hemorrhage had hypoalbuminemia on admission. Furthermore the same study identified admission hypoalbuminemia as an independent risk factor for pneumonia and sepsis.^[4] In paediatric patients with sepsis and septic shock hypoalbuminemia has been found to be much more prevalent than in other populations. In a study by Qian Sy et al the overall rate of hypoalbuminemia in children with sepsis was 72.9%.^[5] Furthermore in the same study 59.4%, 86.2% and 100% of the patients had sepsis, severe sepsis and septic shock respectively. There was no difference in duration of hospital stay with regards to a

positive or a negative change in albumin levels during the stay but admission hypoalbuminemia of less than 3 mg/dl was associated with a significantly increased duration of stay in the hospital. Older studies have found an increase in the length of hospital stay in patients with hypoalbuminemia.^[6] In acutely ill patients it was found that hypoalbuminemia increased the odds of prolonging ICU stay by 28% and hospital stay by 71%.^[7] Similarly admission albumin levels of less than 3 was significantly associated with mortality but a change in albumin levels during the stay was not associated with any mortality. Patients with bacteremia have a relatively high rate of mortality varying from 15% to 30%.^[8] The rates of survival in pediatrics patients with hypoalbuminemia was significantly lower than patients with normal albumin levels. 69.5% as compared to 94.1% of the patients who survived as compared to those who did not had hypoalbuminemia.^[5] In a study on evaluating the prognostic factors in sepsis and septic shock due to community acquired infections, hypoalbuminemia was found to be an independent risk factor associated with global mortality in logistic regression analysis.^[9]

CONCLUSION

Hypoalbuminemia on admission in patients with sepsis is associated with prolonged hospital stay and increased rates of mortality.

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