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ORIGINAL ARTICLE

Evaluating the in-Hospital Mortality Frequency during 30 Days among Patients with Hypoalbunemia admitted in a Tertiary Care Hospital of Karachi

WARDAH ASIF[1], ARJAN KUMAR[2], MUHAMMAD REHAN[3], HARI LAL[4], MUHAMMAD TANVEER ALAM[5], MUHAMMAD ADNAN KANPURWALA[6]
[1]Postgraduate Trainee, Civil Hospital Karachi
[2,3,4]Assistant Professors, [5]Professor, Medicine Dow University of Health Sciences/Civil Hospital Karachi
[6]Professor, Department of Physiology, Karachi Institute of Medical Sciences, Karachi
Correspondence to: Muhammad Adnan Kanpurwala, E-mail: drmuhammadadnank@gmail.com

ABSTRACT

Background: Hypoalbuminemia is a strong predictor for assessing acute and chronic illness conditions. The condition of hypoalbuminemia is associated with the low synthesis of albumin resulting from cachexia and wasting.
Aim: To find out the frequency of 30 Day in-hospital mortality among patients with hypoalbuminemia admitted at a tertiary care hospital of Karachi.
Study design: Cross-sectional study.
Place and duration of study: Data was collected from the Department of Medicine Department, Government Tertiary Care Hospital of Karachi during a period of six months from Feb 2022 to August 2022.
Methodology: One hundred and seven patients who met the investigative criteria were included. A short history was taken and demographic details were recorded after taking informed written consent. 5 ml of blood from a peripheral vein and collected in a specific tube to measure serum albumin level at admission. Patients with serum albumin < 3.5 mg/dl were labelled hypoalbuminemia. Patients were followed throughout the admission, and those expiring within the 30 days of admission were labelled as having 30 Day in-hospital mortality.

Results: The measurements of mean age, height, albumin, and weight were 49.87±12.41 years, 159.00±7.28 cm,1.89±0.33 mg/dl, and 78.7±9.87 kg, respectively. Sixty-five (60.7%) were male, and 42 (39.3%) were female. In this study, we found that the in-hospital death rate was 14%. A significant association was found between in-hospital mortality and gender, age group, diabetes mellitus, hypertension, anemia, smoking status, and family income status.

Conclusion: Hypoalbuminemia is a strong predictor for assessing acute and chronic illness conditions. The plasma albumin levels were reduced during mortality and extended hospital stay. Hence, the measurement of plasma albumin should be considered during the assessment of patients with cardiogenic shock.

Keywords: 30 Day in-hospital mortality, Hypoalbuminemia, Length of hospital stay

INTRODUCTION

Albumin is documented as an acute-phase globular serum protein made by the liver[1]. In addition, albumin is considered as a primary serum-binding protein as it has several vita functions in the bloodstream. One of the significant functions of albumin is to carry various substances, containing hormones and fatty acids. It is also stated that albumin also has anti-thrombotic properties playing a necessary role in regulating of the normal plasma colloid oncotic pressure.[2] The normal half-life of albumin is 15-19 days, which is considered long than plasma albumin as it can be fell off by 10-15 g/L in 3-5 days among diagnostically ill patients[3]. A study further evaluated that albumin is a protein that has key role in transporting small molecules into the blood, along with limiting leakage of fluid from the vasculature into the tissue[4]. The reduced serum albumin level is established to be linked with malnutrition and chronic inflammatory diseases that could be triggered by negative acute-phase protein. In contrast, haemo-concentration is a condition that is found to be associated with a high level of serum albumin[5].

It is further demonstrated that serum albumin is a multifactorial protein that has an essential role in providing neuroprotective effects and other properties.[6] Hypoalbuminemia has been found to be related to bigger short-term mortality, length of hospital stay and complications[7]. It may be an indirect marker of a systemic condition such as malnutrition. Patients having low albumin may have chronic medical or neurological conditions.[8] Managing critically ill patients and those admitted through an emergency is a mammoth responsibility[9]. After admission in the hospital, patients who remain in the ED are expected to have a lengthier length of stay as compared to patients who are immediately transferred to inpatient units[10]. The management depends and varies with the predicted prognosis of each patient[11]. However, estimating the prognosis is not an easy task, and many factors must be considered.[12] When patients arrive at hospitals, then physicians made decisions that whether they are required to be admitted in the hospital or not. However, this process is quite challenging and several factors should be considered when deciding[13]. In this regard, multiple blood tests and several scoring systems based primarily on vital signs have been used[14]. A study by Jellinge et al[14] demonstrated that the rate of mortality within 30 days among patients with hypoalbuminemia was found to be high, which is 16.3%.

The study's rationale is to find the frequency of 30 Day in-hospital demise in patients displaying hypoalbuminemia to determine the possible local risk factors, as there is a lack of native data. Stratifying patients at risk of mortality is of paramount importance. Several scores and lab parameters are available, but most are complicated, requiring calculations, whereas lab parameters can be expensive in our resource-deprived setting. Hence data from this study would provide valuable information on the role of hypoalbuminemia in mortality. Moreover, patients could be screened for this inexpensive lab for risk stratification to prevent adverse outcomes.

MATERIALS AND METHODS

This cross-sectional study was performed at the Department of Medicine, Dr. Ruth K.M Pfua Civil Hospital, Karachi from Feb 2020 to August 2022 after approval of the ethical review committee of the institute. The requisite sample size was 107 patients by taking the prevalence of 30 Day in-hospital mortality to be 16.3%[14] margins of error 7% and confidence level CI 95%. This sample size

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was computed using the WHO software. Patients presenting with hypoalbuminemia within 6 hours of admission of either gender with age between 30 to 80 years were taken in the study. Patients with a pre-existing history of bleeding disorders and haematological malignancies, history of malnutrition, history of hypothyroidism or hyperthyroidism, renal impairment, history of stroke, and chronic obstructive pulmonary disease, asthma and CCF, history of co-infection HIV/Hep B and Pregnant patients evaluated by history and confirmed by dating scan were eliminated from the study. Informed permission was acquired from all the patients to assign them to sample and use their research data. The data regarding demographics and smoking has been collected briefly. The researcher drew a blood sample using a 5cc disposable syringe and was drawn 5 ml of blood from a peripheral vein and collected in a specific tube to measure serum albumin level at admission. The sample was transported to a standardised hospital laboratory by proper labelling, and the investigation was requested. A qualified Biochemist did reporting. The report was collected, and patients with serum albumin <3.5mg/dl were labelled hypoalbuminemia. Patients were followed throughout the admission, and those expiring within the 30 days of admission were labelled as having 30 Day in-hospital mortality. Each participant's height in meters was measured using tape, and the weighing machine measured the weight to the nearest kilogram. The findings of quantitative variables (age, height, weight, and serum albumin) and qualitative variables (gender, hypertension, smoking status, diabetes mellitus type II, anemia, family monthly income status, and 30 Day in-hospital mortality).

The data was entered and analyzed through SPSS-20. Stratification was used to control effect modifiers to evaluate the impact of hypoalbuminemia on 30 Day in-hospital mortality rate. In addition, post-stratification Chi-square was used with a p-value of ≤0.05 as the significance value.

RESULTS

The mean age was 49.87±12.41 years. There were 60.8% male and 39.2% female patients. The mean albumin, height, and weight were 1.89±0.33 mg/dl, 159±7.28 cm and 78.7±9.87 kg. 32.7% were found with diabetes mellitus, 29% with hypertension, and 44.9% with anemia while 37.4% were smokers. The majority of patients (50.5%) were from the upper class. 14% of the patients found to be concurrent with in-hospital mortality (Table 1).

For the patients of age group 30-40 years, 41-50 years, 51-60 years, and 61-80 years, the in-hospital mortality was 0%, 26.7%, 46.7%, and 26.7%, respectively. The in-hospital mortality was 60% and 60.9% among male and female patients, respectively. In-hospital mortality was 26.7%, 46.7%, 40% and 26.7% for diabetic, hypertensive, anemic and smokers. We found insignificant correlation between in-hospital mortality and gender (p=0.580), age group (p=0.590), diabetes mellitus (p=0.410), hypertension (p=0.090), anemia (p=0.450), smoking status (p=0.260) and family income status (p=0.830) as demonstrated in Table 2.

DISCUSSION

It is evaluated that albumin is a major protein component in plasma that is essential for maintaining acid-base function, microvascular permeability, oncotic pressure, and inhibiting platelet aggregation. Additionally, it is demonstrated that the serum albumin is a critical parameter that has an important part in determining the nutritive status of acute as well as chronically ill patients. It is further demonstrated that physicians ‘decision regarding admission of patients in to the hospital is challenging and affected by several factors. With regard to it, various scoring systems based on several blood tests and primary vital signs are developed to guide physicians while making assessment. However, some of these predictions systems are validated and provided unknown clinical implications. On the other hand, it is evaluated that several of these prediction systems have provided a discriminatory results like hypoalbuminemia in the validation cohorts and initial development. It asserts that the low level of serum albumin with other blood tests is a convincing predictor of mortality as a vital sign upon arrival of patients to the hospital. Physicians can get much information from low level of serum albumin and this should be incorporated in the standard tests to examine patients on their arrival to hospital.

Table-1: Descriptive statistics (n=107)

Variable	No. (%)
Gender	
Male	65 (60.8%)
Female	42 (39.2%)
Age (years)	
30 – 40	4 (3.7%)
41-50	21 (19.6%)
51-60	42 (39.3%)
61-80	40 (37.4%)
Albumin (mg/dl)	1.89±0.33
Height (Cm)	158±7.28
Weight (Kg)	78.7±9.87
Diabetes mellitus	
Yes	35 (32.7%)
No	72 (67.3%)
Hypertension	
Yes	31 (29%)
No	76 (71%)
Anemia	
Yes	48 (44.9%)
No	59 (55.1%)
Smoking status	
Smokers	40 (37.4%)
Non-Smokers	67 (62.6%)
Family income status	
Lower	4 (3.7%)
Lower middle	8 (7.5%)
Middle	14 (13%)
Upper middle	27 (25.2%)
Upper	54 (50.5%)
In-Hospital Mortality	
Yes	15 (14%)
No	92 (86%)

Table-2: Relationship between In-Hospital mortality and demographic factors and comorbidities

Variable	In Hospital Mortality		P value
	Yes	No	
Gender			
Male	9 (60%)	56 (60.9%)	0.580
Female	6 (40%)	36 (39.1%)	
Age (years)			
30 – 40	-	4 (4.3%)	0.590
41 - 50	4 (26.7%)	17 (18.5%)	
51 – 60	7 (46.7%)	35 (38%)	
61 - 80	4 (26.7%)	36 (39.1%)	
Diabetes Mellitus			
Yes	4 (26.7%)	31 (33.7%)	0.410
No	11 (73.3%)	61 (66.3%)	
Hypertension			
Yes	7 (46.7%)	24 (26.1%)	0.090
No	8 (53.3%)	68 (73.9%)	
Anemia			
Yes	6 (40%)	42 (45.7%)	0.450
No	9 (60%)	50 (54.3%)	
Smoking Status			
Smokers	4 (26.7%)	36 (39.1%)	0.260
Non-Smokers	11 (73.3%)	56 (60.9%)	
Family income status			
Lower	1 (6.7%)	3 (3.3%)	0.830
Lower Middle	1 (6.75)	7 (7.6%)	
Middle	3 (20%)	11 (12%)	
Upper Middle	4 (26.7%)	23 (25%)	
Upper	6 (40%)	48 (52.2%)	

P value ≤0.05 (Significant)

In the present study, the mean age, weight, height, and albumin were49.87±12.41 years, 78.7±9.87kg, 159±7.28cm, 1.89±0.33 mg/dl, respectively. In our study, 60.7% (6) were male, and 39.3% (42) were female. Furthermore, 14% (15) of patients had in-hospital mortality, while 86% (92) of patients did not show in-hospital mortality. In a study, 5894 patients were included and albumin was found in 5451 (92.5%) patients. In this study, 5.6% (332) patients found dead within 30 days of admission [14]. In addition, crude 30-day mortality rate with low level of albumin was 16.3% and was 4.3% in patients with normal level of albumin with the significance level (p<0.0001). In patients, median plasma albumin was measured as 40g/L. It is demonstrated in this study that patients with low level of albumin were admitted for a longer period as compared to the patients with normal level of albumin and were older patients. On the contrary, patients with high level of albumin had reduced 30-day mortality and were admitted for shorter period, and were younger patients. In this study, multivariable logistic regression analyses exhibited the relationship between hypoalbuminemia and rate of mortality (95% CI: 1.31–2.90). The results showed that the calibration was acceptable and discriminatory power was good (95% CI, 0.70–0.77).

In another cohort study, 30732 patients participated with mean age of 67±18 years and 51% were male. At the time of admission, most of the patients (65%) had normal levels of albumin, 29% patients had mild hypoalbuminemia, and 5% patients marked hypoalbuminemia. In contrast, hyperalbuminemia was found in 6% of the patients at the time of admission. Mean follow-up was 1675±325 days. On admission, the link between in-hospital death and normal level of albumin was 2%, mortality rate was higher among patients with mild hypoalbuminemia which was 12%, and was 34% among patients with marked hypoalbuminemia. However, the mortality was lower in patients with hyperalbuminemia which was 0.3%. Additionally, the rate of mortality was 29% among patients with normal albumin levels, 83% among patients with marked hypoalbuminemia, and 67% among patients with mild hypoalbuminemia at the end of follow-up. These results showed that the on admission and before discharge, patients with hyperalbuminemia have the greatest long- and short-term existence. These results found related in diverse age groups. Furthermore, the normalization of albumin levels at the time of admission found to be associated with short- as well as long-term survival rate among hypoalbuminemic patients compared to the patients with hypoalbuminemia before hospital discharge.[13]

A study showed, hypoalbuminemia found very frequent in 75% of patients with cardiogenic shock at baseline[15]. The outcomes of this study deduced patients with hypoalbuminemia showed high mortality matched to patients with average levels of albumin with the difference of 48% vs. 23% and significance value of p= 0.004. At 90 days, the odds ratio for mortality was 2.4 per 10g/L, which reduces in reference P-Alb. In regression models, the connection of hypoalbuminemia with death rate was adjusted for clinical risk scores with the diagnosis of cardiogenic shock. The levels of albumin reduced at a similar rate between 0h and 72 hrs among non-survivors and survivors with the p value 0.5 in serial measurements. In contrast, the reduced levels of albumin was higher among patients with normal P-Alb at baseline than patients with hypoalbuminemia at baseline with p value <0.001. It asserts that the level of albumin reduction was not correlated with the comorbidities in the patients.

CONCLUSION

Hypoalbuminemia is found to be linked with 30-day mortality amongst patients admitted acutely in hospitals. The level of albumin may reduce due to several factors, including inflammation (malignancy or infectious disease), poor nutritional status, tumor necrosis and interleukin-1 factor. These factors can cause the low release of albumin by the liver. Another factor that may reduce the albumin level include surgery or trauma, burns or renal disease due to albumin loss in the urine, stress that may enhances energy and protein requirements by developing catabolic state, hypermetabolic, and liver disease. It is also demonstrated that patients suffering from hypoalbuminemia are likely to have critical illnesses than patients with high or normal levels of albumin. Thus, physicians should recognize the significance of albumin level association with illness for timely diagnosis and management of critical illnesses. In this regard, strategies are required to be optimized in order to prevent hypoalbuminemia among high-risk populations.

Conflict of interest: Nil

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