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STUDY TO KNOW THE INCIDENCE OF HYPOALBUMINEMIA IN CRITICALLY ILL PATIENTS ADMITTED TO INTENSIVE CARE UNIT

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Abstract:
Objective: Problem of hypoalbuminemia is a commonly found among those patients who are having chronic and acute medical conditions. Level of serum albumin is counted as an essential prognostic indicator. The aim of our study was to determine the frequency of hypoalbuminemia in the admitted patients who are critically ill and whose admission was in tertiary care hospital`s intensive care unit (ICU).
Study Design: Cross sectional study
Place and Duration of Study: This study was conducted at the Department of General Medicine, Mayo Hospital Lahore from January 2020 to July 2020.
Materials and Methods: 178 patients fulfilling inclusion criteria were enrolled in this study. Patients were admitted to ICU. After shifting, blood sample was obtained through staff nurse by using 5cc BD syringe. All samples were sent to the laboratory of the hospital for assessment of albumin level to reach the outcome i.e. hypoalbuminemia. All this information was recorded a proforma.
Results: Mean age of the patients was 50.66 (SD=7.97) years. There were 93(52.25%) male and 85(47.75%) female. Hypoalbuminemia`s frequency in those patients who are critically ill and whose admission was in intensive care unit (ICU) came out to be in 26.79% (48/178) patients.
Conclusion: In conclusion, albumin has major role in severity of disease. Serum albumin measurement during the period of admission to the intensive care unit (ICU) could be utilized as a biomarker in order to facilitate the recognition of group of patients at high risk.
Key Words: *Hypoalbuminemia, critically ill patients, serum albumin*

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INTRODUCTION:

Serum albumin in human is known as the most plentiful protein in his/her blood plasma. Around half of the serum protein is constituted by Albumin. It is monomeric and soluble as well. The range for the concentrations of albumin in serum is about 35 - 50 gram/liter (3.5 - 5.0 gram/dL). [1] Various conditions can be the cause of hypoalbuminemia, i.e. hepatic cirrhosis, nephrotic syndrome, malnutrition and heart failure; although in most of the cases, acute and chronic inflammatory responses are found to be the cause of hypoalbuminemia. Level of serum albumin is counted as an essential prognostic indicator. Lower levels of serum albumin are associated with the greater risk of mortality and morbidity among the patients who are hospitalized. [2]

One study conducted in a regional teaching hospital in Denmark in acutely medical patients admitted to medical unit, the frequency of hypoalbuminemia was reported to be 12.5%. [3] While India reported slightly high frequency of hypoalbuminemia i.e. 21% in the patients who were critically ill and were in ICU. [4] One more study also reported that 82 percent of the patients had the concentration of serum albumin <35 g/L. [5]

Rationale of this study is to reveal the frequency of Hypoalbuminemia in those patients who are critically ill and were in intensive care unit of a tertiary care hospital. Literature has reported ambiguous results. As some reported the frequency of hypoalbuminemia was low while other reported it to be high. But we did not find any local evidence which showed the actual extent in local population. Albumin has major role in severity of disease. So we planned to conduct this study in local population presenting in a tertiary care hospital. This will help us to get local data which will help us to plan the management of such critically ill patients.

MATERIALS AND METHODS:

Inclusion Criteria: Patients of age 30-70 years of either gender, critically ill (as per operational definition) admitted in ICU

Exclusion Criteria:
· Patients with immune deficiency, malabsorption syndrome, celiac disease, protein loosing enteropathy (on medical record and clinical assessment)
· Smoker (>2packs/year) for more than 5 years.
· Decompensate liver disease (ALT>40IU, AST> 40 IU)

· Nephrotic syndrome (already diagnosed case)

178 patients fulfilling inclusion criteria were enrolled in the study from the emergency of Department of Medicine, Mayo Hospital Lahore from January 2020 to July 2020. Informed consent was obtained and demographics of patients (name, age, gender, diagnosis and contact) were noted. Patients were admitted to ICU. After shifting, blood sample was obtained through staff nurse y using 5cc BD syringe. All samples were sent to the laboratory of the hospital for assessment of albumin level. Reports was assessed to hypoalbuminemia was noted (as per operational definition). All this information was recorded on proforma.

Statistical analysis:
Collected data was entered and analyzed using SPSS 22. Quantitative data like age was described by Mean ± S.D, while qualitative data like gender and hypoalbuminemia was described using frequency and percentage. Data was stratified for gender, age, Diagnosis (cause of admission). Chi-square was applied to compare stratified groups taking p-value≤ 0.05 as significant.

RESULTS:

There were 178 patients with critical illness admitted in ICU were recruited in this study. It was observed that most of the cases were between 46 to 60 years of age. Mean age and serum albumin of the patients was 50.66 (SD=7.97) years and 37.85(SD=6.02) as shown in table 1. Gender distribution of the study in Table-2 showed that 93(52.25%) were male and 85(47.75%) female. Regarding diagnosis alcohol intoxication, meningo encephalitis, wound sepsis and malaria were the commonest.

Frequency of hypoalbuminemia in critically ill patients admitted to intensive care unit was observed in 26.79% (48/178 patients).

Rate of hypoalbuminemia was observed among different age groups but there were no significant difference in the rate of hypoalbuminemia as shown in table-3. It was also observed rate of hypoalbuminemia was also not significant between male and female (21.5% cs. 32.9%; p=0.086) as shown in table-4. Frequency of hypoalbuminemia in critically ill patients admitted to intensive care unit with respect to diagnosis was insignificant association with hypoalbuminemia.

Table No.1: Descriptive statistics of study patients n=178

Statistics		Age (Years)	Serum Albumin (gl)
Mean		50.66	37.85
Std. Deviation		7.97	6.02
95% Confidence Interval for Mean	Lower Bound	49.48	36.96
	Upper Bound	51.84	38.75
Median		51	38
Interquartile Range		10	9

Table No.2: Frequency distribution of gender (n=178)

Gender	Frequency n=(140)	Percentage (%)
Male	93	52.25%
Female	85	47.75%
Total	178	100%

Table No.3: Frequency of hypoalbuminemia in critically ill patients admitted to intensive care unit with respect to age groups   n=178

Age Groups (Years)	Hypoalbuminemia		Total
	Yes n=48	No n=130	
30 to 45 Years	8(21.6%)	29(78.4%)	37
46 to 60 Years	30(31.6%)	65(68.4%)	95
> 60 Years	10(21.7%)	36(78.3%)	46

Chi-Square=2.201; p=0.333

Table No.4: Frequency of hypoalbuminemia in critically ill patients admitted to intensive care unit with respect to gender   n=178

Gender	Hypoalbuminemia		Total
	Yes n=48	No n=130	
Male	20(21.5%)	73(78.5%)	93
Female	28(32.9%)	57(67.1%)	85

Chi-Square= 2.95 p=0.086

DISCUSSION:

Albumin is known as an essential molecule in the pathophysiological and physiological conditions, with various impacts, i.e. osmotic pressure regulation; bearer of ineffectively water dissolvable particles, for example, cholesterol, hormones, iron, calcium, bilirubin, medications and free fatty acids; and against oxidant properties and mitigating effects. [2]

Hypoalbuminemia is a regular and early biochemical unhinging in patients who are critically ill [6]. While this critical illness, capillary permeability is increased intensely and adjusts the exchange of albumin in between the compartments i.e. intravascular and extravascular [7]. In this setting hypoalbuminemia in those patients who are adults is an indicator of severity of disease and has been related with dependence of elongated ventilator and duration of stay at ICU [8]. It is additionally an autonomous indicator of mortality and it is related with poor result in patients with critical illness [9,10,11]. In basically sick and with extreme sepsis the metabolic response alters to make extraordinary measures of intense stage proteins. Since albumin isn't an intense stage protein, change of manufactured ability to different proteins is probably going to diminish synthesis of albumin [12,13]. Other likely reason recommended in the causality of hypoalbuminemia in these type of patients is improved vascular penetrability, which would energize a bigger move of albumin to the interstitial space from the vascular [14]. 178 patients were there who were having critical illness and were

admitted in intensive care unit; those patients were selected for this study.

In this research, 52.25% (93) of the patients were counted to be males and rest of 47.75% (85) were females. This male prevalence is also upheld by the literature. Robert AN et al [15] detailed that from the total number of 466 patients, 792 were admitted in the hospital. Proportion of admission for males and females came out to be 60% v. 39.9%. Levels of serum albumin were abnormally low (<35 g/L) and are found to be continuous and timely biochemical disturbance in adults who are critically ill with the indicated frequency of 30% to 40% [6,7,16]. Reinhardt et al [17] indicated that the concentration of serum albumin under 34 g/L was related with a month/30 days mortality of 24.6 percent. In this research occurrence of hypoalbuminemia in patients who are critically ill and are admitted to intensive care unit (ICU) was found in 26.79 percent patients. Mc Cluskey et al [18] reported in their research that out of 348 back to back patients who were critically ill and were admitted to ICU, 29.3 percent of them were having lower concentrations of serum albumin ad the time of admission. Ryan et al [19] revealed that 31 percent of patients who were admitted to ICU after the completion of upper gastrointestinal medical procedure for harm had level of serum albumin less than 20 gram/Ltr. On the primary postoperative day was an autonomous indicator of complications. Amendys-Silva et al in their research detailed that, from 200 admissions of patients in ICU, who were critically ill, 82 percent of them were having the level of serum albumin less than 35 gram/Liter [5].

The hypoalbuminemia is related with expanded inconveniences and more regrettable forecast in numerous populations [20]. The part of the hypoalbuminemia as an indicator of result in the ICU is reflected in its joining as a segment of the APACHE III score [21]. Murray et al. revealed that level of serum albumin was related with lengthy stay at the ICU and so the hospital in the patients who were ill [22]. A meta-analysis of 16 RCTs also suggested that albumin use was associated with a significant reduction in mortality (odds ratio, 0.46; 95% CI, 0.25 to 0.86) and renal impairment (odds ratio, 0.34; 95% CI, 0.15 to 0.75) in patients with cirrhosis and any infection [23]. Efforts to substitute synthetic colloids for albumin as part of perioperative fluid therapy have not been very successful. Hydroxyl-ethyl starch solutions can persist for long durations in the skin, the liver and, most importantly, the kidney [24], Furthermore, in the population of adult trauma, serum albumin level was found to be

lower i.e. less than 2.6 g/dL and they were also found to have essentially longer stay at ICU and the hospital. Delayed ventilatory care and more prominent mortality when coordinated for the severity of injury and age [10]. Most recently, a cost-effectiveness analysis in severe sepsis and septic shock using an advanced Bayesian approach observed life-years gained with albumin relative to crystalloid therapy, and concluded that albumin may be the most cost-effective intravenous solution in this patient population [25].

CONCLUSION:
Hypoalbuminemia was commonly found in the admitted patients in the hospital`s intensive care unit (ICU). In the severity of disease, albumin has main role. Serum albumin`s measurement at the time of admission in the ICU could be utilized as the biomarker clinical in order to facilitate the recognition of high-risk patient groups. Further prospective randomized controlled trials are needed patients who are critically ill in order to evaluate the exact place of albumin in the intensive care unit (ICU).

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