Journal for Re Attach Therapy and Developmental Diversities
eISSN: 2589-7799
2023 August; 6 (9s): 58-65

Hypoalbuminemia on Admission in Covid 19 pandemic in Iraq: An Initial Analyst of Mortality and Adverse Events

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Received: 10-June-2023
Revised: 19-July-2023
Accepted: 03-August-2023

Abstract

Introduction The Covid 19 pandemic is a current universal health emergency. negative acute phase reactant proven an association of hypoalbuminemia with inflammatory in the infectious diseases.

Objectives: The study was conducted to examine the variations of serum albumin levels in Covid 19 patients. A cross-sectional study with total on fixed cases of Covid 19 pandemic in Karbala city in AL-Hussein hospital from 1 June 2021 to 12 September 2021.

Methods: Serum albumin levels, Liver function tests and hematocrit were review to estimate its link with disease evolution in Covid 19 patients. There were fifty-five Covid 19 patients and twenty healthy people in total. When compared to normal healthy persons, the levels of serum albumin, ALT, AST, urea, S. creatine, CRP, and hematocrit in Covid 19 patients were considerably different, and the levels of albumin were even lower.

Results: Lymphocytes showed a reduction. However, the clinical markers of the increase are unremarkable. Extremely common of severe Covid patients showed a significant decrease in albumin value as well as a continuous decrease in infection growth. A positive correlation has been found between albumin and CRP, platelets, and urea levels. ($r = +0.969$, $r = +0.2.06$ and $r= 0.971$ respectively; $P < 0.0001$).
Conclusions: The observation revealed that have lower serum albumin values, While the explanation for this interaction needs to be investigated further, measuring blood albumin levels could be a useful technique for identifying people who are at a greater risk of mortality**.**

Keywords: Covid 19, serum Albumin, hypoalbuminemia, CRP.

1. Introduction

The Covid 19 epidemic has precipitated the worst world health accident in decades. The number of infected individuals has destroyed just about all healthcare systems worldwide with severe Covid 19 illness. Patients with severe diseases who sought treatment in the emergency department due to Covid 19 infectious disease have now been noted to have hypoalbuminemia [1, 2]. Decrease serum albumin values have now found to be a significant indicator of disease development and mortality in hospitalized Covid 19 positive elderly patients [3-5]. Several unique characteristics have been found in severe Covid 19, such as lymphopenia, old age, high C-reactive protein (CRP) level and underlying comorbid diseases [6-7]. Severe Covid 19 patients frequently have significantly lower

albumin levels [8-10]. However, in Covid 19, the change in albumin does not correspond to the severity of hepatocellular injury [9, 11]. This suggests that mechanisms other than hepatocellular injury could explain the severe hypoalbuminemia seen in Covid 19. Another of the potential causes is the severe systemic inflammation seen in severe Covid 19[12] cases [13]. Because increased capillary permeability allows albumin to escape into the interstitial space, hypoalbuminemia is widespread in many inflammatory diseases [14, 15]. Albumin's role mostly in development of Covid 19 is unknown. We hypothesized that serum albumin levels at hospitalization would represent the severity of inflammatory process and thus could be used to predict Covid 19 outcomes [16-19]. To answer this question, we conducted a retrospective study in which we compared the outcome for patients with and without hypoalbuminemia and investigated the role of albumin in the diagnosis of Covid 19.

2. Objectives

The study was conducted to examine the variations of serum albumin levels in Covid 19 patients. A cross-sectional study with total on fixed cases of Covid 19 pandemic in Karbala city in AL-Hussein hospital from 1 June 2021 to 12 September 2021.

3. Methods

Data Collection

At the hospital's triage, clinical and laboratory data were collect. The data was entered into an electronic spreadsheet and then submitted to a health database. Patient socioeconomics (age, sex, home drugs, smoking propensities), comorbidities, early side effects of the sickness, and emergency vitals including fever, blood oxygen (SpO2), systolic and diastolic pressing factor, and pulse, just as a chest X-ray diagnosis of pneumonia, were all collected [20].

SARS-CoV-2 patients were studied in this reflection investigation. Demographic features, laboratory markers were collected. These patients were classified in to SARS-CoV-2 with severe, moderate and mild patients based on Spo2 percentage. All patients with COVID-19 enrolled in this research study were laboratory-confirmed cases with positive results (PCR) detection of COVID-19. A number of reverse transcription polymerase chain reaction (RT-PCR) kits to detect SARS-CoV-2 genetically. This work was conducted in Imam AL-Hussein Medical-City in this period. Inclusion criteria were SARS-COV-2 patients admitted to hospitals that were diagnosed by PCR and/or clinically, those included both severe and moderate cases. This reflective study was agreed by Ethics was obtained from Karbala Health Directorate. In addition, an approval was taken from the patients and /or their parents before taking the sample.

A meta data type of study a Cross-sectional and data collection of the medicated all of the records SARS-COV-2 patients with positive SARS-COV-2 real-time RT-PCR results. The demographic data, laboratory analysis during hospitalization were collected. All data were checked by groups of highly qualified doctors.

Albumin measurement

Albumin was measured by BCG (Bromocresol Green) Albumin Assay Kit. Sigma-Aldrich US; normal values are 35-47 g/L. Multiwall plate assay uses samples as small as 5 mL and can be readily automated as a high-throughput assay for samples per day. The procedure involves addition of a single working reagent and a 5-minute incubation. The optimized formulation has greatly enhanced reagent and signal stability. The kit utilizes bromocresol green, which forms a colored complex specifically with albumin. The intensity of the color, measured at 620 nm, is directly proportional to the albumin concentration in the sample.

4. Results

The data in Table 1 represented Mean ± SE Lab. results finding of the Coronavirus Disease 2019 Patients.

On admission, biochemical tests (Table 1) revealed significant differences ($P \leq 0.05$) in mean Albumin throughout Coronavirus Disease compared to the healthy group. Furthermore, the table mentions a significant difference decrease ($P \leq 0.05$ALT and CRP levels in Coronavirus Disease patients were lower than in the healthy group.

Table 1. Laboratory mean patient test

Parameter	Groups n	Mean± SE	P. value
Albumin g/l	Normal(20)	48.22±11.91	0.05
	Moderate(27)	*27.85±5.4	
	Severity(28)	*28.22±5.31	
ALT u/l	Normal(20)	25.53±10.01	0.005
	Moderate(27)	*57.83±32.46	
	Severity(28)	*65.64±59.41	
AST u/l	Normal(20)	21.97±8.27	1.04
	Moderate(27)	47.88±15.62	
	Severity(28)	55.26±18.96	
S. creatine mg/dl	Normal(20)	0.97±0.39	0.835
	Moderate(27)	1.08±0.77	
	Severity(28)	1.01±0.71	
urea mg/dl	Normal(20)	22.69	7.24
	Moderate(27)	55.98	
	Severity(28)	60.53	
CRP mg/l	Normal(20)	0.96	0.04
	Moderate(27)	* 1.78	
	Severity(28)	* 1.002	

ALT (Alanine Aminotransferase), AST (Aspartate Aminotransferase), and CRP (C-Reactive Protein) are abbreviations for the enzymes ALT (Alanine Aminotransferase), AST (Aspartate Aminotransferase), and CRP (C-Reactive Protein).

Seventy-three patients diagnosed with corroborated Covid 19 were evaluated with a 30-day follow-up. Because of pre-existing kidney disease, twenty subjects were excluded from the study. Table 1 summarizes the character traits of the patients who participated in the study. Serum albumin levels <27.85±5.4 g/L were found in Moderate patients and 28.22±5.31 Severity patients at hospital admission.

Figures 1–3 The Spearman coefficient correlation revealed a significant positive correlation between albumin and both CRP, platelets, and urea levels at hospital correlation. (r = +0.969, r = +0.2.06 and r= 0.971 respectively; P < 0.0001).

Figure 4,5,6 A positive relationship was discovered between albumin levels and both Alanine Aminotransferase. Aspartate Aminotransferase and serum creatine (r=0.897, r=0.940, and r=0.854 respectively; P < 0.0001).

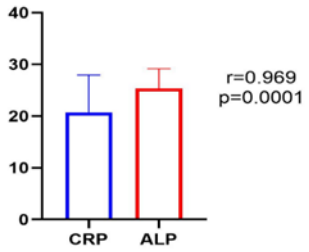

Fig. (1) Mutuality amongst serum Albumin and CRP in Coronavirus Disease19 Patients (n=55), r =0.969, $p < 0.0001$

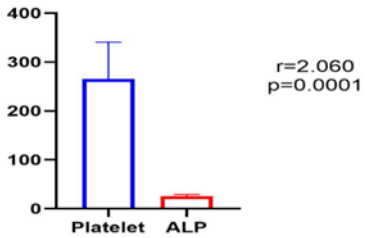

Fig. (3) Mutuality amongst serum Albumin and Urea in Coronavirus Disease19 Patients (n=55), r = 0.971, $p < 0.0001$

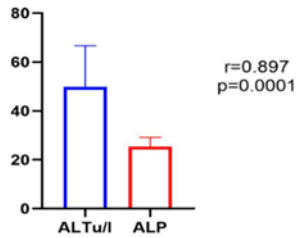

Fig. (2) Mutuality amongst serum Albumin and platelets in Coronavirus Disease19 Patients (n=55), r = 2.060, $p < 0.0001$

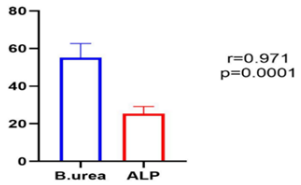

Fig. (4) Mutuality amongst serum Albumin and Alanine Aminotransferase in Coronavirus Disease19 Patients (n=55), R^2 = 0.897 , $p < 0.0001$

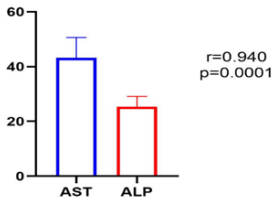

Fig. (5) Mutuality amongst serum Albumin and Aspartate Aminotransferase in Coronavirus Disease19 Patients (n=53), r = 0.940 , p

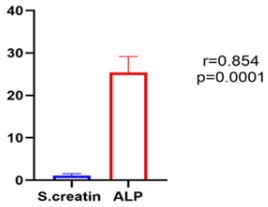

Fig. (6) Mutuality amongst serum Albumin and serum creatine in Coronavirus Disease19 Patients (n=55), r = 0.854, $p < 0.0001$

Table 2 shows the mean SE assessment of haematological in Coronavirus Disease 2019 patients who participated in the study.

parameter	Groups N	Mean± SE	p.v
WBC 10^9/L	Normal(20)	7.8±2.73	0.01
	Moderate(27)	*16.07±6.02	
	Severity(28)	*15.93±4.55	
	Total(75)	13.81±5.96	
Neutrophil %	Normal(20)	41.60%±0.26	0.208
	Moderate(27)	81.50%±0.41	
	Severity(28)	83.20%±0.33	
	Total(75)	68.76%±0.35	

Lymph.%	Normal(20)	23.40%±	0.209
	Moderate(27)	8.60%±0.01	
	Severity(28)	9.30%±0.03	
	Total(75)	13.76%±0.02	
Hemoglobin	Normal(20)	13.5±2.1	1.2.
	Moderate(27)	12.65±3.5	
	Severity(28)	12.94±2.36	
	Total(75)	12.8±71.85	
Platelet	Normal(20)	265.35±96.72	0.133
	Moderate(27)	236.04±105.91	
	Severity(28)	208.5±83.75	
	Total(75)	233.57±97.03	

Abbreviations: N(Number), WBC (White Blood Cell), Mean± SE (mean Standard error), p.v (p-value)

The statistical analysis revealed a significant (P≤0.05)) increase in the mean of WBC and Neutrophil in Coronavirus Disease when compared to the healthy group. Furthermore, the table indicates a significant decrease (P≤0.05) in Lymphocyte in Coronavirus patients compared to the healthy group.

5. Discussion

Several papers have described hypoalbuminemia in Covid 19 patients. The underlying mechanisms, but, have yet to be determined. the report on the predominance of hypoalbuminemia in a gathering of 207 Covid 19 patients and its association to sickness seriousness and clinical visualization. As recently showed [5,21,22]. Low degrees of serum albumin at confirmation is strictly linked to illness severity and death. Furthermore, we discovered a link between albumin levels and the inflammatory marker CRP. The reduced serum albumin of Covid 19 patients could be due to a variety of pathologic causes (a) Transcapillary leakage: As found in intense respiratory distress syndrome (ARDS) and sepsis, the physiological transcapillary get away from the pace of albumin might increment by a few overlap under inflammatory circumstances, maybe driven by interleukin-2, interferon-, and interleukin-6. Albumin spillage into the pulmonary interstitium occurs when endothelial integrity is disrupted, and the protein content rises from less than 40% to more than 60% of the plasma value. As a result, many critically ill individuals' serum albumin concentrations drop [23,8]. Sepsis is associated with a disruption of the glomerular basement membrane, which indicates increased albumin penetrability and spillage into the urine in addition to pulmonary sequestration [24], (c) Histopathological analysis of kidney autopsy specimens exposed tubular necrosis, vacuole degeneration, and luminal brush border loss, which could be prompt to some extent by SARS-direct CoV-2's cytopathic effect.

In this study, we discovered that depression albumin values on admission can predict Coronavirus disease 19 results independently of other known indicators such as lymphocyte count 3. This finding is under a prior study that found that hypoalbuminemia, or a decrease in albumin, is a link to the severity of ARDS, or severe renal damage. According to a meta-analysis, roughly 80.4 percent of Covid 19 patients with impaired liver function had hypoalbuminemia, which was associated with prognosis and outcome. The causes of hypoalbuminemia in Covid 19 have still not been thoroughly investigated or characterized. Hypoalbuminemia was found more frequently in severe Covid 19 patients than in moderate cases in a previous study12 and the current study. Because serum albumin has a much shorter half-life, hypoalbuminemia in severe Covid 19 is less possible to be the result of

impaired albumin production. There was no significant association between albumin levels and inflammatory markers in this investigation (CRP, WBC). Systemic infection is frequent in severe Coronavirus Disease [25,11]. Increased capillary permeability caused by inflammation has been found to allow serum albumin to escape into the interstitial space, resulting in increased albumin volume distribution [15]. As a result, our findings powerfully suggest that hypoalbuminemia in Coronavirus Disease19 is caused by systemic infection. We just showed the predictive value of baseline albumin level for Covid 19 illness outcome; but, changes in albumin levels through the span of the illness were not captured inside our data set, and whether dynamic variations in albumin value tend to be more predictive of death remains uncertain [9]. Our findings revealed no increase in the liver function indicators AST and ALT, corroborating prior findings that hypoalbuminemia in Coronavirus Disease 2019 Patients is unrelated to liver disease [15]. As a result, identifying relatively little serum albumin values in hospitalized Covid 19 patients may aid in risk classification and the selection of appropriate care options, even when age is a confounding factor. In conclusion, test albumin values in Coronavirus Disease 2019 Patients with high disease severity or poor results reflect a negative correlation between IL-6 and serum albumin, agreeing to our systematic review and meta-analysis. According to Huang et al [4]. A systemic inflammation condition might be the reason for Covid 19 hypoalbuminemia [26-27]. Inflammation has long stayed thought to be the cause of serum albumin extravasation into the interstitial space because of improved albumin volume distribution and capillary permeability [15]. Still, it is equally crucial to note that serum albumin values in both sexes be likely to decline with age [28]. As a result, differences in albumin values between groups may be partly explained by the developed illness severity and desperately poor results seen in older people. Even though more studies into the link between albumin and Covid 19 disease results are needed, the discovery of serum albumin as a measure of Covid 19 severity is physiologically and therapeutically significant. Through simple and relatively cost analytical processes, serum albumin values, a reasonably steady quantity that is highly related to key functional and health parameters, could provide quick and relevant information about an individual's overall homeostatic capacity. When compared to those with a milder form of the condition, are significantly lower. The variation between studies is influenced by age, location, and inflammatory status. More research is needed to determine whether albumin testing can efficaciously enable physicians to detect patients at increased risk of poor outcomes and whether this indicator can also be used to estimate response to therapy at an early stage [29].

Acknowledgement

Authors like to thanks Health authority in Karbala State, Iraq

Conflicts of interest

The authors declare no conflict of interest

Funding

The work is not funded

Author contribution: Wasim contributed to the methodology and writing the original draft; Hayder & Hussein contributed to data collection; Abdul Amir & Ahmed contributed to editing the manuscript.

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