Comparison of prognostic indicator of acute Pancreatitis Ranson's Scorewith serum albumin

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Abstract

Background: Although RANSON score is the most commonly used prognostic model in the severity of acute pancreatitis, serum albumin has been reported as a novel biomarker of various ischemia-based diseases in recent years.Serum albumin decreases in patients with inflammation and infection.

However, their role in patients with acute pancreatitis is not clear.The aim of the present study was to investigate the correlation between RANSON score and serum albumin in patients with acute pancreatitis.

Objectives: To compare the effectiveness of serum albumin as prognostic indicator in patients with acute pancreatitis with a known predictor, Ran son score.

Methods:A prospective clinical study among 145 adults' patients attending a tertiary care Centre with acute pancreatitis. Patients will be observed from the date of admission to date of discharge and will be reviewed till 6th week. Clinical History and physical examination were taken. Serum albumin was measured at the time of admission after 48 hours and fifth day along with other parameters. Statistical analysis is done using multivariate logistic regression analysis and area under ROC will be used to explain the role of serum

albuminas an independent prognostic marker in comparison with RANSON's score.

Results: One forty-five studied subjects with acute pancreatitis 57.2% were relieved, and others were suffering from various levels of complication including 4.8% deaths in 6 weeks' time. The correlation between outcome and serum albumin at 48 hours shows a rho of -0.643 (CI -0.732, -0.533) with a p-value of <0.001. The correlation of serum albumin at day five with outcome shows a rho of -0.748 (CI -0.814, -0.664) with a significance of <0.001. Conclusions: According to the results from the study, serum albumin at 48 hours and dayfive of onset of acute pancreatitis has got significant negative correlation with outcome (prognosis). So, serum albumin can be consider as a prognosis indicator of acute pancreatitis.

Keywords: Pancreatitis, Acute pancreatitis, Biomarkers

Introduction

The course of acute pancreatitis (AP) varies widely in clinical presentation and severity. In most patients, the disease course is mild and self-resolving, but severe necrosis with organ failure occurs in about 20% of patients, and the mortality rate is as high as 10-50%.(1)AP is a very complex disease, and despite the existence of multiple criteria, its progression is not easy to predict.

Severe acute pancreatitis (SAP) is the most severe form of the disease and is associated with high morbidity and mortality. SAP is promoting a two-stage course. During the first 1-2 weeks, the pro-inflammatory response leads to systemic inflammatory response syndrome (SIRS). When SIRS is severe, it can lead to early multisystem organ failure (MOF). After the first 1-2 weeks, a transition from a pro-inflammatory to an anti-inflammatory response occurs; during this transition,

patients are at risk of gut microbiota translocation and the development of secondary infection in necrotic tissue, which can lead to sepsis and advanced MOF.(2)To date, many uniparameter and multiparameter indicators have been reported to predict the severity of AP.Ranson developed an AP severity grading system based on clinical and biochemical findings.(3)Serum albumin decreases in patients with inflammation and infection. However, their role in patients with acute pancreatitis is not clear.(4)

Although RANSON score is the most commonly used prognostic model in the severity of acute pancreatitis, serum albumin has been reported as a novel biomarker of various ischemia-based diseases in recent years.(5)We performed this study tocompare the effectiveness of serum albumin as prognostic indicator with a known predictor, RANSON score.

Materials and methods

One forty-five adult patients diagnosed with AP between September2020 and December 2022 were included in this prospective clinical study. Patients with chronic pancreatitis, chronic kidney diseases, chronic liver diseases, trauma, burns, malignancy, on albumin infusion,pancreatic calculus, and patients aged < 18 years were excluded from the study. The following criteria are used to diagnose AP: acute onset of abdominal pain, typical physical examination findings, at least a tripling of plasma amylase levels, and ultrasonographic and/or tomographic evidence of AP.

Statistical analysis were done by using IBM SPSSStatistics 28. DiseaseSeverity was analysed using Spearman's correlation coefficient. Correlation of serum albumin with prognosis of acute pancreatitis compared with Ranson Score and prognosis. If there are no repeated data values, a perfect Spearman correlation of

+1 or −1 occurs when each of the variables is a perfect monotone function of the other. Intuitively, the Spearman correlation between two variables will be high when observations have a similar (or identical for a correlation of 1) rank (i.e., relative position label of the observations within the variable: 1st, 2nd, 3rd, etc.) between the two variables, and low when observations have a dissimilar (or fully opposed for a correlation of −1) rank between the two variables. A p-value <0.05 was considered statistically significant.

Results

Gender distribution of study participants
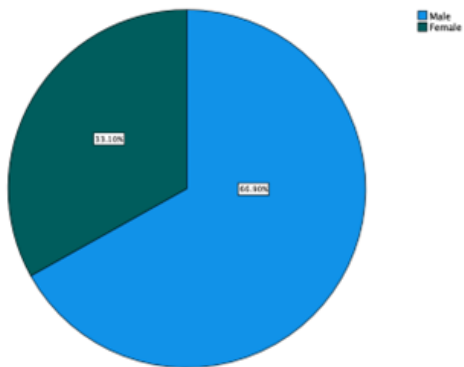
Out of the 145 study subjects 66.9% (97) were females and 33.1% (48) were males

Serum albumin level at various stages

Table 1: Serum Albumin level at various stages

Serum albumin	At the time of admission		48 hours		At 5 days	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
<3gm/dL	64	44.1	75	51.7	66	45.5
>3gm/dL	81	55.9	70	48.3	79	54.5
Total	145	100	145	100	145	100

Ran son score at various stages

Table 2: RANSON Score at various stages

Ran son score	At the time of admission		48 hours	
	Frequency	Percent	Frequency	Percent
<3	121	83.4	109	75.2
> = 3	24	16.6	36	24.8
Total	145	100	145	100

Outcome of acute pancreatitis at 6 weeks

Table 3: Outcome of acute pancreatitis at 6 weeks

Outcome	Frequency	Percent
Relieved	83	57.2
Persistent organ failure	26	17.9
Local complications	13	9.0

Persistent organ failure & Local complications	16	11.0
Death	7	4.8
Total	145	100

Correlation of outcome with serum albumin and ran son score at 48 hours

Table 4: Correlation of outcome with serum albumin and Ranson score at 48 hours

			Outcome	S albumin at 48 hrs	Ran son score at 48 hrs
Spearman's rho	Outcome	CorrelationCoefficient	1.00	-0.643**	0.751**
		Sig. (2-tailed)	-	<.001	<0.001
		N	145	145	145
	S albumin at 48 HRS	Correlation Coefficient	-.643**	1.00	-0.459**
		Sig. (2-tailed)	<0.001	-	<0.001
		N	145	145	145
	Ranson score at 48 hrs	Correlation Coefficient	0.751**	-0.459**	1.00
		Sig. (2-tailed)	<0.001	<0.001	-
		N	145	145	145

**Correlation is significant at the 0.01 level (2-tailed)

From the above result, correlation between outcome and serum albumin at 48 hours shows a rho of -0.643(CI -0.732, -0.533) with a p-value of <0.001 indicate that there is a negative correlation between the level serum albumin and the undesired outcome from acute pancreatitis, which is statistically significant. The correlation of Ranson score with outcome shows a rho of 0.751(CI 0.648, 0.842) with a significance of <0.001, indicate a positive correlation with Ranson score and undesired outcome from acute pancreatitis, which is statistically significant.

Confidence interval of spearman's rho

Table 5: Confidence Interval of Spearman's Rho

	Spearman's rho	Significance (2-tailed)	95% confidence intervals (2 tailed)	
			Lower	Upper
Outcome-S Albumin at 48 hrs	-0.643	<0.001	-0.732	-0.533
Outcome Ran son at 48 hrs	0.751	<0.001	0.668	0.842
S Albumin at 48 hrs- Ran son score at 48 hrs	-0.459	<0.001	-0.582	-0.316

a. Estimation is based on Fisher's r-to-z transformation

b. Estimation of standard error based on formula proposed by Fieller, Hartley

Correlation serum albumin at 5 days and outcome

Table 6: correlation serum albumin at 5 days and outcome.

			Outcome	S albumin at 5 days
Spearman's rho	Outcome	Correlation Coefficient	1.00	-0.748
		Sig. (2-tailed)	-	<.001
		N	145	145
	S albumin at 5 days	Correlation Coefficient	-0.748	1.00
		Sig. (2-tailed)	<0.001	-
		N	145	145

The correlation of serum albumin with outcome shows a rho of -0.748 (CI -0.814, -0.664) with a significance of <0.001, indicate a negative correlation with serum albumin and the undesired outcome from acute pancreatitis, which is statistically significant.

Discussion

Despite recent advances, diagnostic algorithms remain critical care conditions and other treatments, Acute pancreatitis remains as a dangerous disease with a mortality rate of 10-20%. Because of its high morbidity and mortality in AP, many scoring systems, laboratory tests and radiological methods are recommended to evaluate the clinical course of the disease. Some of these grading systems include Ran son, Bedside SeverityAP Index (BISAP).

Low serum albumin levels have been noted during the course of many diseases, including cancer, infection, inflammation.(6) According to studies of low serum albumin in these diseases, abnormal albumin metabolism caused by inflammatory response may be an important reason, in addition to low albumin absorption.(7)The mechanism is not clear, but inflammatory cytokines such as IL-6 may play an important role.(8)Again, this phenomenon was also found in AP, especially in patients with severe acute pancreatitis. The mechanism is more complicated and is still not very clear. The following are suggested explanations; a) reactions during the SAP process, including infection, leading to insulin resistance and ultimately to metabolic disturbances, resulting in a stronger breakdown of albumin due to a lower rate of consumption of glucose and fat, b) hepatic biosynthesis of albumin weakens during stress response, and c) increased vascular permeability allows albumin to enter the interstitial space.(1,9)Since Ranson's first contribution in 1974, various forecasting systems have

been developed over the past decade. There are three problems with these studies. First, different endpoints and ambiguous descriptions of severe pancreatitis were used. For example, Meek et al.(10)

A retrospective analysis of data from more than 20,000 emergency department patients in Ireland found that hypoalbuminemia was independently associated with 30-day in-hospital mortality and that mortality was non-linearly related to albumin levels on admission.(11) In this study also shows a positive correlation with serum albumin and outcome at 48 hours (rho -0.643, and significance of <0.001) and at five days (rho -0.748, and significance of <0.001). Serum albumin levels undoubtedly decrease under inflammatory conditions, probably due to albumin dilution due to the shorter half-life and larger interstitial pool.(12)

Conclusion

Hypoalbuminemia was very common in AP and was an independent risk factor for severity and mortality. Importantly, albumin loss during hospitalization was also associated with severity and mortality, suggesting that routine monitoring of serum albumin is recommended and that albumin administration should be studied as a therapeutic intervention for AP.

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